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ABSTRACT

Applying a CLIL methodological approach marks a shift in emphasis from language learning based on linguistic form and grammatical progression to a more ‘language acquisition’ one which takes account language functions. In this article we will study the elements of the “language of instruction” of the area of Maths in Secondary Education, by focusing on the analysis of the communicative functions, and the lexical and the cultural items present in the textbook in use. Our aim is to present the CLIL teacher with the linguistic and didactic implications that he or she should take into consideration when implementing the bilingual syllabuses with their students. In order to do that, we will present our conclusions emphasizing the need for coordination in different content areas, linguistic and communicative contents, between the foreign language teacher and the CLIL subject one.

KEYWORDS: CLIL, Language of Instruction, English, Maths, Secondary Education

RESUMEN

La aplicación de un enfoque metodológico AICLE supone un cambio de prioridades de un aprendizaje de lenguas basado en la forma lingüística y progresión gramatical a uno de ‘adquisición del lenguaje’ que tiene en cuenta las funciones del lenguaje. En este artículo estudiaremos los elementos de la “lengua de instrucción” del área de matemáticas en la educación secundaria, centrándonos en el análisis de las funciones comunicativas y los elementos léxicos y culturales presentes en el libro de texto utilizado. Nuestro objetivo es mostrar al profesor AICLE las implicaciones lingüísticas y didácticas que debe tener en cuenta al implementar la programación bilingüe con sus estudiantes. Por ello, presentaremos nuestras conclusiones haciendo hincapié en la necesidad de coordinación en diferentes áreas de contenido –contenidos lingüísticos y comunicativos– entre el profesor de lengua extranjera y el de AICLE.

PALABRAS CLAVE: AICLE, lengua de instrucción, inglés, matemáticas, educación secundaria

1. Introduction

With the 4C's teaching framework defined in CLIL methodology, where the learner must use a different language to acquire knowledge, comes an adjustment of the traditional process of language teaching/learning. The so called "language of instruction" here must not only be considered a tool but an important element of the CLIL process; even though language may not be the designated subject in the classroom, there are language related goals apart from the ones linked to the content subject that must be taken into consideration. Therefore, applying such methodological approach marks a shift in emphasis from language learning based on linguistic form and grammatical progression to a more 'language acquisition' one which takes account language functions. In this article we will study the elements of the language of instruction, by focusing on the analysis of the communicative functions, and the lexical and the cultural items a CLIL textbook of the area of Maths in Secondary Education. Our aim is to present the CLIL teacher with the linguistic and didactic implications that he or she should take into consideration when implementing the bilingual syllabuses with their students. In order to do that, we will present our conclusions emphasizing the need for coordination in different content areas, linguistic and communicative contents, between the foreign language teacher and the CLIL subject one.

2. CLIL in the Spanish context

Content and Language Integrated Learning is an umbrella term coined by Marsh and Maljers in 1994 that covers many varieties of educational programmes and projects focused on the teaching and learning of academic content throughout a language other than the mother tongue in the classroom (Pavón in Marsh, 2013: 11). CLIL projects share some principles all over the world. Pérez (n. d.) highlights three main principles that any CLIL project should follow: (1) the language is used to learn content of the subject but it is also necessary to learn the language in order to understand and communicate, this is, there is a double aim, content-wise and language-wise. (2) The language used is determined by the content so elements such as vocabulary, linguistic forms and skills will be dependent on the contents of the subject. The third principle Pérez points out is strongly linked to the communicative competence the CEFR promotes as (3) fluency is more important than grammar and linguistic precision in general.

In Spain, language-improvement initiatives have been increasing in the last decade. Although foreign language acquisition has usually been a weak point in the Spanish education system (Fernández, 2009: 3), European initiatives are being put into practise in Spain in order to improve foreign language learning and teaching. CLIL programmes are considered in the former (LOE, 2006) and new (LOMCE, 2013) education law so to reinforce foreign language teaching.

3. Language of Instruction

It must be pointed out that the language of instruction is not only a tool but an important item of the CLIL process: language may not be the designated subject in the classroom but there are language related goals apart from the ones regards to content subject (Dalton-Puffer, 2007). The numerous CLIL experiences have supported the idea that changing the language of instruction to a foreign language such as English, French or Portuguese can mean a significant change in the way primary and secondary education teachers face their class and how students learn (Campo, Grisaleña & Alonso, 2007). This change in the language of instruction leads to improvements in the educational system.

Nevertheless, in order to do so, an intensive analysis of the language of instruction and its functions must be conducted. Dalton-Puffer (2007: 128) points out that academic language functions may be best understood as a special case of the general communicative functions of language. These functions are classified as (1) being linked to certain interactive and social situations and (2) playing an important part related to language functioning as a social tool. These communication practices give rise to linguistic conventions, hence, a “certain spectrum of realization becomes established, providing linguistic and structural patterns for coping with standard situations” (2007: 128). Then, having control over these conventions which are of utmost importance to the development of communicative competence this will be reached.

It is difficult to determine how many academic language functions can be as this area has not been exposed to many researches from a linguistic point of view (2007: 129). However, Dalton-Puffer (2007: 129) compiles a list of the most common academic language functions in English in the literature related to the topic: analysing, classifying, comparing, defining, describing, drawing conclusions, evaluating & assessing, explaining, hypothesizing, informing, narrating, persuading, predicting, and requesting/giving information

In science-related subjects hypothesizing is one of the most used academic language functions; this is defined by their use of “relatively complex verb phrases for their verbalization so that this is an interesting testing ground for the occurrence of ‘more difficult grammar’ in the classroom language” (2007: 159). The lexico-grammatical collection of this modality varies from modal verbs (*can, will, may, etc.*), adverbs (*probably, perhaps, possibly, possibility, etc.*), conditional conjunctions (*if*) and lexical phrases. Some lexical verbs introducing hypothesizing episodes used in the classroom are: “assume, guess, hypothesize, imagine, predict, propose, speculate, suggest and suppose” (2007: 160). A significant aspect of these verbs is that they are likely to appear in typical syntactical phrases (2007: 161):

- let’s think/say/assume/imagine
- (so) what would happen (if)
- what will happen if
- what happens if
- can you predict

- what would your prediction be?
- what would you propose
- what would you do if

Dalton-Puffer (2007) studied the use of hypothesis in CLIL classrooms and found out that hypothesizing:

can be identified [...] by lexical phrases which seem to serve as discourse signals signifying the start of a hypothesizing episode [...] The much higher lexico-grammatical complexity of hypothesizing might be drawn upon as an explanation for why students mostly respond to hypothesizing prompts with avoidance or minimization (2007: 169).

This does not mean there is no presence of hypothesizing on the subject, but that hypothesizing out loud and with the aforementioned lexical-grammatical items has not been present on the students' speech. It would be a matter of another study the analysis of hypothesis in the students' writing production, the teacher's usage or other classroom materials such as the textbook.

4. CLIL and Maths

As it has been previously stated science subjects are the most sought subjects to introduce in a CLIL classroom and many resources have been created for the CLIL Maths classroom such as the book *Teaching Maths through English – a CLIL Approach* (n. d.) published by Cambridge University Press. Science-related subjects are the most sought-after subjects in secondary education in order to create a CLIL course; hence, it is normal that many studies have focused on the management and success of these projects (Jäppinen, 2008; Evnitskaya & Morton, 2011).

Regarding Coyle's 4C's in CLIL Maths it is "important to notice that 'content' is the first word [...] because curricular content leads language learning [...] learning about mathematics often involves learners in making a hypothesis and then proving whether this hypothesis is true or not" (*Teaching Maths through English*, n. d.: 2). In this book the 4C's in Maths are described as:

- (1) Content: what is the maths topic? e.g. algebra, ratio, linear graphs
- (2) Communication: what maths language will learners communicate during the lesson? e.g. the language of comparison for comparing and contrasting graphs
- (3) Cognition: what thinking skills are demanded of learners? e.g. identifying, classifying, reasoning, generalising
- (4) Culture (sometimes the 4th C is referred to as Community or Citizenship): is there a cultural focus in the lesson, e.g. do learners from different language backgrounds calculate in the same way? What symbols do they use? In multilingual contexts, it is important to take time to talk about methods used in different cultures represented by learners in the classroom (*Teaching Maths through English*, n. d.: 2).

In regards to the content, it is necessary to make a distinction between content-obligatory and content-compatible language: content-obligatory language deals with specific vocabulary, grammatical structures and functional expressions whereas content-

compatible language is not specific to a subject and may be learned in the English class in order to communicate more fully (*Teaching Maths through English*, n. d.: 3).

As stated above, content-obligatory language is subject-specific so teachers and students must be aware of this specific vocabulary to direct and participate in the lesson. In regards to Maths, *Teaching Knowledge Test (TKT) Content and Language Integrated Learning (CLIL): Handbook for Teachers*. (n. d.) provides a list of vocabulary which would work as the essential list of words related to Maths in English. In relation to their level of difficulty from the Spanish students’ perspective, an etymological classification could be done so the words with Latin roots may be easier to use than others with an Anglo-Saxon etymology:

Latinate words	Anglo-Saxon Words
algebra angle axis bar graph calculate calculator chart circumference column graph compasses coordinates cube diameter equation estimate formula fractions geometry line	grid working out

As it can be appreciated, the table shows that most of the specific vocabulary in a Maths lesson comes from Latin origins; this would definitely make easier for natives of a Romanic language (in this case, Spanish) to understand the relatively new concepts due to the similarities between these words in English and their Spanish counterparts. Nevertheless, it must be taken into account that the list of vocabulary is only an exemplification of Maths-related vocabulary and not a complete compilation of all the specific vocabulary of the subject.

Choosing Maths as a CLIL course has many advantages as, for instance, this subject excludes the possibility of various interpretations and misinterpretations of specific problems to some extent and non-verbal communication such as visual and material graphs are considerably used (Novotná & Hofmannová, n. d.); hence, this helps along the students’ learning without completely relying on the language. Nevertheless, there are some drawbacks to the subject: it is not possible to take a ‘holistic’ approach to it due to its exact character so items such as idioms and ambiguity in vocabulary cannot be considered in a CLIL Maths classroom.

5. Maths CLIL Case Study

5.1 Contextualisation

In this study we have focused on the analysis of a specially designed textbook by the CLIL teachers of a CLIL section in a Galician high-school taking special interest in some linguistic forms which will be listed below. For practical reasons we have decided to analyse in depth the linguistic elements of one of its units. Nevertheless, a brief analysis on the practice of English and Spanish will be performed in order to contextualise the use of the communicative competence. Therefore, the main points of the study will be divided into three categories.

- Functional Language
- Lexical Items
- Cultural Items

5.2 Functional Language

5.2.1. Use of Conditionals

There are many conditional sentences found in Unit 7 of the textbook *Mathematics: 4º ESO* (n. d.) by Garvi Herizo, Sánchez Rodríguez and González Pérez. As it can be appreciated in ‘Annex 1: Conditionals’, most of the conditionals found in the textbook belong to the zero conditional category; this could probably be related to the fact that the textbook writers have as their first language Spanish and their L1 could have influenced their writing as the zero conditional is formed with two present simple verb tenses. As the most common way to create conditional sentences in Spanish is by using present simple tenses, it is not far-fetched to think that its repeated use in the text could be related to this. Nevertheless, the frequent usage of conditionals answers to a need of the Maths content of the unit to hypothesize: for instance, the conditional “Then, if you square both terms, you get the equation of the circumference” (Annex 1) could be rephrased with one of the syntactical phrases Dalton-Puffer (2007) writes for hypothesis: ‘*what happens if you square both terms? You get the equation of the circumference*’.

Therefore, Dalton-Puffer’s statement about the use of conditional conjugation ‘if’ and conditionals are used the academic language function of hypothesizing may be considered right, though not all the conditionals found in the textbook fall into the hypothesizing category, e. g. “If the lines are intersecting, calculate the intersection point” (Annex 1). It is also significant the use of modals verbs within the conditional sentences, the passive voice and the subject ‘you’ in most of the examples; these traits will be addressed next.

5.2.2 Use of Modal Verbs

As it has been pointed out before, modals verbs can be hypothesis markers, though this is not always the case. Due to the high figure of modal verbs in the textbook (Annex 2: Modal Verbs), it is necessary to mention these. In the analysed unit of the Maths textbook these following results were drawn:

24 sentences have been found which have modal verbs, however, not all of them are related to hypothesis as it can be appreciated in Figure 1: the type of modal verb most used is ability; the modal verb ‘can’ is the most used in this category. This could be linked with the fact that the analysed material is a textbook so it should encourage the reader to try so using the verb ‘can’ would provide a sense of achievement and encouragement in the learners’ skills: it should be taken into account that modal verbs of ability are accompanied by personal pronouns such as ‘you’ and ‘we’, therefore, highlighting the sense of ‘intimacy’ with the reader.

Nevertheless, a high number of modal verbs follow Dalton-Puffer’s theory that modal verbs are linguistic forms used in hypothesis (see *Language of Instruction* in this essay): ‘may’ and ‘would’ are the most frequent modal verbs in a hypothesis, though ‘can’ and ‘might’ are also present in the hypothesis related to the contents of the Maths unit. Other types of modal verbs which have been found are modals of possibility (‘can’), advice (‘should’), obligation (‘must’) and certainty (‘must’) though these are not numerous enough to make a more in-depth analysis of them.

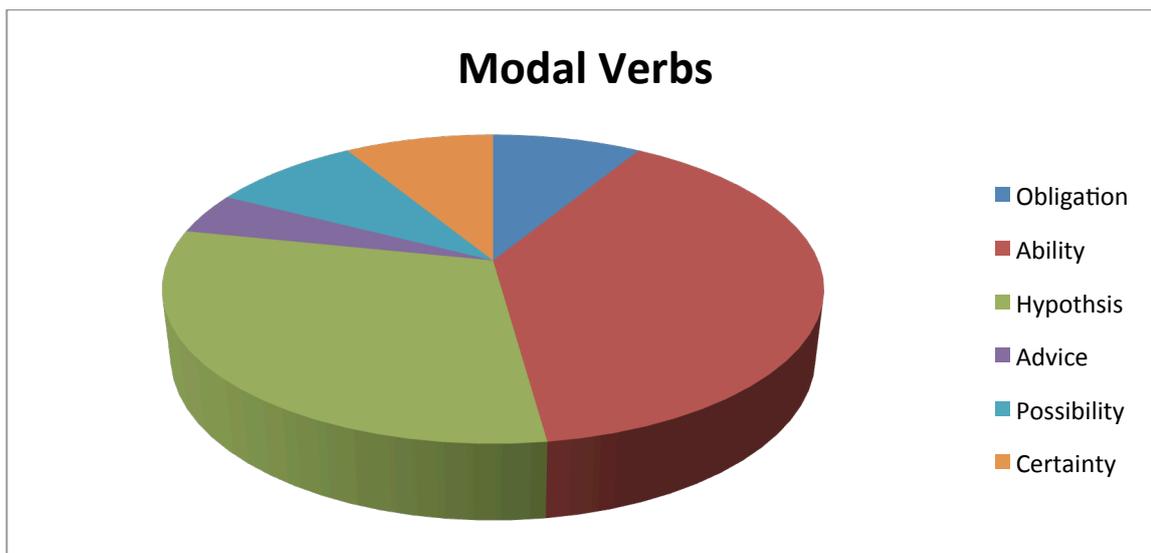


Figure 1. Types of modals used in Unit 7

5.2.3 Use of the Passive Voice

It is necessary to mention the usage of the passive voice in the unit due to its high use: 19 sentences have a passive voice tense. This use of passive is significant as it is not taught in the first years of mandatory secondary education, but it is explained in the last courses of secondary education. Probably due to the students’ lack of use or knowledge of the passive voice, the passive structures in the text are not very varied but thoroughly used; for instance the verb tense “is called” is used five times whereas its plural counterpart (“are called”) is repeated thrice (Figure 2). As it can be appreciated, many of the sentences with a passive voice have common verbs which can be classified under the content-compatible language vocabulary, that is, it is not specific to the subject (e.g. ‘call’, ‘write’, etc.) so this could help to comprehend the meaning even though the learners are not familiarised with the passive voice.

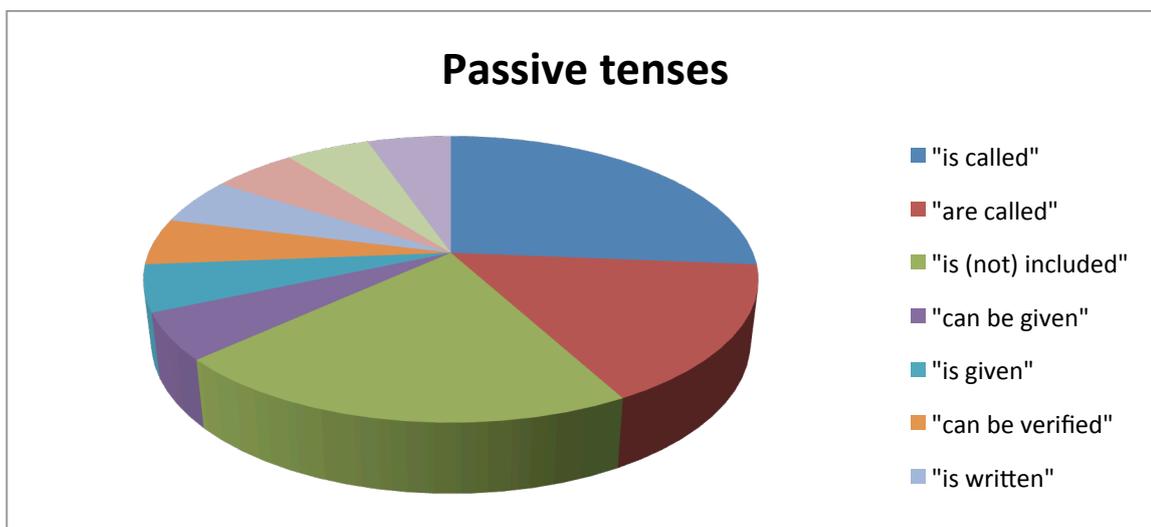


Figure 2. Passive tenses used in Unit 7

In perspective, the number of sentences with passive voice may not be considered that high but it should be considered that many of the sentences with a ‘you’ subject as, for instance, “you should know that the graph [...] is a straight line” (Garví et al. n. d.: 81) should have been written in passive so to become less ‘subjective’ and more academic-like: “it should be known that the graph [...] is a straight line” would be a rough approximation to a more natural and objective statement in the English language.

5.2.4. Addressing

This frequent use of personal pronouns in the text such as ‘you’ and ‘we’ to a lesser extent personalises the unit; by using these pronouns the writer ‘introduces’ the learners in the learning process with statements as “Sometimes *you* need to find the point M that is exactly halfway between two other points A and B. For instance, *you* might need to find a point that divides a given segment into equal halves” (Garví *et al.* n. d.: 80) speaks directly to the reader as they are the ones who will perform the action. Some other sentences in the textbook also rely on this sense of familiarity and they could be even considered informal or placed under the speaking category:

- “Let’s see some geometric problems about points on a plane”.
- “Let’s check it analytically using the slope formula”.
- “As you know, the graph of the equation $y = n$ (where n is a real constant) is a horizontal line (parallel to the x -axis)”.
- “As you know, the graph of the equation $x = a$ (where a is a real constant) is a vertical line (parallel to the y -axis)”.
- “Don’t let the subscripts in the distance formula scare you”.
- “As you studied previously, the equation $(x - x^0)^2 + (y - y^0)^2 = r^2$ represents a circumference with centre $C(x^0, y^0)$ and radius $r > 0$ ”.

The words in italics are examples of how the writer tries to create a link and relate to the learner so to encourage their learning by awakening their previous knowledge (“As you studied previously”, “As you know”), supporting ‘community learning’ (“Let’s see” “Let’s check”) and boosting their confidence (“Don’t let [that] scare you”). This along with the ‘overuse’ of the personal pronouns ‘you’ and ‘we’ creates a sense of partnership so the learner does not feel another individual learning Maths, but as they have a particular learning experience.

5.2.5 Phonology

It is significant that a Maths textbook would pay attention to phonetics, but it must not be forgotten that the analysed textbook was designed for Spanish natives so they may probably not know many of the specific vocabulary and its pronunciation in English. Therefore, a list of the most used specific words of the unit is not only advisable but necessary; at the end of each lesson, the textbook provides a list of these words with their phonetic transcripts. This part is most important to develop the students’ phonological competence (CEFR, 2009: 116) and be able to hold a conversation about the topic at hand.

5.3 Lexical Items

5.3.1 Specific Vocabulary: Content-obligatory Language

As it has been previously mentioned, content-obligatory language is related to the language employed in a specific subject, in this case, analytic geometry in a 4º ESO Maths classroom. At the beginning of the unit, a list of keywords is provided so the students familiarise themselves with the specific terminology:

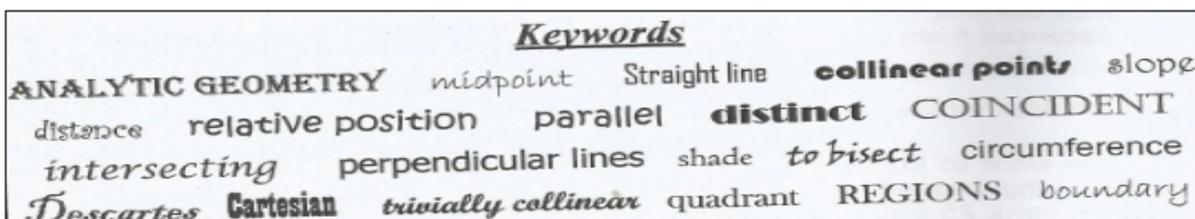


Figure 3. Keywords, Unit 7: Analytic Geometry

These words are probably unknown to the students in English so it is necessary to provide them with this vocabulary in order to understand the concepts which will be explained and used during the lesson: by highlighting and listing these words the students will have the same tools to face the Maths class and it will also give them an idea of the most significant points of the unit. Furthermore, these words are also listed in the pronunciation guidelines at the end of the unit.

However, some of these words may be already known to the students due to their similarities with their Spanish counterparts. As it has been pointed out earlier, many of the specific vocabulary items found in the Maths classroom have Latin and even

sometimes Greek origins, hence, benefitting students whose mother tongue has Romanic roots such as Spanish. In this case, the percentage of Latin words and Anglo-Saxon words is: out of the 21 keywords, 18 items have a Latin etymology, 2 have Anglo-Saxon roots and one of the two-worded elements (“straight line”) has one word of each of the presented etymologies.

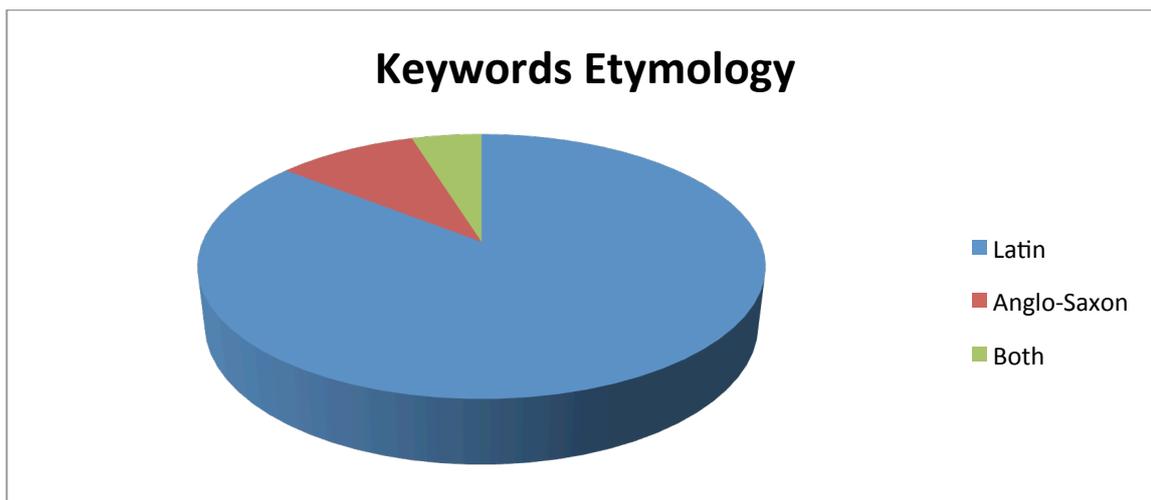


Figure 4. Etymology of the keywords in Unit 7

If the keywords are considered a reliable exemplification of the specific vocabulary found in the textbook, then the following statements may be proved:

- Maths-related vocabulary consists both on single words and two-worded items.

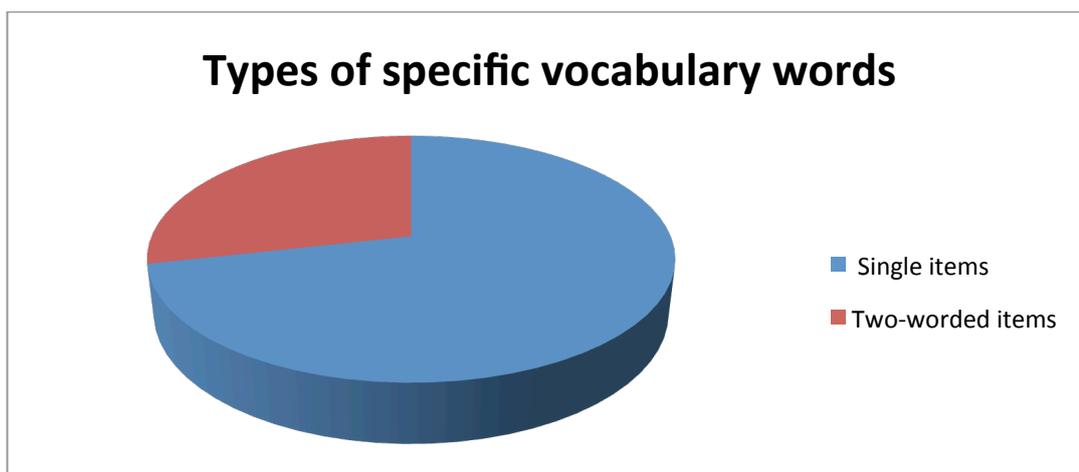


Figure 5. Types of specific vocabulary words

- Most of the two-worded items follow an adjective + noun structure though there are some exceptions (adverb + adjective; “trivially collinear”).
- Most of the words of specific vocabulary are nouns.

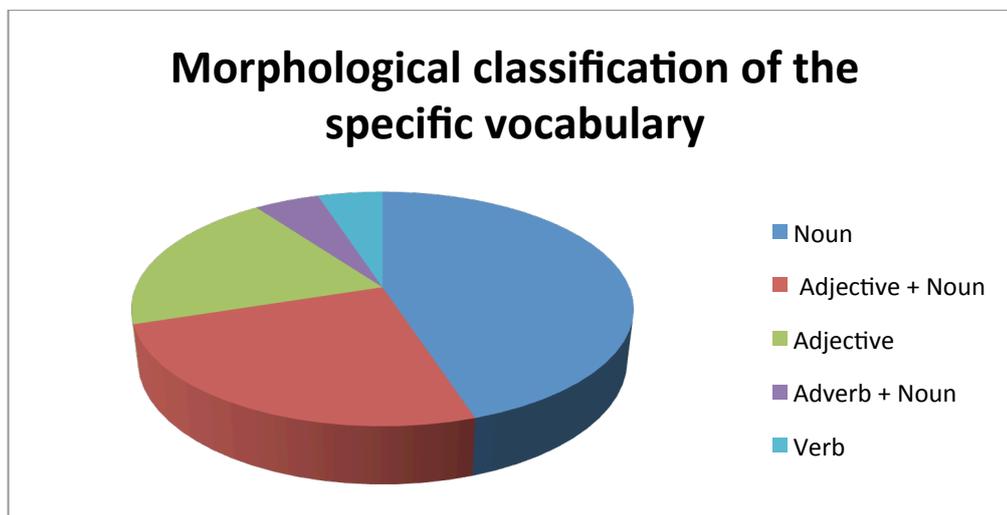


Figure 6. Morphological classification of the specific vocabulary

5.3.2 Content-compatible Language

Content-compatible language deals with the use of items in a CLIL lesson with no special relationship to the topic, that is, they are not specific to a topic or content such as analytic geometry or Maths. On the textbook many of these words are found:

- Verbs: to use, to call, to see, to need, to be, to have, to find, to check, to know, to draw, to write, to give, to go, to substitute, to include, etc.
- Nouns: points, man, philosopher, writer, problems, centre, general, origin, expression, form, exercise, position, sides, regions, solution, etc.
- Adjectives: halfway, given, different, easy, horizontal, vertical, infinite, continuous, both, symbolic, previous, broken, chosen, closed, following, etc.
- Adverbs: exactly, analytically, finally, easily, previously, graphically, etc.

These are some examples of the most common words used in the text; as it can be appreciated, they are quite ‘common’ in usage and meaning outside the Maths classroom. The use of these lexical items would not produce any setback or difficulty in the students’ learning process as they are well-acquainted with these words from their years of English learning, but what it is more, their previous knowledge may be activated to review these concepts and their familiarity could also help in their understanding of the Maths content.

For instance, most of the verbs aforementioned appear on the provided list of irregular verbs in the English workbook used in the students’ English lessons (Johnston, 2012: 159-160) so their usage in the Maths textbook serves to a dual purpose: revising the verbs learnt in the English classroom and facilitating the understanding of the Maths

concepts by using verbs students already know. It is also significant that some of the adjectives in the unit are created with verbs in their past participle form so the number of verbs reviewed is higher.

5.3.3 Use of Connectors

Connectors are most commonly used to provide cohesion to a text and to improve stylistically said text. English as a L2 students are accustomed to learn and use connectors during their writings; they also know there are different categories for connectors and linkers depending on their usage and the writing style. This class in particular has studied the following connectors and linkers in their English lessons this year: connectors of addition and result, linkers of contrast and linkers of contrast and sequencing (Mauchline, 2012: XV). Therefore, students know a wide range of connectors from this year and previous courses.

In regards to the textbook some expectations were made: due to its academic purpose it was only normal to think that a varied number of ‘formal-style’ connectors and linkers would be present in the text to improve its cohesion and the general quality of the explanations. However, after a careful reading of the unit, only the following connectors were found:

- For instance: connector of addition
- So: connector of consequence
- Because: connector of reason/cause
- Then: connector of succession
- Finally: connector of succession

These connectors have in common that their usage is often reserved to a more informal sphere than the one a textbook is supposed to belong: texts of academic nature generally use varied and formal connectors whereas the analysed unit has a short range of connectors with little variety. At this stage of their English learning, 4º ESO students have an extensive repertoire of these lexical markers. Therefore, the lack of connectors in the textbook should not be taken as deference to the supposed students’ lacking knowledge of these cohesive items but as a slight deficiency on the writing style of the unit.

5.4 Cultural Items

Although the book focuses on math contents, other basic competences apart from the mathematical and linguistic competences are put into practice in the textbook. This goes according to the current and new legislation (LOE and LOMCE) as they highlight the need to use all competences in all subjects without restricting competences by contents. In particular, Unit 7 takes into consideration some cultural and historical aspects related to the topic at hand: analytic geometry.

For instance, the book briefly describes the inventor of analytic geometry, René Descartes, by contextualising him in time and place besides naming his different careers and giving some fun facts about his life (“never got out of bed before 11 in the morning”) and his work (analytic geometry is also called Cartesian geometry in his

honour). Another example of this is a mention to Heron of Alexandria, creator of the Heron's Formula named after him.

It must be pointed out not the number of cultural facts in a Maths textbook, but the fact that there are cultural items at all; this is an encouraging example which could prove that learning materials are evolving out of their own branch of knowledge and competence, thus, providing a learning experience richer and more nurturing to students. Furthermore, this timid approach to humanistic knowledge in a science textbook may break to some extent the barrier between the humanistic and scientific field which has recently plagued the education system.

6. Conclusions

In regards to the language of instruction, only some aspects of it have been analysed due to the scope of this study, i.e. one book chapter. As it has been exemplified, the number of conditional sentences in the text is quite high and most of them are of the zero conditional type ('If + present simple, present simple'). This type of conditional is used to express results of a condition which is always true. Nevertheless, its 'overuse' may be related to the fact that the textbook has been written by Maths teachers whose mother tongue is Spanish: the fact that they are not English 'experts' though they have a good grasp of the general linguistic features of the English language and that the most common form of conditional in Spanish follow the same pattern of the zero conditional may be the main reasons why the use of the zero conditional is so prolific in the unit. This theory is also backed up with some found examples where the main sentence of the conditional was an imperative tense, an item fairly used in the Spanish language. However, the use of the conditional conjunction 'if' also responds to the hypothesizing language function.

Still conditionals are not the only items in the text which can be found in relation to hypothesis: modal verbs are also markers of hypothesis. Some of these were found in the analysed unit (see Figure 1 in the analysis): modals of ability were the highest in number, this is probably due to the 'practicability' of the subject as students need to use their skills and abilities to perform what they are asked to do so sentences with modal verbs of ability like "you can use" or "you can easily represent" state what the students are able to do and encourage them to complete these tasks. In second place, there are what they were named 'modals of hypothesis'; these are sentences with modals which introduce a hypothesis such as "For instance, you might need to find a point that divides a given segment into equal halves". In these hypothesis the most used modal verbs are 'might', 'may' and 'would'.

In both the conditional and the modal verbs examples, the active voice is dominant though there are some sentences with passive verb tenses. It is interesting that an 'academic' text as a textbook should be chose to follow a structure for their sentences with a subject 'you' or 'we' and an active tense rather than using the passive voice in order to show objectivity in the writing. With this, it is not the researcher's intention to doubt the objectivity of the textbook or its contents but to highlight that the constant use of 'you' and 'we' may give the impression of subjectivity or informality to the reader. It could be also considered that the lack of passive in the text was because the writers thought the passive voice was taught only in the English classroom in higher levels of mandatory education so the students may not be accustomed to or even know what the

passive voice in English is or how it is used. This uncertainty on the students' knowledge of passives might be the reason why the passive sentences found in the textbook are very similar ("is included"/"are included") and the verbs used in these sentences are also of very common usage: this could have been done to facilitate the students' understanding of this 'complex' grammar structure.

Nevertheless, after looking at the contents of the English textbook which is used in the English language lessons it is shown that the passive voice is explained in at the beginning of the third trimester, just at the same time the analysed unit is being explained. Therefore, at this point, students would have been aware of the use of the passive voice in English due to their previous knowledge of this (3º ESO) and the recap done in the English classroom at the same time. While watching the contents in the English textbook it is noticeable that the grammatical items analysed in this study are present in the list of contents in the textbook: conditionals (Unit 5-6), modal verbs (Unit 6) and the passive voice (Unit 7). It could reflect on the fact that these items, which are part of the linguistic competence inside the communicative language competence, are further reviewed in the Maths textbook so a dual purpose would be met: they are used to make sense of the contents in the Maths class and they are a recap on the learned knowledge in the English lesson.

In regards to lexical items, a division was made between content-obligatory language and content-compatible language. As it has been pointed out in the analysis, most of the content-obligatory words came from Latin origins, thus, as the students' mother tongue is Spanish or Galician (both Romanic languages) the specific vocabulary with Latin etymology would be easy for them to understand due to the similarity of these words to the Spanish homologues. The reason behind the high number of Maths-related words to Latin (and Greek) resides in the history of this field of study which began in Greece and was adopted later by the Romans among other civilizations, hence, the high number of Maths words with Latin and Greek roots. If this historical view is taken into account, it could be established that choosing Maths as the subject for a CLIL lesson in a Spanish/Galician speaking high-school would benefit the students not only because of socio-linguistic reasons, but because students would find easier the specific vocabulary of Maths as it is very similar to their L1.

WORKS CITED

- Dale, L. & Tanner, R. (2012). *CLIL Activities: a Resource for Subject and Language Teachers*. Cambridge: Cambridge University Press.
- Dalton-Puffer, C. (2007). *Discourse in Content and Language Integrated Learning (CLIL) Classrooms*. Amsterdam: John Benjamins Pub.
- Dalton-Puffer, C. (2009). Communicative Competence and the CLIL Lesson. In Ruiz de Zarobe & Jiménez Catalán (eds.), *Content and Language Integrated Learning: Evidence from Research in Europe* (197-214). Bristol: Multilingual Matters.
- Evnitskaya, N. & Morton, T. (2011). Knowledge Construction, Meaning Making and Interaction in CLIL Science Classroom Communities of Practice. *Language and Education*, 25 (2), 109-127. DOI: 10.1080/09500782.2010.547199

- Garvi Herizo, M. A., Sánchez Rodríguez, R. & González Pérez, J. I. (n. d.) *Mathematics: 4º ESO*. Valencia: Educalia Editorial.
- Jäppinen, A. (2005). Thinking and Content Learning of Mathematics and Science as Cognitional Development in Content and Language Integrated Learning (CLIL): Teaching Through a Foreign Language in Finland. *Language and Education*, 19 (2), 147-168. DOI: 10.1080/09500780508668671
- Johnston, O. (2012). *Interface 4: Workbook*. Oxford: Macmillan.
- Marsh, D. (2013). *The CLIL Trajectory: Educational Innovation for the 21st Century iGeneration*. Córdoba: Universidad de Córdoba.
- Marsh, D., Mehisto, P., Wolff, D. & Frigols Martín, M. J. (2011). *European Framework for CLIL Teacher Education: A framework for the Professional Development of CLIL Teachers*. Graz: European Centre for Modern Languages.
- Mauchline, F. (2012). *Interface 4: Teacher’s Book*. Oxford: Macmillan.
- Novotná, J. & Hofmannová, M. (n. d.). *CLIL and Mathematics Education*. Retrieved from: <http://math.unipa.it/~grim/Jnovotna.PDF>
- Pavón Vázquez, V. (2013). Foreword. In Marsh, *The CLIL Trajectory: Educational Innovation for the 21st Century iGeneration* (11-16). Córdoba: Universidad de Córdoba.
- Teaching Knowledge Test (TKT) Content and Language Integrated Learning (CLIL): Handbook for Teachers*. (n. d.). Cambridge: Cambridge University Press.
- Teaching Maths in English – a CLIL Approach* (n. d.). Cambridge: Cambridge University Press.

Annex 1: Conditionals

Examples: Conditionals	Notes
If the slope is the same for two different pairs of points, then the three points are collinear.	Zero conditional
If it is , then it means that the 3 points are collinear.	Zero conditional
If $n = 0$, you obtain a linear function $y = mx$ that goes through the origin [...]	Zero conditional: instead of using the verb tense ‘equals’, = is used.
If you use cross-multiplication in (*) and you isolate the y-variable, you can easily obtain the equation in the slope-intercept form [...]	Zero conditional: the modal verb “can” is used along with “obtain”.
The point-slope form is useful if the slope m and a point (x^1, y^1) through which the line passes are known .	‘Mixed’ conditional: instead of using an active verb tense after <i>if</i> as it is usual, a present

	simple tense with a passive voice is used.
If two non-vertical lines are parallel, then they have the same slope.	Zero conditional
If two distinct non-vertical lines have the same slope, then they are parallel.	Zero conditional
If two non-vertical lines are perpendicular, then the product of their slopes is -1.	Zero conditional
If the product of the slopes of two lines is -1, then the lines are perpendicular.	Zero conditional
If the lines are intersecting, calculate the intersection point.	Zero conditional: the second part could be described as an order (imperative), so it would not be classified as a hypothesis.
If you use the formula [...] you get [...]	Zero conditional
Then, if you square both terms, you get the equation of the circumference.	Zero conditional
If you use an inequality sign (<, >, ≤ or ≥) instead of [...] the region that you get is [...]	Zero conditional
If the inequality is true, the half-plane includes this test point [...]	Zero conditional
If the inequality is false, the half-plane does not include [...]	Zero conditional
If you substitute $x = 0$ and $y = 0$ in the inequality you get [...]	Zero conditional
If you had chosen a test point situated on the other half-plane [...] you would have got [...]	Third conditional

Annex 2: Modal Verbs

Examples: Modal Verbs	Notes and Category
For instance, you might need to find a point that divides a given segment into equal halves.	Hypothesis
The point P must be the midpoint between the point A and its symmetrical point.	Certainty
You can use the slope formula [...]	Ability
[...] you should know that the graph of the function [...] is a straight line.	Hypothesis
The equation [...] can be given in the form [...]	Possibility
The expression (*) is true because a generic point (x, y) of this line must be collinear with the two given points, so the slope must be the same for both pairs of points.	Certainty
[...] one of the denominators can be equal to zero.	Possibility

If you use cross-multiplication [...] you can easily obtain the equation [...]	Ability
Finally, you can express the equation [...]	Ability
The other forms may be different depending on the point that you choose [...]	Hypothesis
On, the plane, two straight lines may be [...]	Hypothesis
You can easily calculate the slope of [...]	Ability
This formula can be verified using [...]	Possibility
To check [...] you can use the following method [...]	Ability
[...] so you can shade the resulting region [...] (x2)	Ability The (x2) means the sentence was repeated.
For example, you can choose the test point [...]	Hypothesis: 'for example' changes the modal verb so the sentence becomes a hypothesis.
[...] you would have got $1 \leq 4 - 2$ [...]	Hypothesis
[...] and the final solution would be the same.	Hypothesis
In this case you should draw it as a broken line [...]	Advice
In this case [...] so you cannot choose it [...]	Obligation
You must take into account that all inequalities must be verified at the same time, so you must graph the intersection [...]	Obligation
[...] you can easily represent the solution region [...]	Ability
Given a triangle, we can define three [...]	Ability