

Textbook analysis for literacy development in CLIL

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ABSTRACT: The flourishing of Content and Language Integrated Learning (CLIL/bilingual) programs in Spain has led national and international textbook publishers to see a market niche and to launch into publishing textbooks for CLIL contexts (López-Medina, 2016). The general objective of this study is to analyse the contents of 24 CLIL textbooks used in the teaching and learning of the subject of Biology and Geology as an academic discipline in the region of Andalusia (Spain) in order to identify their internal coherence with respect to the methodological principles related to the cognitive discourse functions (CDFs) and the textual genres that predominate in the work plans- namely, tasks, activities and academic questions- present in these textbooks that characterize the subject of Biology and Geology. To address the research questions, a quantitative analysis was conducted.

Overall, in relation to the text genres present in most work plans (tasks, activities and questions) no text genre was specified; moreover, results also reveal a preponderance of the CDF "describe". The implications of the results are that sole reliance on textbooks could be detrimental to the development of academic literacy if CDFs and genres to which students should be exposed are limited.

Keywords: CLIL textbooks, literacy development, tasks, genres, cognitive discourse functions.

Un análisis de los libros de texto para el desarrollo de la literacidad en AICLE

RESUMEN: El florecimiento de los programas de Aprendizaje Integrado de Contenidos y Lenguas Extranjeras (AICLE/programas bilingües) en España ha llevado a las editoriales de libros de texto nacionales e internacionales a ver un nicho de mercado y a publicar libros de texto para contextos AICLE (López-Medina, 2016). El objetivo general de este estudio es analizar los contenidos de 24 libros de texto AICLE utilizados para la enseñanza y aprendizaje de la asignatura de Biología y Geología como disciplina académica en la región de Andalucía (España) con el fin de identificar su coherencia interna con respecto a los principios metodológicos relacionados con las funciones cognitivo-discursivas del discurso (FCD) y los géneros textuales que predominan en los planes de trabajo- tareas, actividades y preguntas académicas- presentes en estos libros de texto que caracterizan la asignatura de Biología y Geología. Para responder a las preguntas de investigación, se realizó un análisis cuantitativo.

En general, en relación con los géneros textuales presentes, en la mayoría de las tareas, actividades y preguntas no se especificó ningún género textual; además, los resultados tam-

bién revelan una preponderancia de la función cognitivo-discursiva «describir». Las implicaciones de los resultados son que la dependencia exclusiva de los libros de texto podría ser perjudicial para el desarrollo de la literacidad académica si se limitan las FCD y los géneros a los que los estudiantes deberían estar expuestos.

Palabras clave: Libros de texto, AICLE, literacidad, tareas, géneros, funciones cognitivas del discurso.

1. INTRODUCTION

Over recent decades, Content and Language Integrated Learning (CLIL), where subject content is taught through an additional language, has expanded worldwide, particularly in Europe (European Commission, 2017). In Spain, although CLIL programs grew rapidly, there was initially a notable shortage of ready-made materials, including textbooks, which became a common concern among teachers and stakeholders (Mäkiranta, 2014; Mehisto et al., 2008). This initial scarcity of commercial materials forced teachers to “create their own materials from scratch, employ ‘diluted’ authentic materials or adapt authentic materials in line with the teaching goals” (Moore & Lorenzo, 2007, p. 28). Today, national and international publishers offer textbooks for CLIL contexts in Spain (Lopez-Medina, 2016), along with a broader range of online materials and websites for materials development (López- Pérez & Galván Malagón, 2017). The importance of textbooks, or coursebooks, as essential teaching and learning materials is widely recognized (Mikk, 2000; Oakes & Saunders, 2002), having long been described as the “visible heart of any...educational program” (Sheldon, 1988, p. 237). This research departs from the hypothesis that teachers in bilingual/CLIL secondary schools in Andalusia, southern Spain, likely use textbooks specially designed for CLIL contexts, reflecting trends found in L1 education in Spain, where Travé-González et al. (2015) reported that 95% of teachers used textbooks in their classes.

Research on CLIL materials is still in its infancy (Banegas, 2017; Banegas & Tavella, 2021; Romeu Peyró et al., 2020), although some studies exist, for example, Lorenzo (2013), highlighted teachers’ struggles in designing CLIL materials for a whole-school curriculum; while Mäkiranta (2014) investigated teachers skills in materials design but noted the need for more research on how materials are used in CLIL contexts. Similarly, Banegas, (2010, p. 14) stressed the importance of studying how teachers adapt textbooks and develop their own materials to meet their specific classroom needs. While existing studies have advanced the field of CLIL materials, few have specially analysed the content of CLIL textbooks for secondary education. This research aims to contribute to this field and more specifically to the analysis of textbooks for CLIL. According to Tomlinson (2012, p. 148), materials analysis seeks to “identify what they contain, what they ask the learners to do and what they say they are trying to achieve”.

The general objective of this study is to analyse the content of 24 textbooks used for teaching Biology and Geology as an academic discipline in bilingual secondary education (CLIL approach) in Andalusia. The aim is to assess their internal coherence with respect to the methodological principles that should govern CLIL materials and evaluate their effectiveness in the learning of language, content and literacy development. The selected methodological principles for this study focus on cognitive discourse functions (Dalton-Puffer, 2013) and the predominant textual genres in the workplans characteristic of Biology and Geology, as outlined in section 3.1.

2. WHAT'S CLIL

CLIL stands for “Content and Language Integrated Learning”, a term coined in 1994 in Europe by a group of bilingual education specialists: UniCOM, a continuing education centre of the University of Jyväskylä (Finland) and the European platform for Dutch Education (Pérez-Cañado, 2012), stemming from European multilingual policies (Marsh, 2013). CLIL refers to any educational approach where an additional language (a vehicular language, mainly a foreign language or L2, or a minority language (Marsh, 2002)) is used for teaching non-linguistic contents to learners still developing proficiency in that language (Karabassova & Oralbayeva, 2023). Examples include Spanish students learning Science or Math through English, with countless possible language-subject combinations worldwide (Mehisto et al., 2008).

Marsh (2002) described CLIL as an umbrella term encompassing practices where “a foreign language is used as a tool in the learning of a non-language subject in which both language and the subject have a joint curricular role” (p. 58), both the content and the language are “[...]integral parts of the whole” (p. 52). Similarly, Mehisto et al. (2008) defined CLIL as a “dual- focused approach” (p. 9), balancing subject matter learning with L2 learning while supporting L1 (mother tongue) development. CLIL practices vary widely across countries and contexts in Europe and beyond (Nikula, 2016), making CLIL highly contextual (Lopriore, 2020). The report CLIL/EMILE: The European Dimension (Marsh, 2002) detailed the diverse forms of CLIL across Europe and offered recommendations for good practices (Nikula, 2016). Although CLIL is not a new concept (Marsh, 2002), as Europe historically used Latin or Greek as languages of instruction and learning (Dalton-Puffer et al., 2010), a key difference today is that CLIL is publicly funded and integrated in mainstream education, making it more universal (Dalton-Puffer et al., 2010, p. 3). Its uniqueness as an educational approach is recognized, despite sharing features with other models such as CBI or immersion programmes.

3. KEY CONSIDERATIONS IN MATERIALS DESIGN FOR CLIL

3.1. Principles for CLIL materials

Pérez Cañado (2018) highlighted the need for research on the characteristics of both the materials and resources used in CLIL, as well as for more principled-based materials (Ávila-López, 2020).

Responding to this call, the authors of the present study have developed a set of CLIL-specific principles to serve as a non-prescriptive guide for materials developers and teachers. Literature on suggesting pedagogical principles for CLIL materials abounds (Bane-gas, 2014), this is why a summary of such principles is provided in the table below. They are grouped according to the aspects they are focusing on, mainly, *input*, *scaffolding*, *tasks*, *activities and questions*, and finally, *assessment* and they have been extracted in order of appearance from the year 2008 until 2020. It is by no means an exhaustive list as others may emerge (Czura, 2017). However, some of them are particularly relevant for the study present in this paper, as they are used as a guiding framework from which more specific

dimensions depart. These dimensions are described in section 3.2.

We are aware of the challenge for teachers to try to comply with all these principles when they have to design their own materials, however, the more they try to comply with the better. In the case of ready-made materials, it would be expected that they would comply with the methodological recommendations in a more systematic way owing to their specialized teams of experts dedicated to the development of educational materials. This paper intends to find out how frequent those CLIL-specific principles are already present in the textbooks, something that has been relatively little researched (Banegas, 2014), because there is a need to understand how far existing textbooks are complying with the principles presented here to identify any gaps and make recommendations for improvement (Harwood, 2010). This study therefore conducts an analysis of specific textbooks; it is not an evaluation of such textbooks. An analysis aims to provide an objective portrayal of the materials “as they are” (Littlejohn, 2011, p. 181) whereas an evaluation seeks to know how materials behave in action, that is, the effect that they have on users in the classroom (McGrath, 2002).

Table 1. Principles for CLIL materials design

Focus	Principles	References
Input	• It should be comprehensible	Coyle et al., 2010; Mehisto et al., 2008
	• It should be challenging, rich, motivating, stimulating and authentic	Ávila-López, 2020
	• It should consist of increasingly sophisticated text types, such as visuals, tables, diagrams, bulleted and continuous texts	Coyle et al., 2010
	• It should consist of subject-specific genres, presented in a variety of modes	Meyer et al., 2015
	• It should also be grammatically and lexically appropriate for learners although language can gradually become more complex as contents are consolidated and learners gain more confidence	Coyle et al., 2010
	• Key language of input should be made salient	Ball et al., 2016
Tasks, activities & questions	• There should be progression in tasks regarding their cognitive demands. Appropriate progression can be achieved by considering Bloom’s taxonomy and Cummin’s CLIL matrix	Coyle et al., 2010
	• First focus on lower order thinking (LOTS) and gradually include more specific and challenging tasks or questions using higher order thinking (HOTS)	Dale & Tanner, 2012; Mehisto et al., 2008
	• Cognitive Discourse Functions (CDFs) should be considered for the design of learning tasks	Meyer et al., 2015; Morton, 2020
	• Tasks or activities should promote work with subject genres or subject-specific literacies	Meyer et al., 2015; Pimentel-Velázquez & Pavón-Vázquez, 2020; Ávila-López, 2020
	• Tasks should focus on the four linguistic skills (listening, reading, writing and speaking) for the manipulation of contents	Czura, 2017; Pimentel-Velázquez & Pavón-Vázquez, 2020
	• Special relevance should be given to the productive skills and communication aspects of grammar, vocabulary and pronunciation should also be addressed	Czura, 2017

Focus	Principles	References
Scaffolding	• Both input and output scaffolding have to be provided for students	Meyer, 2010
	• ICT applications may be used to support learning	Guerrini, 2009
	• Cognitive fluency can be fostered through scaffolding of “content, language, learning skills” according to individual needs	Coyle et al., 2010; Mehisto, 2012, p. 24
Output	• Output can be triggered by means of tasks manifested by means of authentic products, such as posters, brochures or letters	Dale & Tanner, 2012
	• Output should be encouraged for the development of academic language and subject-specific literacies or “pluriliteracies”	Mehisto, 2012; Meyer et al., 2015; Ávila-López, 2020
Assessment	• A wide range of assessment should be used: both spoken and written assessment, such as magazine articles, essays, dramatic presentations, or drawings; including activities and tasks aiming at assessment <i>for</i> learning is important as it will encourage the learning of both subject and language	Dale & Tanner, 2012
	• Assessment tools of a formal (tests) and informal nature (diaries, self-assessment, portfolios, assessment of projects, etc.) should be used	Pimentel-Velázquez & Pavón-Vázquez, 2020
Pimentel-Velázquez & Ellison, 2023		

3.2. Literacy-supporting dimensions: school genres & CDFs

Hereon we establish the main considerations in CLIL materials relevant for our study, based on the underpinning principles above; specifically, we have considered it relevant to study the characteristics of the workplans present considering the CDFs, the text genres—their importance and relevance is explained below. Following Breen (1989), a workplan is “a designed proposal of work with its objective, contents and procedures” (p.188); the concept of workplan was also used by Ellis (2003) in his definition of a task, which is a workplan that requires learners to process language pragmatically to achieve an outcome that can be evaluated in terms of whether the correct or appropriate propositional content has been conveyed. The CDF model has been chosen as a fundamental dimension because as Pavón Vázquez (2018) points out it is an alternative model to Bloom’s taxonomy (Bloom et al., 1956), which has long been considered a key model for describing cognitive processes in learning. However, its rigid hierarchy and limited scope have led to revisions (Krathwohl, 2002) and the emergence of alternative models. One such model is Dalton-Puffer’s (2013) seven Cognitive Discourse Functions (CDFs), which focus on processes essential for constructing meaning. As she explains, “[CDFs are used as] prototypical communicative intentions about the cognitive steps that are necessary to approach knowledge” (p. 233). These include classifying, describing, defining, evaluating, explaining, exploring and reporting, along with their associated members, such as labelling and specifying for the CDF “describe”; the importance of textual genres to understand and verbalize academic contents is explained below.

3.2.2. *Focus on the genres of Science*

Learners need to work with different types of texts typical of the subjects being studied, in different types of modes as they need to progress from the “grammar of speaking” to the “grammar of writing” (Coyle & Meyer, 2021, p. 71) and with appropriate scaffolding construct such texts independently. Being able to understand, interpret and produce different types of texts will allow learners to progress on their (pluri-) literacies development (Coyle et al., 2023). The genres presented here represent the ones that students have to produce in written assignments and examinations (Veel, 1997) and thus the ones that could be mostly present in published materials. Each of these genres has a social purpose, a set of varieties or sub-types and they will be carried out in a series of stages, the types of genres used in this study correspond with the main written genres present in school Science- CLIL and non CLIL- based on Veel (1997), Martin & Rose (2008), Llinares et al. (2012) and Derewianka & Jones (2016), mainly:

- A. Procedures: their purpose is to instruct on how to do something, as in the case of the scientific experiment.
- B. Procedural recounts: they inform how an investigation or experiment was carried out (i.e. experiment report).
- C. Explanations: they explain how and why something happens or works, within this category we have: sequential explanations, causal explanations, consequential explanations, system explanations, factorial explanations, conditional explanations, cyclical explanations and theoretical explanations.
- D. Reports: they aim at classifying and describing phenomena, there are different types, for instance, descriptive reports, classifying reports, compositional reports, comparative reports and problem-solving reports.
- E. Expositions and discussions: they argue and persuade about scientific issues.

In this study, “definitions” and “summaries” have been considered as part of this typology of text genres due to their wide abundance in the tasks of the textbooks studied, it has been observed that “definitions” are especially abundant.

3.2.3. *Focus on the Cognitive Discourse Functions*

The CDFs are “discursive, lexical and grammatical schemata arising from the routines of working with and towards specialist knowledge and which form an integral part of spoken and written subject literacy” (Dalton-Puffer et al., 2018, p. 7). According to Coyle & Meyer (2021), Cognitive Discourse Functions (CDFs) are cognitive operations which can function independently as lesson learning goals and serve as “building blocks for larger texts or genres” (micro-genres).

CDFs represent how cognitive processes are verbalized during content learning, helping learners deepen their understanding and refine academic literacy. They are grouped into seven main categories (see Table 2). Morton (2020) highlighted their value for task design, as they correspond to action verbs that learners can actively engage with.

Table 2. Cognitive Discourse Functions

CDF	Communicative intention	Other members
Type 1 Classify	I tell you how we can cut up the world according to certain ideas.	classify, compare, contrast, match, structure, categorize, subsume.
Type 2 Define	I tell you about the extension of this object of specialist knowledge.	define, identify, characterize.
Type 3 Describe	I tell you details of what can be seen (also metaphorically).	describe, label, identify, name, specify.
Type 4 Evaluate	I tell you what my position is vis a vis X.	evaluate, judge, argue, justify, take a stance, critique, recommend, comment, reflect, appreciate.
Type 5 Explain	I give you reasons for and tell you cause/s of X.	explain, reason, express cause/effect, draw conclusions, deduce.
Type 6 Explore	I tell you something that is potential.	explore, hypothesize, speculate, predict, guess, estimate, simulate, take other perspectives.
Type 7 Report	I tell you about sth. external to our immediate context on which I have a legitimate knowledge claim.	inform, recount, narrate, present, summarize, relate.

Note: Adapted from “Cognitive discourse functions: Specifying an integrative Interdisciplinary Construct” by C. Dalton-Puffer, in T. Nikula, E. Dafouz, P. Moore and U. Smit (Eds.), *Conceptualizing Integration in CLIL and Multilingual Education* (p. 33), 2016, Multilingual Matters.

4. THE STUDY

4.1. Aims and Research questions

This study analyses 24 Biology and Geology textbooks for 1st, 3rd, and 4th years of Compulsory secondary education- (ESO) -targeting students aged 12-16. The textbooks, from major national and international publishers in Spain, meet the Andalusian curriculum requirements and are specifically designed for CLIL (bilingual) contexts in Andalusia. This study seeks to identify the dominant CDFs and text genres that support literacy development in the workplans (tasks, activities and academic questions) featured in these textbooks. It is guided by the following research questions:

- (1) What type of text genres predominates in the tasks, activities and academic questions, and how often do they appear?
- (2) Which CDFs, if any, are promoted in the textbooks and how often do they appear?

4.2. Methodology

To answer the research questions, a quantitative analysis was carried out. Textbooks were selected from the “Register of Textbooks and Complementary Material” of the Junta de Andalusia (Autonomous Government) between February and March 2020. Eight textbooks were selected for each of the levels of Compulsory secondary education (ESO) where the academic subject of “Biology and Geology” is taught, meaning the 1st, 3rd and 4th lev-

els, this subject is not taught in the 2nd level of ESO. None of these textbooks has been discontinued. One unit from each textbook was selected at midpoint, as recommended by Littlejohn (2011); all the units analyzed correspond to the Biology contents of the textbooks. Textbook were selected based on the following criteria:

- (1) the title appeared as “Biology and Geology” in English in the official Register.
- (2) the textbook was valid in the Register at least until August 2020.
- (3) the publisher offered textbooks for all relevant secondary education levels– 1st, 3rd and 4th.
- (4) the textbook could be purchased through a local bookshop.

4.2.1. Procedures

The study focuses on the analysis and classification of each one of the workplans (tasks, activities and academic questions) in each unit in terms of the cognitive discourse functions and the text genres present in them. A first-glance analysis of the table of contents of each textbook determined the specific unit to be analysed. The analytical tool (Table 3), a checklist specially developed for the analysis was used to determine whether workplans fitted into the analytical parameters/categories according to the following:

- (1) Type of CDF, if any, present in each one of the tasks, activities and academic questions;
- (2) Type of genre present in the prompts of such tasks, activities and questions. If not explicitly mentioned, then genre implicitly expected (Llinares et al., 2012);

The classification of the type of CDF and text-genre is based on the wording of the instructions of each workplan; the checklist allowed us to analyse and classify each one of the workplans according to the CDFs that they contain, the genres that are expected (explicitly or implicitly) in each one of the prompts.

For the purposes of the study all the workplans present in each of the units were analysed not only those present in the sections “Activities” of each selected unit. Some workplans were displayed not only in these specific sections but also along the units. Once a workplan was identified, its wording was analysed for action verbs telling learners what to do in the workplans. Examples of the analysis performed on workplans include the following, which was extracted from one of the textbooks of the 1st year of secondary education:

1. *Using your own words, write a definition for the following words: isolate, advocate, persecute:* in this case, this workplan belongs to the category question for facts, the CDF corresponds to “define”, the type of output required is linguistic complex; the implicit genre is a definition.

The checklist guided the following steps:

- (1) Classifying type of workplan (task, activity or question) under the “kind of WP” section;
- (2) Identifying any CDFs present in the “CDFs” section;
- (3) Noting whether instructions explicitly or implicitly require students to produce a specific textual genre (section “genres”).

When workplan instructions included more than two action verbs, each was treated as a separate workplan. After applying the checklist to each workplan, the data were entered into SSPS software to analyse frequencies of both CDFs and Science genres. Results were obtained in percentages.

Table 3. The Checklist

Workplan n°		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Kind of WP	Total	
Genres	Procedure																							
	Procedural recount																							
	Explanation (sequential, causal, consequential, system, factorial, conditional, cyclical & theoretical)																							
	Report (descriptive, classifying, compositional, comparative & problem-solving)																							
	Exposition																							
	Discussion																							
	Summary																							
	Definition																							
CDFs	0. None																							
	1. Classify																							
	2. Define																							
	3. Describe																							
	4. Evaluate																							
	5. Explain																							
	6. Explore																							
7. Inform																								

5. RESULTS

The results obtained from the analysis are presented in accordance with the research questions.

5.1. What type of text genres predominates in the tasks, activities and questions, and how often do they appear?

Figure 1 indicates an analysis of genres that are elicited in the workplans for level 1. There is a preponderance of “no genre” (48.0%), which means that in most of the workplans no genres are explicitly or implicitly expected as learner output. However, in 16.9% of the workplans analysed, the “descriptive report” is explicitly required or implicitly expected as analysed in the wording of the instructions. In 9.8% of the workplans learners are asked to provide a “definition”. In 7.1% of them the “exposition” genre is asked to be produced, followed by a “comparative report” (6.1%), a “classifying report” (2.6%), a “factorial explanation” (2.2%), a “compositional report” (1.6%), a “summary” (1.4%) and a “procedural recount”, which represents only 1%. The lowest scores are for causal “explanations” (0%), “conditional explanations” (0%), “system explanation” (0%), “problem-solving reports” (0%) and “biographical recounts” (0%); sequential explanations have an anecdotal representation, with only 0.6%, the same as “procedures” (0.6%), “consequential explanations” (0.6%), “cyclical explanations”, “theoretical explanations” represent 0.2% of the genres present, the same as the category of “mixed genres” (0.2%).

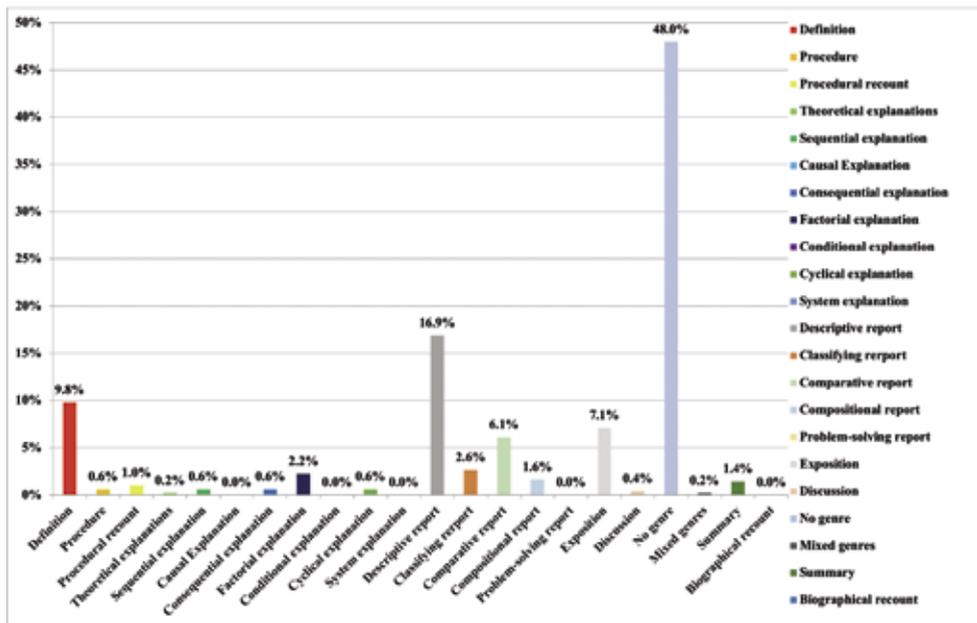


Figure 1. Frequency of Genres level 1

Note: N = 492

Figure 2 shows genres present in workplans of level 3. The highest scores occur in “no genre” (62.2%). It is followed by genres of: “definition” (8.3%), “descriptive reports”

(6.2%), “sequential explanations” (6%), and “expositions” (5.3%), “comparative reports” (4.7%), “summaries” (2.5%) and “compositional reports” (1.9%). The remaining genres are present marginally, with percentages ranging from less than 1% to 0%.

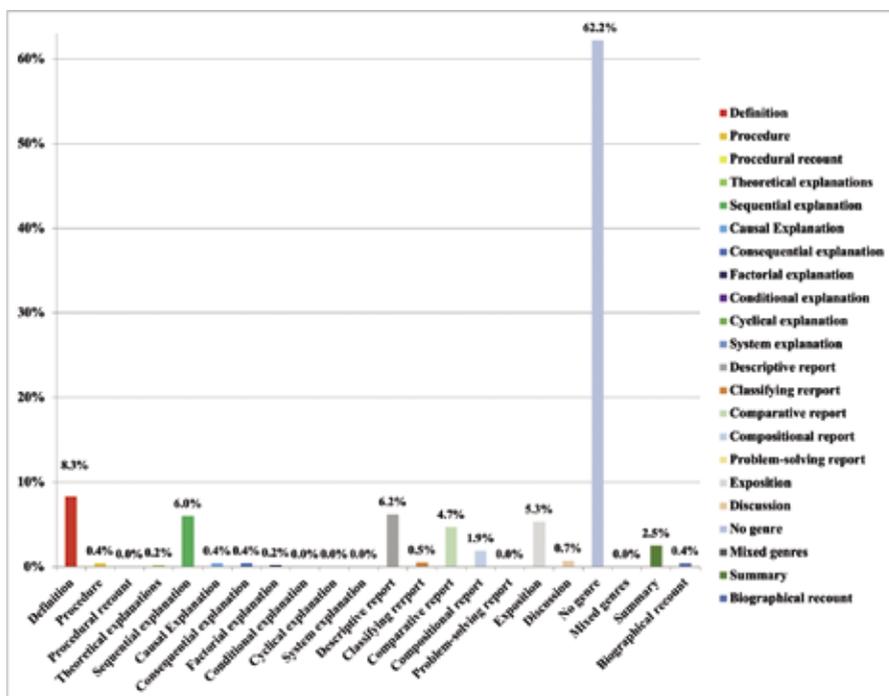


Figure 2. Frequency of Genres level 3

Note: N = 569

Figure 3 shows the genres which appear, either explicitly or implicitly, in the workplans of textbooks of level 4. 70.6% of such workplans do not identify genres; 7.6% of the workplans correspond to “definitions”; 8.4% to “expositions”. In 2.6% of the workplans “descriptive reports” can be found, 2.2 % represent “summaries”; 1.7% represent “sequential explanations”, the same as “consequential explanations” (1.7%); “comparative reports” (1.9%); the remaining genres, mainly “cyclical explanations”, “problem-solving reports”, “discussions”, “procedural recounts”, “factorial explanations” and “conditional explanations” are only displayed in less than 1% of the workplans. Other genres are not present in the workplans and thus they represent 0%.

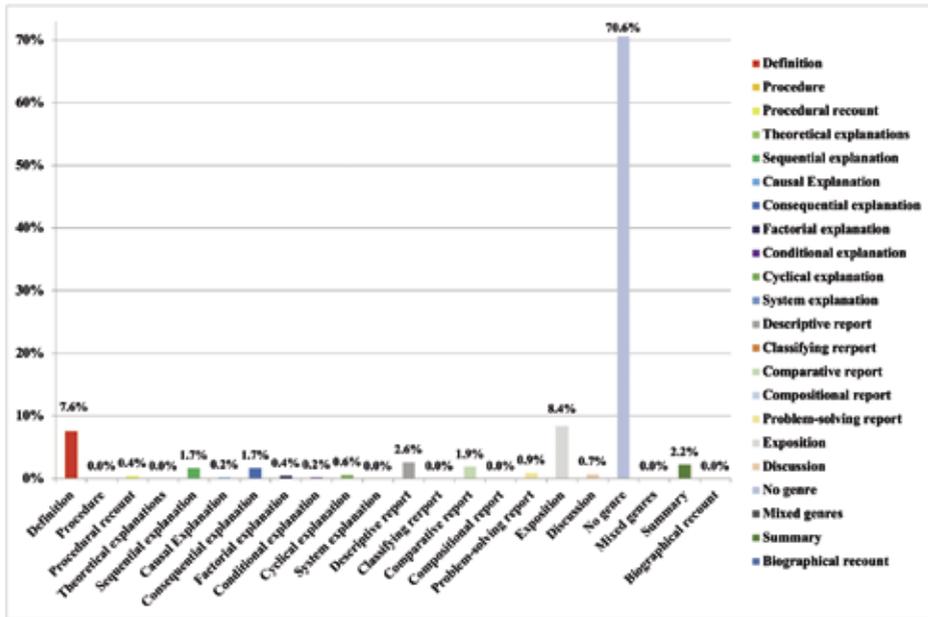


Figure 3. Frequency of Genres level 4

Note: N = 541

Figure 4 shows the average percentage of the genres present in all the workplans across the three levels. In 60.7% of the cases “no genres” were found or expected.

The second mostly present genre is the “definition” (8.6%), followed by “descriptive reports” (8.2%), “expositions” (6.9%), “comparative reports” (4.2%), “sequential explanations” (2.9%) and “biographical recounts” (2.1%); the other genres which are non-significantly present are “consequential explanations” (0.9%); “factorial explanations” (0.9%), “compositional reports” (1%) and “discussions” (0.6%); the rest of the genres are not represented and therefore their percentage is 0% .

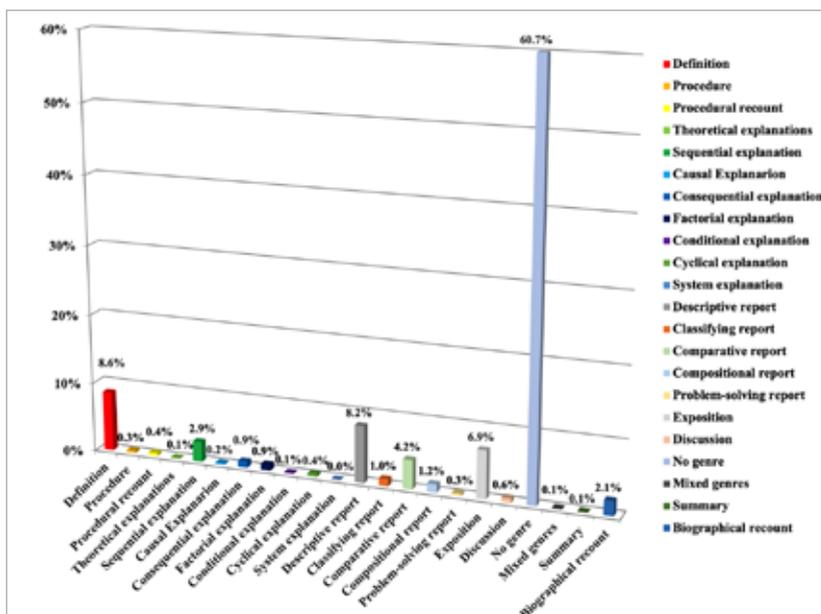


Figure 4: Frequency of Genres levels 1,3 and 4

Note: N = 1602

5.2. What CDFs are present in the textbooks and how often do they appear?

Figure 5 shows the CDFs present in the level 1 workplans. 37.4% contain the CDF “describe”; 19.3% do not contain any CDF; 10.6% contain the CDFs “define”, 10.8 % “evaluate”; followed by the CDFs “classify” (6.7 %), “explain” which are present in 7.1% of the workplans. The lowest percentages of presence are among the CDFs “report”, with 2%; explore, with 3.5%, and the “mixed” category, with 2.6%.

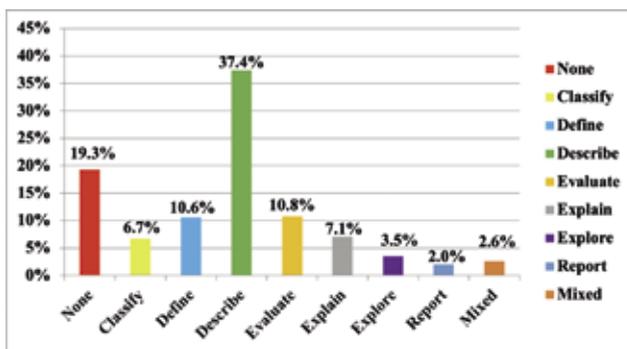


Figure 5: Frequency of CDFs in level 1

Note: N = 492

Figure 6 displays the CDFs present in the level 3 workplans of level 3. Here the preponderance of ‘describe’ is repeated, with 41%; followed by ‘explain’ (14%) and the lack of any CDF (11%); ‘explore’ with 10%, followed by ‘defined’, ‘classify’ (7%); with the lowest scores we find ‘evaluate’ (4%), ‘report’ (4%) and the ‘mixed’ category with 0%.

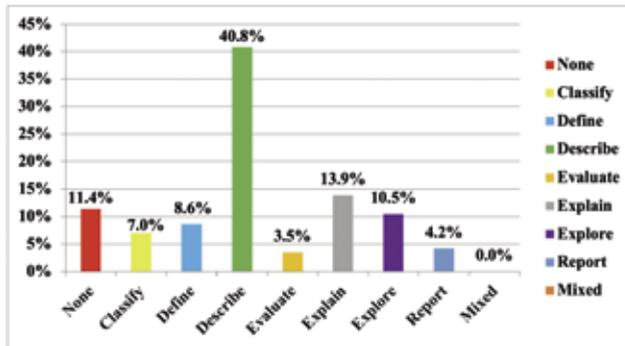


Figure 6: Frequency of CDFs in level 3

Note: N = 569

Figure 7 shows the CDFs present in the level 4 workplans. It also shows that ‘describe’ dominates over the rest of CDFs (24%), followed by ‘explore’, with 21%. There is an increase with respect to the previous level in the ‘none’ category, with 16%, followed by ‘explain’ (14%), ‘evaluate’ (8%), define (8%); the lowest scores are found in ‘classify’ (6%), ‘report’ (3%) and the ‘mixed’ category, with 0%.

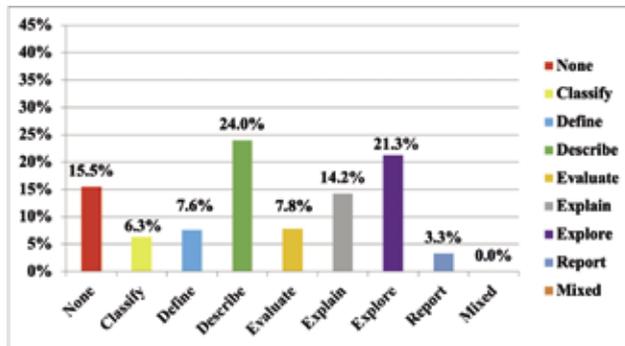


Figure 7: Frequency of CDFs in level 4

Note: N = 541

6. DISCUSSION

As far as the CDFs present, in level 1, these results are not surprising since ‘describing’ is one of the most widely carried out activities in Sciences (Dalton-Puffer, 2013). In fact,

descriptions have been considered as key elements in thinking skills and for the development of academic language. Moreover, the relatively high presence of “define” is in line with research stating that it is a very common process in the classroom, especially used in exams (Linares et al., 2012). It is surprising, however, that a percentage of activities or tasks do not correspond to any CDF (11.4%). Therefore, these authors ask themselves to which actions or verbs the activities in the textbooks refer. For the Pluriliteracies model, the presence of CDFs is fundamental for the mastery of the language, its registers, and textual genres as well as the concepts, facts and procedures typical of Science (Meyer et al., 2015; Morton, 2020). Limited awareness of the role of CDFs for deeper learning in Science, might lead to limiting language use, the scientific knowledge base and procedures embedded in progressing scientific literacies.

Among levels 1 and 3, there is not a large observable difference, such a lack of variety in the cognitive operations may affect student mastery of the academic language they need for expressing and demonstrating their understandings. Therefore, tasks and activities might not be providing adequate opportunities for advancing towards a more developed literacy level (Coyle & Meyer, 2021).

Level 4 seems to be a little more balanced in terms of the presence of different CDFs. This is a very positive move since CDFs can manifest themselves in text genres. Therefore, students may have more opportunities to elaborate different types of texts, manage the lexico-grammatical constructions of each one and advance in the development of their literacy (Meyer et al., 2015), this will only occur if the CDFs are geared towards the development of extended responses (texts).

Across levels, results demonstrate the tendency to favour the CDF “describe” rather than encouraging the development of different text genres that characterize Science (Meyer et al., 2015) and thinking processes through a wider variety of CDFs.

With regards to genres, the absence of textual genres in the workplans may indicate that learners are not being asked to develop the text genres that are specific to the school subject, this will be the case if the teacher has a strict textbook-based approach. This will also have implications with respect to the quantity and quality of learner output indicating that such output will remain at the word or sentence level. Neither do they have the opportunity to demonstrate a more elaborate handling of language resources in extended texts. This will also affect the level of knowledge and the mastery of the concepts and facts that the students have, since the more opportunities they have to express and manipulate them in different modes, the more knowledge and understanding they will have of them. In addition, the elaboration of extended texts representing different genres is a fundamental requirement in higher levels of schooling, as is manifested in the “Pluriliteracies Teaching for Deeper Learning” or PTDL (Meyer et al., 2015). In this model learners are classified into different levels of expertise they demonstrate according to different genres, modes, styles and purposes. Hence their language of schooling, according to this model can indicate novice, intermediate and expert (Coyle et al., 2023). Put simply, if learners are not progressively involved in the development of genres, they will not progress in terms of their literacy levels, thus they might remain at the novice level. The presence of descriptive reports in level 1 textbooks seems to be in line with Martin & Rose (2008), who established that reports were one of the genres most commonly present in Science. This seems also to be the case of textbooks

for level 3. In addition, “definitions”, which are present in the textbooks of the three levels with similar percentages, have been claimed to be a “micro-genre”, being able to stand alone or combined in larger genres, known as “macro-genres” (Coyle & Meyer, 2021), its presence seems to be in line with the study by Llinares et al. (2012), which already highlighted its presence in Science texts in secondary school.

7. CONCLUSIONS

In this paper 24 CLIL secondary school textbooks for the subject of Biology and Geology used in the region of Andalusia, in southern Spain, were analysed. Results indicate that the development of academic literacy within and across school levels in this subject may be compromised if the textbooks are the only materials used by teachers and strictly adhered to. Our data suggests that learners may be involved in undemanding classroom procedures (Dalton-Puffer, 2007) in which language demands are likely to be simple, at word level, or at best, complex at sentence level. These results suggest that longer texts are not being required from learners and thus few opportunities to produce genres typical of Science are provided. Moreover, if the written and oral productions are so limited this will reduce the possibilities for students to produce texts in different modes and in different styles (Coyle & Meyer, 2021; Meyer et al., 2015). Therefore, the results of this study have several pedagogical implications for both teachers and materials developers in CLIL contexts, which are described below.

The study is not without limitations. Firstly, regarding sample representativeness in the analysed coursebooks: although Littlejohn (2011) recommends that analysing 10% of a coursebook is sufficient for a valid analysis, analysing two or three units instead of just one could have yielded more significant and representative results. This would have provided a more comprehensive reflection of the textbooks as a whole. The results obtained are representative only of the specific units analysed within each textbook. Nevertheless, the study remains relevant as a first analysis of such textbooks in Andalusian CLIL contexts.

7.1. Pedagogical recommendations

The primary pedagogical recommendation for teachers and materials developers emphasizes the importance of what we refer to as “literacy-supporting dimensions”, which represent essential elements that materials and coursebooks should prioritize. A key focus is on well-established text genres and CDFs, particularly those relevant to Biology and Geology. Additionally, tasks, activities, and academic questions should systematically integrate CDFs (Dalton-Puffer, 2013), as cognitive processes inherent to formal education. These workplans should also foster extended output—beyond isolated words or individual sentences—by encouraging students to produce diverse academic genres specific to Biology and Geology. These genres must be made visible across subject areas, as emphasized by Polias (2016) and the Pluriliteracies approach (Meyer et al., 2015), which supports introducing genres both through input and output (Lorenzo, 2017). Following Veel (1997), the introduction of scientific genres should follow a progressive path that reflects increasing cognitive and linguistic complexity. Initially, genres such as procedures and procedural recounts, focused

on concrete contexts—either the immediate present (“here and now”) or past events (“there and then”)—should be introduced, followed by reports and various forms of explanations. Eventually, more complex genres such as expositions and discussions should be taught, enabling students to develop argumentation and critical thinking skills about scientific topics. This genre pathway, particularly relevant to school Sciences, requires teachers to determine suitable sequences based on the specific literacy progression required in each discipline (Coyle & Meyer, 2021; Coyle et al., 2023).

While CDFs may trigger certain genre productions, this is not always the case. For this reason, teachers should be aware of type of language elicited by textbook workplans. For instance, the CDF “classify” might be addressed with a gap-filling activity using vocabulary to sort animals, generating primarily simple linguistic output. Alternatively, students could write a classifying report, generating more extended output. To support this, teachers are encouraged to use the “teaching-learning cycle” (Rose & Martin, 2012), which provides structured support for text production and its language requirements.

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