The sociolinguistic dimension of CLIL: applying SFL, the socio-cultural theory and the principles of visual literacy on designing a CLIL project to teach Astronomy to EFL students

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Introduction

Content and Language Integrated Learning, known as CLIL, is a rapidly-growing trend in second/foreign language teaching and learning in Europe nowadays. CLIL shares a strong affinity with the immersion programs applied in Canada and, therefore, CLIL, roughly, relates to bilingualism (Eurydice, 2006). Its European context, however, has revealed another dimension of it, other than its innate bilingual nature: CLIL has developed into a dynamic second/foreign language teaching methodology which could be used to promote plurilingualism, according to the Council of Europe framework of language teaching and learning (Coste et al., 2009). CLIL is teaching non-linguistic curricular content in a second or foreign language (L2), one different from the learners' mother tongue (L1) (Eurydice, 2006). The target language (L2) is the medium for content, such as biology, history, RE, mathematics, science, to be taught to native speakers of an L1. In this chapter, we are going to suggest the design and implementation of a CLIL model to be incorporated in the EFL class. The model has to do with the generation of educational material to teach Astronomy in English to 13 to 15-year-old learners (lower secondary) with a linguistic competence level that ranges from A1 to B1+ in the CEFR. The model applies the principles of Halliday's Systemic Functional Linguistics (SFL) (Eggins, S., 2004), these of Vygotsky's socio-cultural theory (John-Steiner & Mahn, 1996, Llinares et al., 2012) and the principles of the grammar of visual design (Kress & van Leeuwen, 2006) towards the production of a linguistic tool compatible with the core philosophy of CLIL.

The historical background and philosophical framework of CLIL

a. Bilingualism

Getting into the process of outlining the essence of CLIL in rough lines, we could say that CLIL, in broad terms, relates to bilingualism. Bilingualism could also serve as a useful starting point in order for us to understand how the idea of CLIL, in the European teaching contexts, emerged. There are many factors that favour bilingualism. These can be economic ones (e.g. migration), geographical ones (e.g. neighbouring countries), historical/political ones (e.g. population exchange) or cultural ones. It is also true that bilingualism is not the only case of linguistic diversity within a country, since certain countries are multilingual. Bilingualism is about a dominant language and a non-dominant (minority) language (Hall, et al., 2011). Of these two poles, the former exercises power over the latter, due to numerical, political and economic supremacy (Grosjean, 2001). To avoid political and social conflict and friction, bilingual countries foster a status of linguistic equality between the two languages, so that both languages can share an official status, a condition that is reflected to education, the public sector or foreign policy. Examples of such countries are Belgium, Canada or Switzerland. Education and schooling are fields where both bilingual and multilingual conditions can collide and may cause high tension among the stakeholders. We can distinguish the so-called bilingual education into submersion education, in which there is no respect for the minority language and its speakers are placed in classes with proficient native speakers of the dominant language (Hall, et al., 2011). In addition, we can have transitional bilingual education programmes, in which there is a temporary use of the students’ L1, which is the non-dominant language, to bridge the academic gap between them and the native speakers of the dominant language (ibid). There are also
maintenance bilingual education programmes, aimed mainly to immigrant students, where there is an effort of ‘upkeep of the non-dominant language’ (Hall, et al., 2011, p.183), within the educational framework of the dominant language. An important parameter of bilingual education is the immersion bilingual education programmes, applied in Canada, in which ‘learners are immersed in the second language’ (Hall, et al., 2011, p.184), through being taught content in it (ibid).

‘Studies of programmes following this well-documented and influential model suggest that children from a majority language background can develop content knowledge (history, science, mathematics, etc.) in a second language to a degree comparable or superior to peers schooled exclusively in their L1, and that they do so without apparent cost to academic development in the majority language’. (Hall, et al., 2011, p.184).

In Europe, a similar programme, which complies with the European Commission guidelines on linguistic competence in at least three languages, the students’ mother tongue and two additional languages (Sheils, n.d), has emerged. This programme is Content and Language Integrated Learning (CLIL). Other bilingual education programmes entail community language teaching and heritage language programmes (Hall, et al., 2011).

b. From multilingualism to plurilingualism

Bilingualism is not the case in the European Union (EU) as a whole. The Council of Europe, the official body for designing and disseminating language policy in the EU, has recognized the linguistic diversity within the Union (Council of Europe, n.d). This condition is actually the recognition of the EU being multilingual and this, in turn, has led to the solid belief that all languages spoken within the Union are respected and given equal socio-cultural status (Eurydice, 2006). Part of the European Union language policy has been the development of a framework for preparing linguistic material and assessing linguistic competence, during the process of language learning across the Union, the well-known Common European Framework for Languages (CEFR). Within the philosophy of the CEFR, there lies the belief that language knowledge and linguistic competence are fundamental among the members of the Union, because they facilitate mobility for academic, professional and social purposes, they enhance intercultural communication and access to information and they promote language learning as a life-long process (Council of Europe, n.d). These elements take language learning beyond the basic recognition that member states share a multilingual home. There is now a shift from multilingualism - the command of two or more languages - to plurilingualism. In being plurilingual, the individual is viewed as a social actor who ‘has proficiency, of varying degrees, in several languages and experience of several cultures’ (Coste, et al., 2009, p.11). The notion of plurilingualism, therefore,

‘emphasises the fact that as an individual person’s experience of language in its cultural contexts expands, from the language of the home to that of society at large and then to the languages of other peoples (whether learnt at school or college, or by direct experience), he or she does not keep these languages and cultures in strictly separated mental compartments, but rather builds up a communicative competence to which all knowledge and experience of language contributes and in which languages interrelate and interact’. (Council of Europe, n.d, p.4)

An immediate inference made out of these statements is that plurilingualism has to do with an individual’s ability to act and interact in a specific social context, using language as a medium of social (inter)communication, and, at the same time, they would allow themselves to negotiate their own social knowledge with other cultures, in different contexts. Plurilingualism is not only about linguistic competence; it entails investment on social inheritance and experience and how they can be negotiated among interlocutors, who are challenged to make certain linguistic, as well as cultural, choices, to carry out communicative tasks. Plurilingualism, thus, entails pluriculturalism (Coste, et al., 2009).
c. **Key competences for lifelong learning**

The recognition of the European Union being multilingual – a condition that has to do with both the official languages of the member states and the minority languages that European citizens may use in their everyday communication –, as well as of the latest tendency to develop one’s plurilingual skills has led the European Parliament and the Council of Europe to the generation of a Reference Framework of Key Competences for lifelong learning (Official Journal of the European Union, 2006). The Framework also emerged out of the need to prevent social, educational and professional exclusion and isolation of certain disadvantaged groups within the Union, as well as a front against the challenges of globalization, which requires flexibility on the part of the citizens (Official Journal of the European Union, 2006). The Framework includes eight (8) competences:

1) Communication in the mother tongue
2) Communication in foreign languages
3) Mathematical competence and basic competences in science and technology
4) Digital competence
5) Learning to learn
6) Social and civic competences
7) Sense of initiative and entrepreneurship
8) Cultural awareness and expression

A CLIL lesson can serve as a platform where all of the eight competences can find fertile soil to grow. Because CLIL is ‘a dual-focused educational approach’ (Marsh, D. et al. (n.d), p.11), combining language teaching with non-linguistic content teaching, learners, as well as teachers, are challenged to use different competences and skills to deal with both the requirements of the methodology as such and the aspects of the teaching components.

**Designing a CLIL lesson for the lower secondary EFL classroom**

a. **The CLIL context in Greek schools**

CLIL is non-existent in Greek state schools, both primary and secondary. Greece is a monolingual country (Greek), therefore there is not an official second language to be taught at schools. Teaching an L2 in Greek schools has to do with foreign language teaching (English [compulsory], French and German [selective]). In practice, foreign language teaching, in general, is quite underestimated in the Greek educational system, despite the very important and innovative initiatives that have been taken up by the University of Athens and the University of Thessaloniki recently. Therefore, initiatives on applying CLIL, or other innovative methodologies, are single initiatives, very sporadic ones, and they always have to do with a single foreign language teacher’s decision to enhance their teaching and attach a different dimension to it. Fortunately, taking up such initiatives is not restricted by educational officials, but rather encouraged, with the foreign language teachers to enjoy a degree of autonomy. To my knowledge, CLIL lessons in Greek schools, where applicable, are carried out in English.

b. **Designing a CLIL Astronomy lesson**

Two years ago, I took up the initiative of introducing CLIL in my EFL teaching. Through my readings, I came across the CLIL methodology and I decided to, experimentally, add it to my mainstream EFL teaching. I have not stopped studying and researching about CLIL ever since. I chose to teach Astronomy in English and, since there was not any teaching material to start with, I decided to design my own teaching material. The reasons why I chose Astronomy could be summarized thus: first of all, Astronomy is a fascinating subject and, to my view, most of us share a great interest in what happens ‘out there’. The space, the sky, our galaxy, the birth of the universe are issues which are fascinating not only to scientists, but to all of us. Secondly, Astronomy is part of the curriculum: the students in Greek schools are taught basic Astronomy as a part of their physics classes. Thirdly, there is much of what I would call ‘social knowledge’ about it among us: we talk about the outer space in many instances in our everyday interactions, we are thrilled by space films, documentaries, space missions, we very often look up to the sky,
wonder what is there and make up stories. Fourthly, Astronomy seemed a subject which, to my understanding and anticipations, could very effectively support the 4Cs CLIL Framework (Coyle, D., 2005), explained below. Lastly, Astronomy seemed to provide me with lots of input which was compatible with the socio-linguistic model that I had in mind to develop throughout my teaching material and approach.

c. The 4Cs CLIL framework

Do Coyle (2005) has developed a cohesive, conceptual tool of the CLIL standards and has explained how they interrelate to co-construct a CLIL class. Below we can check what the Framework could look like and what its components are.

![Fig. 1 The 4Cs CLIL Framework](image)

The first C stands for **content** (subject, themes, cross-curricular approaches). **Content** does not only refer to the specific content of a subject and knowledge about it; it also refers to the learner’s ability to construct their own knowledge. One’s ability to construct their own knowledge has to do with the second C – **cognition**, in other words our thinking mechanisms. The third C stands for **communication** that is language used for content analysis and understanding, but also for social (class) interaction. The fourth C is for **culture**. CLIL is about intercultural awareness. Later on, in the presentation of my teaching model I am going to show (hopefully!) where and how these components fit.

As stated above, CLIL is about both language teaching and content teaching. The methodology views these two components as **integrated**, as the acronym suggests. Yet, an important, distinctive point about the role of language in CLIL is the one that Llinares, Morton and Whittaker make: ‘the focus of CLIL is not to equip learners with the language they need to transact everyday tasks, such as ordering a meal or buying a train ticket’ (Llinares et al., 2012, p.9). What CLIL actually does is to give the students the opportunity to communicate educational knowledge (*ibid*). In other words, students are challenged to use the language they learn to talk about content/subject issues, in a, more or less, scientific way. In my model, I would like to explain how language in my CLIL material can be organized to serve this purpose as well as to reveal the social role of a language.

**Teaching Astronomy in the EFL class: integrated disciplines**

My CLIL model integrates three (03) theoretical perspectives in order for a comprehensive CLIL teaching product to be realised, compatible with the core philosophy of CLIL. As Llinares, Morton and Whittaker (2012) suggest, the philosophy of CLIL shares a lot with Vygotsky’s **sociocultural theory**, which, in turn, matches Halliday’s **systemic functional linguistics (SFL)** framework. The third aspect I have added to my model has to do with ‘the grammar of visual design’ (Kress & van Leeuwen, 2006), which examines the role of visual representation in communication and how ‘reading images’ can guide interlocutors into negotiating meaning. This third approach is in complete alignment with the other two approaches. The three perspectives alike view language as a social product, emerging through social interaction and negotiation of meaning. Therefore, they offer a common platform for a CLIL teaching project to be developed,
but, at the same time, they are compatible with the Council of Europe principles for language teaching.

a. Vygotsky's socio-cultural theory
Vygotsky's socio-cultural theory serves as the broad framework where the other two approaches will be embedded in my model. Vygotsky's approach is based on the view that 'human activities take place in cultural contexts, are mediated by language and other symbol systems, and can be best understood when investigated in their historical development' (John-Steiner & Mahn, 1996, p.191). Language is, therefore, central to human (social) interaction and, moreover, in Vygotsky's terms, language is one of the choices that interlocutors have among other symbol systems. This point is core to the development of my CLIL teaching model, as I will explain below. Vygotsky also stressed to the 'dynamic interdependence of social and individual processes' (John-Steiner & Mahn, 1996, p. 192) towards knowledge acquisition. An important process towards knowledge acquisition is internalization. Humans co-construct their knowledge through linguistic interaction with other humans and nature (social context) and, in process, they transform ‘this communicative language into inner speech and further into verbal thinking’ (John-Steiner & Mahn, 1996, p. 196). Another concept, central to the socio-cultural theory, is scaffolding. In short, scaffolding has to do with a social process where more knowledgeable individuals ‘intervene temporarily to enable learners to achieve learning goals’ (Llinares et al., 2012, p. 11). Scaffolding is about knowledge building and facilitating, helping learners move higher and higher, acquiring more and more knowledge. Scaffolding is entailed in the concept of the zone of proximal development, which defines the spectrum between the actual developmental level, where learners can achieve tasks independently, and the level of potential development, where the learners can realize tasks with the aid of a more knowledgeable peer (John-Steiner & Mahn, 1996).

b. Systemic Functional Linguistics (SFL)
M.A.K Halliday, like Vygotsky, stresses on the fundamental role of language in social communication and interaction. He goes on to view language as a core tool of negotiating meaning in social (con)texts and regards this as an ongoing process within ‘products of social interaction (texts), in relation to the cultural and social context in which they are negotiated’ (Eggins, 2004, p. 2). Halliday views language as a system, as social semiotic, therefore he is interested in explaining 'how people use language with each other in accomplishing everyday social life' (Eggins, 2004, p. 3). Four theoretical aspects are central to the SFL framework: first, ‘language use is functional’ (Eggins, 2004, p.3), second, language functions towards meaning-making, third, meanings produced through language are determined by their social and cultural context (Eggins, 2004), and fourth, language use is ‘a semiotic process, a process of making meaning by choosing’ (Eggins, 2004, p.3). The importance of meaning in language use and production, as well as the stress on linguistic choices are very crucial elements in SFL. Producing meaning is the result of the language being formulated by a set of systems, which can provide the language user with ‘an unlimited choice of ways of creating meaning’ (Bloor & Bloor, 2013, p. 3). Therefore, different ideas can be expressed in different (lexico-grammatical) forms, depending on the context, but even the same idea can be expressed in various (lexico-grammatical) forms to match Malinowski’s ‘context of situation’ (Malinowski, 1923, 1935 cited in Martin, 2010) and/or his ‘context of culture’ (ibid). Halliday also suggests that towards the meaning-making process three kinds of meanings (metafunctions (Bloor & Bloor, 2013)) are simultaneously produced in speech: the interpersonal meaning, which reveals the interactants' relationship and status, the ideational meaning, which has to do with the knowledge of the world the interactants share, and the textual meaning, which has to do with the organization of a text in order for a specific kind of meaning to be produced. Moreover, the contextual use of language has led to ‘the development of specific socially recognized forms known as genres (such as business letters) and styles or registers (such as business English)’ (Bloor & Bloor, 2013, p.7).
c. The grammar of visual design

Just as Halliday realizes language as a meaning-making process, Gunther Kress and Theo van Leeuwen (2006) also perceive visual communication as a process for negotiating meaning in a specific social and cultural context. They focus on what they call ‘visual literacy’, which has to with reading, narrating and negotiating pictures. Pictures are signs — and also a genre themselves -, and, as such, they are realizations of a semiotic system. Language is also a semiotic system (Kress & van Leeuwen, 2006) and, as such, it owns, just as pictures do, a place in the broad landscape of symbol systems that interlocutors have at their disposal in social interaction, as Vygotsky had previously suggested. Kress and van Leeuwen (2006) also suggest that individuals can communicate through images (visual literacy), and this communication shares equal stages of development as verbal communication. In their words, ‘it is the transformative action of individuals, along the contours of social givens, which constantly reshapes the resources, and makes possible the self-making of social agents’ (Kress & van Leeuwen, 2006, p. 13). They also adopt Halliday’s SFL framework in order to apply it onto the reading of images. They claim that visual design also entails three functions, the interpersonal, ideational and textual, therefore ‘whether we engage in conversation, produce an advertisement or play a piece of music, we are simultaneously communicating, doing something to, or for, or with, others in the here and now of a social context, (…) and representing some aspect of the world ‘out there’ (…) and we bind these activities together in a coherent text or communicative event’ (Kress & van Leeuwen, 2006, p. 15).

CLIL: Astronomy in the EFL class: lesson presentation and analysis

My model is divided in two broad sections: scientific content about our solar system and its components (content aspect in the 4Cs CLIL Framework) and Mythology (cultural aspect in the 4Cs CLIL Framework). Both sections share the same linguistic organization, based on the socio-linguistic model presented above. CLIL is applied along with the mainstream EFL class, roughly for about four (04) teaching hours per month (out of the eight (08) compulsory teaching hours of English per month provided by the curriculum). I produce the material myself and distribute it to students in photocopied handouts. Students keep the handouts in a file where they add any additional material that has to do with the lesson each time. English is used at a percentage of 85% to 95% in the CLIL class, depending on the linguistic level of the students, but the use of mother tongue is welcome when communication reaches a dead end. After all, the use of mother tongue is not at all restricted in a CLIL class (Llinares et al., 2012). Content is organized with material found online, usually adapted to the students’ linguistic needs, but quite often I cooperate with the science teachers to clarify things or incorporate important information. The project also runs as an eTwinning project for the 2014-2015 school term in cooperation with two Spanish lower secondary schools.

Below you will find examples of my teaching material along with explanations about its construction, function and usage.

The lesson starts with picture discussion. Pictures are the first genre students encounter in this model and they are challenged to discover and deal with its characteristics. Students are asked to study the pictures and talk about what they present. As you may notice studying the following pictures (Example 1- Lesson 1), the linguistic choices students have to make are very simple and, whatever language they choose to use, they are expected to reach some kind of agreement about the information presented in the pictures. They can talk about colour, movement, direction and, of course, facts. They can also talk about the layout of the picture and how it can help and enhance content, and therefore, meaning. Moreover, despite that fact that the pictures seem to present the same theme, there are differences, or best, additional, new information, which challenges the students to expand the spectrum of their linguistic choices (both grammatical and lexical) in order to make meaning. As an exercise, after they have negotiated the meaning across the pictures, students could be asked to add captions to the pictures (a very favourable task!).

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Model lesson 1: Our solar system

Next comes the text (Text 1). The text is a source of information, in order for the students to: 
\textbf{a.} reinforce the knowledge they have acquired through picture discussion, \textbf{b.} discover new knowledge, by deciding what they have already learnt and what is new to them, \textbf{c.} get acquainted with extensive reading and be given the chance to use some reading techniques, \textbf{d.} be introduced to the notion of the \textit{genre}, which, in this case, is a \textbf{report} (the first half of the text), and they have to discover the linguistic choices (basic grammatical) that make up a report (Simple Present). The other half of the text is a \textbf{narrative}, and the students are challenged to decide what can introduce a narrative (the question: \textit{How did the Solar System form?}) and how a narrative is developed (Simple Past). This contrastive analysis will, in the long term, give them the potential to realize the different features and dynamics of these two genres.

\textbf{Text 1}

Our solar neighbourhood is an exciting place. The Solar System is full of planets, moons, asteroids, comets, minor planets, and many other exciting objects. Learn about Io, the explosive moon that orbits the planet Jupiter, or explore the gigantic canyons and deserts on Mars.

\textbf{What is The Solar System?}

The Solar System is made up of all the planets that orbit our Sun. In addition to planets, the Solar System also consists of moons, comets, asteroids, minor planets, and dust and gas. Everything in the Solar System orbits or revolves around the Sun. The Sun contains around 98% of all the material in the Solar System. The larger an object is, the more gravity it has. Because the Sun is so large, its powerful gravity attracts all the other objects in the Solar System towards it. At the same time, these objects, which are moving very rapidly, try to fly away from the Sun, outward into the emptiness of outer space. The result of the planets trying to fly away, at the same time that the Sun is trying to pull them inward is that they become trapped half-way in between. Balanced between flying towards the Sun, and escaping into space, they spend eternity orbiting around their parent star.
How did the Solar System form?
This is an important question, and one that is difficult for scientists to understand. After all, the creation of our Solar System took place billions of years before there were any people around to witness it. Our own evolution is tied closely to the evolution of the Solar System. Thus, without understanding from where the Solar System came from, it is difficult to comprehend how mankind came to be.

Scientists believe that the Solar System evolved from a giant cloud of dust and gas. They believe that this dust and gas began to collapse under the weight of its own gravity. As it did so, the matter contained within this could begin moving in a giant circle, much like the water in a drain moves around the center of the drain in a circle.

At the center of this spinning cloud, a small star began to form. This star grew larger and larger as it collected more and more of the dust and gas that collapsed into it.

Further away from the center of this mass where the star was forming, there were smaller clumps of dust and gas that were also collapsing. The star in the center eventually ignited forming our Sun, while the smaller clumps became the planets, minor planets, moons, comets, and asteroids.

Exercise 1
Students are presented with a word cloud. They are asked to use the words in the cloud to produce a piece of writing, a genre of their choice (either a report or a narrative).
Model lesson 2: The Earth

Below I am presenting again a whole lesson about The Earth. You may notice that the layout of the lesson tries to apply the principles of the linguistic model presented above, following a particular sequence.

THE EARTH

Look at the pictures and their captions and talk about our Earth. Add the missing captions:

The Earth is a **sphere**, an object similar in shape to a ball. Astronauts aboard the Apollo 17 shuttle took one of the most famous photographs in history, called "The Blue Marble". This image shows Earth as it looks from about 29,000 kilometers (18,000 miles) away in Space. The picture shows us that Earth is spherical and looks like a giant blue and white ball. Hundreds of years before humans travelled to space, we knew the Earth was round. The Sun and the other planets of our Solar System are also spheres. Three-fourths of Earth's rocky surface is covered with water. As far as we know, Earth is also the only planet that has liquid water, another important thing for life.

The entire planet is also surrounded by a thin layer of air called the atmosphere. Earth's atmosphere is unique in the solar system in that it contains just the right amount of oxygen to support animal life. Therefore, Earth is the only planet in the solar system on which life is found.

The layers that make it up are also referred to as spheres (Figure 24.3). They are:
- **Atmosphere**—the thin layer of air that surrounds the Earth.
- **Hydrosphere**—the part of Earth's surface that consists of water.
- **Biosphere**—the part of the Earth that supports life. The biosphere includes all the areas where life is found.
- **Lithosphere**—the solid part of the Earth. The lithosphere consists of mountains, valleys, continents and all of the land beneath the oceans. Only one-fourth of Earth's surface is land, but solid rock makes up more than 99% of Earth's total mass.
Exercise 1

Complete the lists below with the information required:

**The Earth's inner layers**

**The Earth's outer layers**

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Exercise 2

**The Earth's magnetic field**

Use the notes below to write about the Earth's magnetic field:

- gigantic bar magnet inside the Earth
- north and south pole
- magnetic field around
- iron and nickel in the Earth's core
- move and create the magnetic field
- magnetic field spreads for thousands of kilometers into space
- what is the important role of the Earth’s magnetic field?

(source [here](#))

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Model lesson 3: Mythology

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This lesson is an example of the second section of my model, that of mythology. Mythology enters the scene of Astronomy as an intercultural component. Astronomical objects have the names of Ancient Greek and Latin deities and there is always a very clear cultural connection between the names of the planets and moons and their ‘ancestors’. In this section we try to discover these intercultural connections and understand how the planets were named after those famous mythological creations. Meanwhile, a cross-cultural dialogue begins, since mythology takes us not only through the famous and rich Greek legends, but there are usually references to other cultures as well, provided different connections can be found.

In the following example there are different activities of intercultural awareness and you will be able to discover the way the students are challenged to enter such a dialogue. The lesson is fully based on picture discussion.

**MARS (ARES): the god of war**

*An oath to Ares*

O, mighty Ares,
in you we trust, to you we bow.
You are our commander, you are our lord,
we leave our destiny in your hands.
Our body and soul are yours,
we do not have a father other than you.
To your legs we rest our weapons,
the shield, the bow, the spear, the sword.
Bless us, proud god!
Exercise

Compare and contrast the following pictures and then talk about soldiers and weaponry in different times:

Conclusions
Let’s now check to what extent my paradigm complies with the 4Cs CLIL Framework. First of all, the content itself. Apart from the typical scientific content of Astronomy, which is given in a linear text, content is enriched with pictures. Pictures help the students receive a very vivid input about the subject in question and put their thinking mechanisms in action almost immediately. Looking at the pictures, the students do not spend much time understanding what they are going to deal with. Pictures are very effective stimulators of previous knowledge, social knowledge and imagination (ideational meaning in SFL). Therefore, all their cognitive skills are activated (cognition in the 4Cs CLIL Framework). And, of course, students look at the pictures and organize information into a text (textual meaning in SFL), making proper linguistic choices. Therefore, communication starts quite smoothly and instantly (communication in the 4Cs CLIL Framework). (Eg. ‘This is the Sun’, ‘I can see the Sun and the planets’ ‘The planets move around the Sun’ ‘The soldiers are carrying guns’ ‘Ares is wearing a helmet’, etc.). Reading the text, the students need to employ reading techniques and strategies, and this requires more advanced cognitive skills, and, of course, understanding the text demands lexical and grammatical knowledge (textual meaning in SFL), but also contextual awareness. (Inter)cultural awareness, on the other hand, owns a very significant portion in this model, since mythology serves it right (culture in the 4Cs CLIL Framework). Mythology is the pure cultural aspect in this teaching material for very obvious reasons, but it is not only Mythology. I believe that the whole content demands a ‘dive’ in our common social knowledge, collective memory and the so-called ‘collective unconsciousness’ (ideational meaning), in order for interlocutors to effectively communicate, make commonly acceptable meaning and reach, what I call, a communicative agreement. For example, students could negotiate meaning over An oath to Ares, and they could, at the same time, discuss the social context of this oath (Who would take such an oath and why? In what cases?) (communication in the 4Cs CLIL Framework). Therefore, the students are challenged here to make use of their plurilingual skills, apart from their linguistic ones. And all these happen in a very subtle way, just as in mother tongue communication. One additional reason for this subtlety is, I think, the fact that, in this case, communication is meaningful, focused and targeted. The students have to talk about very specific things, in a very specific context, with very concrete sources of information. This facilitates communication a lot, to my view. Moreover, negotiating meaning and reaching a communicative agreement or conclusion happen simultaneously, just as Halliday suggests, as far as the meaning-making process is concerned. On a different level, the students need to communicate with each other, in order to reach the anticipated communication agreement, and, in doing so, they need to employ different conversational skills (agreeing/disagreeing, opinion exchange, interrupting, correcting, etc.). This is a process which always takes place in real-life communication domains. This process matches Halliday’s interpersonal meaning: the interlocutors make proper linguistic choices according to their status and relationship in order to reach a communicative goal. Certain exercises could help towards that goal. Exercises which help students discover (new) knowledge, but, at the same time, get them involved in a process of negotiating meaning and information. Exercises could initiate a social dialogue. The model includes many different kinds of activities which serve the meaning-making process (crosswords, puzzles, chart filling, multiple choice activities, sentence completion, rephrasing, information matching).

You may have noticed that, in my model, language is given a slight priority over content, since my purpose is to improve students’ linguistic skills through teaching content, although in CLIL it is not quite clear what is actually prioritized, language or content.

**Note**

As far as the organization of the content in the above teaching material is concerned, different online sources have been used, such as: Kids astronomy, Universe Today, RMG, NASA, Planets for Kids, Space, and Space Facts. Content has been carefully selected, combined and adapted to the students’ linguistic level and the linguistic needs of the model. Pictures have been selected from various internet sources.
References


APPENDIX

Sample teaching material on Astronomy (CLIL).

**MERCUY** - the scarred planet

**Mercury = Hermes**

Hermes ... a. wears winged sandals.

b. can fly.

c. is the messenger of gods.

d. protects the travellers and the merchants. © KONSTANTINA ZAVALARI (MEd – OU)
Exercise 1

Compare and contrast the following pictures. Talk about differences that have to do with: a. Hermes's appearance, b. artistic elements, c. artistic context d. Hermes's role:

![The winged Hermes](image1.jpg)  
![Hermes of Praxiteles, carrying young Dionysus](image2.jpg)

The winged Hermes  
Hermes of Praxiteles, carrying young Dionysus

Fill in the blanks with the proper words:

Hermes was one of the ---------------- Greek Olympian gods. He could ----------- because he wore --------------- --------------- sandals. Hermes delivered the ------------------- of gods to the people.

What do these companies do?

1. [www.hermesmail.com](http://www.hermesmail.com) : You can trust us to take your letters and parcels worldwide.
2. [www.hermesair.com](http://www.hermesair.com) : Our planes travel you to the east and the west, the fastest, the safest, the cosiest.
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Factfile

a. **It orbits the Sun** in **87,969 days.**
b. **It rotates round itself** in **58,6461 days.**
c. **It is 57 million km away from the Sun.**
d. **Its maximum temperature** is **465°C.**
e. **Its minimum temperature** is **-184°C.**
The planet
The planet Mercury is the closest of the planets to the Sun. It is visible from the Earth in the late evening or early morning sky. This planet is often called a morning star. This is because Mercury shines brightly in the early morning, just before the sun rises. It has also been called an evening star for the same reason. Mercury is often visible for a brief period of time just after the Sun sets.

Mercury is heavy
As the Sun formed, it pushed much of the lighter gas and dust out of the inner Solar System, leaving behind only heavier elements. As a result, Mercury is made out of many, heavy elements, mainly iron. It is a large metal ball of iron, with a cool iron core*.

Mercury has wrinkles
As Mercury’s iron core cooled, it shrunk. This made its rocky crust* become wrinkled. Scientists call these wrinkles Lobate Scarps*. These scarps can be hundreds of miles long and even up to a mile high.

Mercury is scarred
The surface of the planet Mercury is covered with craters. These craters have been created by millions of accidental crashes with asteroids and comets. On other planets, different geological activities (e.g. volcanic eruptions) can help heal the wounds of these crashes. But, because Mercury’s crust is so thick and hard, volcanic eruptions cannot make their way through to the surface of the planet, so Mercury will forever retain its scars.

Mercury has no atmosphere
The planet Mercury is too small and has too little gravity to hold onto an atmosphere. Gases released from the planet quickly escape into space. Also, Mercury is so close to the Sun that any atmosphere is quickly blown away by the Sun’s solar winds. That means that there is almost no air on Mercury.

Mercury has no moons !!! (astronomy facts selected and accordingly adapted from www.kidsastronomy.com)

Finish the sentences

1. Mercury is very ------------------ to the Sun, so we can ---------------------------------------------.

2. Mercury is an ------------------------------, that's why it is very -------------------.

3. Mercury’s crust is ------------------.

4. It can be boiling ------------------ on Mercury in the morning and freezing ------------------in the evening. When Mercury faces the Sun, its surface ---------------------- is very, very ------------------.

5. There is ---------------------- in Mercury's core. When it cooled, it ----------------------. After it shrunk, ---------------------- appeared on Mercury’s surface. These ----------------------are called ------ ------------------.

6. The surface of mercury is also full of ---------------------- after ---------------------- crashed onto it. So Mercury is called ' ----------------------'.

7. Volcanic eruptions can never penetrate ---------------------- because it is ----------------------.
Tell the story:

Our universe is our 's neighbourhood. This neighbourhood was created about 13.8 billion years ago. A huge cloud of dust and gas was roaming the dark, lonely sky, until it somehow collapsed under the weight of its own gravity. In the cloud there was lots of matter, which, after the ‘explosion’ – the big bang – started moving in circles, just like a. The cloud matter spinned in a giant circle. At the centre of this circle a small star began to form. The star got bigger and bigger because it collected all the dust and gas that collapsed into it.

At the same time smaller pieces of the cloud matter started appearing around. The small star finally ignited forming and the smaller pieces around it became the, and. The Sun is the biggest and most powerful object in our solar system. So it attracts all the other objects towards it. As a result, all the planets, comets, asteroids and the moons orbit the Sun.

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Jupiter is a giant gas planet. Its atmosphere is made up of mostly hydrogen gas and helium gas, just like the sun. The planet’s surface is covered in thick red, brown, yellow and white clouds.

One of Jupiter’s most famous features is the Great Red Spot. It is a giant spinning storm, resembling a hurricane. At its widest point, the storm is about three-and-a-half times the diameter of Earth. Jupiter is a very windy planet. Winds range from 192 mph to more than 400 mph.

Jupiter has three thin rings. The rings were discovered in 1979 by NASA’s Voyager 1 spacecraft. Jupiter’s rings are made up mostly of tiny dust particles.

Jupiter rotates, or spins, faster than any other planet. One rotation equals one day. Jupiter’s day is only about 10 hours long. Jupiter’s orbit is elliptical, or oval-shaped. It takes 12 Earth years for Jupiter to make one revolution around the sun, so a year on Jupiter is equal to 12 years on Earth.

Did you know that....

a. Jupiter is the largest planet of our solar system (its diameter is 11 times that of the Earth)?

b. Jupiter’s mass is greater than twice the sum of all the other planets?

c. If Jupiter got four times its current mass, it would still remain about the same size?

d. Jupiter is the fastest spinning planet in our solar system (despite its mass and size)?

e. Jupiter’s Great Red Spot measured 40,000 km a century ago, but it’s shrinking – it’s currently half that size?

f. Jupiter has rings, too?

g. Jupiter’s magnetic field is 14 times as strong as the Earth’s?

h. Jupiter has 63 moons?

i. Jupiter takes about 12 years to orbit the Sun?

j. Temperature in the clouds of Jupiter can reach -145°C, but its core temperature can be about 24,000°C (!) (hotter than the Sun)?
Jupiter’s clouds: layers of methane and ammonia

Jupiter’s Great Red Spot: an enormous anti-cyclone system which has lasted at least 100 years. It is a giant spinning storm, like a hurricane.


Jupiter’s rings: three thin rings, made of tiny dust particles

Jupiter’s winds: they range from about 350 km per hour to more than about 750 km per hour

Activity 1

Rate Jupiter’s four largest moons (Galilean satellites):

- Io: a volcanic moon
- Europa: its surface is mostly water ice. Beneath the ice there is an ocean of water.
- Ganymede: the largest moon in our solar system, with its own magnetic field.
- Callisto: has many craters and is made of ice and rock.

ACTIVITIES

True or False?

1. It’s Jupiter’s mass that makes it the largest planet of our solar system.
2. Jupiter is half its size now, comparing it to the past.
3. There is an extreme temperature range between the upper parts of Jupiter and its core.
4. The Great Red Spot of Jupiter looks like a twister.
5. Jupiter’s rings are formed by pieces of ice.
6. Because Jupiter is massive and huge, it moves quite slowly.
7. Jupiter rotates in about 24 hours.
8. Jupiter is cloudy and windy.
9. Jupiter’s orbit is a perfect circle.

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