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Il ruolo e le sfide dei Centri Linguistici universitari – Parte seconda
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Teaching Materials and CLIL Teaching

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1. INTRODUCTION

Over the past two decades there has been a growing interest, especially in Europe, in Content and Language Integrated Learning (CLIL) methodology, leading also to a significant increase in the number of studies looking into the implementation of CLIL programmes. In particular, the new learning and teaching environments being created in Italian schools following the enactment of national reform in 2012 have induced academic interest (Di Sabato 2012; Di Martino e Lopriore 2014, 2018; Cinganotto 2016). Furthermore, the academic world, and in particular the University language centres, has been called upon to take part in the education programmes for future CLIL teachers required by the school reform, which has made the teaching of at least one subject in a foreign language compulsory.

The teacher education programmes for future CLIL teachers include training sessions focusing on a number of aspects that affect the teaching and learning of a foreign language. Lesson planning and material development, together with adaptation strategies based on the underlying principles of language acquisition and on CLIL methodology *per se*, are all relevant in developing training. Thus, subject teachers need to become aware of how to manipulate a text in order to make it suitable for their learning context when both content and language are in focus. Moreover, even though a wide variety of published materials are already available in the education market, CLIL teachers need to be able to evaluate how appropriate they are for their own class and students. Indeed, adapting material from authentic sources might be too challenging for a subject teacher not yet familiar with language learning practice and principles.

In this study, opposing attitudes to and criticism of second and foreign language (S/FL) material development and its use in the classroom will be briefly reviewed. The focus will then be narrowed down to an analysis of TMs available on the Italian publishers' market to teach a variety of subjects in English through CLIL methodology. The TMs considered were used as models of reference in the methodology part of the education programmes for Sardinian subject teachers to become CLIL teachers, organized and run by the University of Cagliari Language Centre for the Italian Region of Sardinia over the past two years. The aim of this article is to suggest practical solutions for analysing TMs for CLIL classes, which can then also be used by CLIL teachers to adapt and develop CLIL materials from authentic texts.

2. THE EFL TEACHER VS. THE CLIL TEACHER

Compared to the English-as-a-foreign-language (EFL) teacher, the teacher who uses a foreign language in teaching a subject matter (subject teacher) with CLIL methodology needs first and foremost to focus on content. Thus, the input selected must be comprehensible or made comprehensible to students through ad-hoc strategies. In a CLIL class, language is not the main issue; it is rather the medium of the student-teacher-content communication dynamic itself.

English is the language most used for CLIL classes in Italy, and the vast majority of subject teachers in Italian schools are not fully competent speakers of the foreign language they are supposed to employ as a vehicle of instruction, in spite of the fact that the reform requires them to have a CEFR B2-C1 level. Therefore, subject teacher education programmes for future CLIL teachers must focus primarily on enhancing teachers' language proficiency in the foreign language. This also means helping them gain self-confidence and control over classroom language in addition to their subject language. It goes without saying that, whether the degree of CLIL implementation is extensive or partial, the fluency level in the vehicular language on the part of CLIL teachers will evidently determine their ability to provide, manipulate, and control input, as well as hone their skills in classroom management. Moreover, scaffolding strategies such as the use of writing or speaking frames are commonly used, and *translanguaging* (Wei 2018; Nikula and Moore 2019), or shifting from the learners and teacher's L1 to the vehicular language and *vice versa*, in order to provide comprehensible content, also remain an option in CLIL classes.

Clearly, training programmes need to address the question of teachers' lack of familiarity with language learning theories and with CLIL methodology. While the EFL teacher can easily identify language levels based on the Common European Framework of Reference for Languages (CEFR), and is familiar with the difficulties learners may encounter when decoding a text and with possible strategies to facilitate comprehension, the subject teacher generally lacks these skills. Besides, there is evidence to show that content teachers tend to underestimate the relevance of language choice for learning when teaching their subject in Italian (Lopriore 2018)¹.

The CLIL teacher should be able to provide scaffolding strategies for the learners so as to help them process content and do something with it, such as use it to solve problems, to hold a position in discussions, to create a text, or to develop a project etc. Despite the fact that this should also ideally be the aim of a FL class, the two learning environments continue to have different agendas. The curriculum design of FL teaching is basically still driven by stereotyped teaching patterns (grammar sequences) that research in SLA has long proved do not follow actual real-life learning sequences (Lightbown 2003). However, FL classes can and must aim to provide meaningful contexts and content for language learning, while CLIL teachers have to think about language only functionally, since their objective is to provide content in a context that is meaningful and linguistically accessible for the learner.

CLIL demands careful consideration of the challenges involved in the content provided to learners. The choice of appropriate TM and effective activities for the CLIL classroom can at times become a challenge for the teacher and compromise the success of teaching and learning outcomes. Among the results of her investigation, Lopriore (2018) lists the fact that both the selection of suitable materials and the development of pertinent reading activities often appeared to be difficult tasks for subject teachers in in-service training courses for aspiring CLIL teachers. Hence, the availability of quality CLIL materials (TMs) on the Italian publishers' market is a great resource for CLIL teachers, particularly for less experienced ones. What they do offer are examples for CLIL-learning unit organization, input-providing activities, and language-related exercises. Yet, these materials cannot be adopted *tout-court*, as subject teachers do also need to learn to evaluate them with a critical eye in the light of what both SLA research and CLIL methodology claim will favour language acquisition.

¹ For a more extended discussion on the issue see also Ferrari 2016.

3. TEACHING MATERIAL: A CRITICAL PERSPECTIVE

The 1990s witnessed the publication of a large number of FL teaching materials, especially coursebooks for EFL. Nonetheless, it was not until relatively recently that research into SLA and learning environments started to pay serious attention to TM development. When referring to TMs, authors generally make reference to all types of ready-made teaching resources, from those oriented to the development of specific skills, to language learning tasks, teacher handouts, games, and nowadays online resources, in addition to comprehensive, integrated-skills coursebooks. Mostly, reference is made to ad-hoc prepared or adapted material, although Tomlinson (2011, 2) refers to TMs as being “anything which is used by teachers or learners to facilitate the learning of a language”. Furthermore, the communicative approach² to second/foreign language teaching (S/FLT) has always advocated the extensive use of realia in the classroom. At present, the complexity of material development and production is also challenged by digitalization for in-class use and independent learning, given that a considerable amount of language teaching/learning, especially at higher level education, takes place online.

While materials for language teaching are presumably designed to facilitate language learning, both practitioners and scholars (Thornbury 2000, 2013; Hall 2011; Ushioda 2011)³ have criticized the way coursebooks are used in the FL classroom. Some authors have recommended customizing the existing coursebook so as to adapt it to the perceived needs of the class (Tomlinson 2011). Tomlinson and Masuhara 2017 and Tomlinson 2017 have argued that successful language teachers modify and supplement their coursebooks in order to facilitate acquisition. Others have encouraged materials production on the part of the teachers to tailor them to the students’ needs. Nevertheless, the coursebook still plays a prominent role in the S/FL classroom both at school and in higher education: it is a meaningful reference for the learners, it helps both the teacher and the learner to keep track of the work done, it provides an outline for syllabus design to the inexperienced teacher and it can offer students resources for preparing for specific tests or level examinations. Interestingly, coursebooks do not seem to have changed a great deal in the last thirty years, while research in SLA has identified some

² Cf. Savignon 2018 for a review of the communicative approach in second/foreign language teaching.

³ See Banegas 2012 for an overview of Dogme in ELT.

milestones that the business of TM development has a hard time taking into account.

The research on the topic over the past few decades has now established materials development as a field of academic research in its own right in foreign language teaching and learning. Key contributions to the launching of this line of research have come from Tomlinson *et al.* 2001; Masuhara 2013; McDonough *et al.* 2013; Masuhara *et al.* 2017; Tomlinson 2010a, 2010b, 2011, 2012, 2017, and Tomlinson and Masuhara 2017. These publications are mainly prescriptive, drawing on SLA research and theories, some providing insights into material design and development (Tomlinson and Masuhara 2008; Harwood 2010; Jolly and Bolitho 2011), others focusing more on the evaluation and adaptation of materials (Littlejohn 2011; McDonough *et al.* 2013). However, in spite of the available research on SLA, there is a mismatch between commercial coursebooks and what are today well-recognised truths about language acquisition (Tomlinson 2017). Unfortunately, not much information is available on case studies based on the use of TMs in the classroom by both teachers and learners, as has been noted elsewhere (Tomlinson and Masuhara 2010b; Garton and Graves 2014).

Tomlinson 2017 outlines five main principles for materials development promoting language acquisition based on well-accepted and well-established lines of thought in SLA research (see *Tab. 1*).

Table 1. – Five main principles for material development for language acquisition proposed by Tomlinson 2017 used here to analyse CLIL textbooks.

Principle 1: That the learners are exposed to a rich, re-cycled, meaningful and comprehensive input of language in use.
Principle 2: That the learners are affectively engaged.
Principle 3: That the learners are cognitively engaged.
Principle 4: That the learners are sometimes helped to pay attention to form whilst or after focusing on meaning.
Principle 5: That the learners are given plentiful opportunities to use the language for communication.

The first principle, of providing meaningful and comprehensive input of language in use, is a basic tenet of the communicative approach to language learning, together with the idea that input should be made comprehensible, deriving from Universal Grammar (UG) and Input Processing (IP) theories. According to IP, language acquisition takes place when the learner can make form-meaning connections. Put in VanPatten's words: "acquisition is, to a

certain degree, a by-product of comprehension. Although comprehension cannot guarantee acquisition, acquisition cannot happen if comprehension does not occur” (2007, 115). Accordingly, input has to be in some way challenging for the learners and it has to be provided through a variety of channels (visuals, maps, graphs, tables, soundtracks, and of course spoken and written texts) that engage learners affectively and cognitively. When the processing stages steer learners’ attention to form, as part of the meaning comprehension process, the supporting intervention of the teacher by means of appropriate materials, helps students make form-meaning connections. Eventually, learners will need opportunities and environments for real communication. The use of these five prerequisites to assess coursebooks led Tomlinson to conclude that the materials evaluated only accidentally matched with principles and strategies that facilitate language acquisition. Besides, the fifth principle, to provide for learners opportunities to use the language for real communication, was seldom considered in the coursebooks analysed, in spite of the fact that it is essential for the development of communicative competence; the focus of coursebooks continues to be especially on form and on structured production.

In conclusion, this short review of the literature on teaching material development has made it clear that the language teaching material available on the international market is not always geared to developing the ability to communicate effectively, nor is it much organized in terms of what is known will facilitate language acquisition. Accordingly, a successful use of available materials requires integration, adaptation, and puts the onus on the teacher to tailor materials to the learning needs of the class.

4. TEACHING MATERIAL FOR THE CLIL CLASS

CLIL involves the teaching of non-language subjects “*with* and *through* a foreign language” (Eurydice 2008, 8). It is an integrated model of learning involving subject matter as well as language learning. The content teacher will have to adjust the subject-specific content so as to make it comprehensible to the learners. The scaffolding strategies CLIL proposes are meant to help learners to process content as well as to develop cognitive skills. According to Coyle *et al.* (2010, 11), “the effective constructivist educational practice it [CLIL] promotes, can also have an impact on conceptualization (literally,

how we think), enriching the understanding of concepts and broadening conceptual mapping resources”.

CLIL involves a triple focus on content, language (communication) and cognition, where culture is the outcome of the interaction of these three aspects. Content is taught through strategies that involve language processing for meaning comprehension. Great emphasis is placed on lexicon, and grammatical features are instrumental to text processing. In other words, language comes into play to make content transparent and accessible to learners, and to give them the tools to discuss, justify, and explain content through communication.

CLIL aims to offer opportunities to go beyond the traditional subject matter, to approach content from interdisciplinary perspectives, to promote cross-curricular collaboration and issue-led enquiries, and to favour spontaneous speech. Therefore, learning content in CLIL is not only a matter of *what*, but also of *how* to provide content for learning, which is then supposed to take place through strategies that keep the learners affectively and cognitively engaged. Coyle *et al.* (2010, 29) talk about social-constructivist learning, which “focuses on interactive, mediated and student-led learning” in a scenario that “requires social interaction between learners and teachers and scaffolding learning [where] [...] the teacher’s role involves facilitating cognitive challenge”.

Coyle’s (1999) four ‘Cs’ building blocks of CLIL’s pedagogical framework have only been briefly covered: content, communication, cognition and culture (see *Fig. 1*).

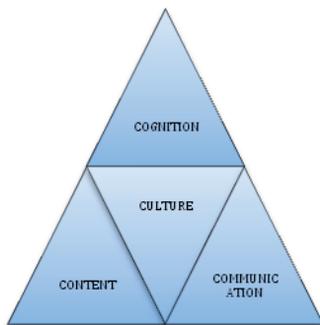


Figure 1. – Coyle’s 4Cs (1999), the four building blocks of CLIL pedagogic framework used to analyse CLIL textbooks.

The underlying precept is that teaching materials available for CLIL classes should have rich, meaningful and comprehensible content to provide effective input. Activities in class should engage learners both affectively and cognitively, learners ought to be disengaged from linguistic difficulties and teachers should eschew lengthy explanations, focussing instead on tasks involving learners in effective communication. These aspects succinctly reflect the five main principles of material development for language acquisition proposed by Tomlinson (2017; see *Tab. 1*). Of course, there should be greater emphasis on the processing of linguistic aspects in the material oriented to language acquisition, while the emphasis has to be more on content in the material selected specifically for CLIL classes.

Coyle and other specialists in the field (Moore and Lorenzo 2007; Coyle *et al.* 2010; Mehisto 2012; Morton 2013; Gondoavá 2015; Ball 2018) have highlighted the scarcity of suitable materials for CLIL and have suggested a set of criteria for CLIL materials development. In his checklist for planning CLIL teaching/learning sequences using the CLIL curriculum framework, at the stage where the teacher should prepare the learning context, Coyle (2007, 15) suggests preparing appropriate material “with special attention to those incorporating learning strategies and pedagogical scaffolding”. Moore and Lorenzo 2007 suggest that CLIL teachers can either produce their own materials, use authentic materials as they are or adapt these to their teaching goals. However, these options require teachers to have both skills and experience in CLIL. The degree of expertise and the workload involved in designing and creating materials for CLIL curricula places a great demand on the CLIL teacher.

As regards more concrete aspects concerning CLIL, such as to how content can be made comprehensible to learners, Ball 2018 warns that materials must be designed around considerations of salience and comprehensibility. On the question of authentic material adaptation, Moore and Lorenzo 2007 suggest that a text providing input should be simplified to its basic meaning, elaborated by employing paraphrasing and explanations, and adapted to the students, to their pedagogical needs. Guerrini 2009 suggests scaffolding strategies such as the use of illustrations with labels and captions, and texts where vocabulary and language are to be processed through the use of graphic organizers (charts, tables, diagrams) or of ICT applications. Bentley (2010, 52) provides a list of prescriptive aspects to be considered when looking at CLIL material, including, besides the 4Cs, the presence of word banks, rubrics, language frames and visuals, and the articulation of tasks and activities so as to ensure a variety of skills are involved.

4.1. Analysis of CLIL materials

In this study, Tomlinson’s principles (2017) and Coyle’s (1999) pedagogical framework, referred to above, were used to analyse and evaluate CLIL materials available in the Italian book publishers’ market. Furthermore, the presence vs. absence of strategies to favour content decoding, of scaffolding strategies to activate content processing, and of tasks to use, apply, elaborate on and produce content were taken into consideration in the materials’ analysis (see *Tab. 2*).

Table 2. – Scaffolding strategies and cognitive skills relevant for processing and manipulating content in CLIL, used to analyse CLIL textbooks.

<i>Strategies for content processing</i>	<i>Scaffolding strategies facilitating content processing</i>	<i>Integrated skills for content manipulation and production</i>
<ul style="list-style-type: none"> - make considerations of salience - simplify - paraphrase - provide explanations - adjust to genre - use rhetorical questions - insert parenthetical information 	<ul style="list-style-type: none"> - illustrations with labels and captions - word banks, rubrics - concept maps with provided words - language frames - graphic organizers: charts, tables, diagrams - ICT applications 	Listening/Reading vs. replying Observing vs. describing, measuring representing, modelling Inferring, debating, deducting, vs. summarising, eliciting presenting

The materials evaluated on this occasion were used in the education programmes for future CLIL teachers organized and run by the University of Cagliari Language Centre for the Italian Region of Sardinia over the past two years. They are subject materials specially published for English CLIL curricula in Art History, Maths, Physics, Biochemistry, Science, and History. Altogether, there are thirteen fairly recent publications ⁴ for the final years of the upper secondary school and a CLIL Resource Pack for primary and lower secondary school not intended for Italian schools, used as a reference for the purpose of comparison.

The qualitative analysis undertaken showed that, on the whole, all the textbooks examined did adhere in one way or another to the first three of

⁴ See especially Tottola *et al.* 2016 for Math; Nifosi 2016 for Art History; Cain *et al.* 2015 for Science; Bianco and Schmitt 2014 for History.

Tomlinson's principles (2017) and to the content and cognition aspects of Coyle's pedagogical framework for CLIL (1999). On the other hand, their weakest aspects were language processing and communication, as they rarely respected Tomlinson's 4th and 5th principles, or Coyle's language learning aspects in his CLIL pedagogical framework, namely communication and culture.

In order to facilitate text processing and content comprehension, the CLIL textbooks examined use simplification, paraphrasing or explanations of specialized or new lexicon. Sometimes, glossaries have the Italian translation, and explanations are provided with translations of English/Italian words, English word/definition or drawing/definition matching activities. In addition, pictures often come together with the content. CLIL textbooks on scientific subjects generally include graphs, diagrams, drawings, pictures and representations of text content, while textbooks on humanistic subjects tend to rely more on longer content text, on open comprehension questions and on writing activities in general. Although they can be ideal scaffolding strategies in the humanities, timelines, charts, diagrams, fact lists and maps were seldom used in the History or Art History CLIL textbooks evaluated. Moreover, scaffolding on language is rarely present either. One Art History CLIL textbook provides language frames to help learners produce written and oral texts, while a Physics CLIL textbook has a "grammar and functions" section where verb tenses and their use are briefly reviewed. Other textbooks provide sections where they focus on some pragmatic function such as "reporting scientific results", yet scaffolding activities on language are not routinely present in all textbooks, or in each unit. The same can be said for the content manipulation, production and expansion tasks requiring higher integrated skills. These sections tend to be reduced to activities such as describing-and-comparing, completing a mind-map, producing a brief presentation, or writing a paragraph. Seldom does production involve higher integrated skills, for instance undertaking a project or a staged group task. Surprisingly enough, not many references are made to the web; nor do these textbooks provide strategies or activities to safely guide learners on exploiting the Internet, which could be somewhat useful as it would be a resource for independent learning. To provide examples of what single CLIL textbooks included, the following paragraphs present some analyses. The first one refers to material targeting lower-school-level learners, with low language competence and requiring reduced and simplified input because of their age. Accordingly, this TM was simplified to the bone, yet it was a good example of how all CLIL requirements could be

included. The other two analyses reported in this article regard material from two Physics CLIL textbooks which share similar unit structure, yet develop their topics in very different ways. Matters of space do not allow to report on the analysis of CLIL TM for humanities' subjects, more uniform in their design.

4.1.1. First analysis

The units of the CLIL Resource Pack for primary and lower secondary school, not intended for Italian schools, are all photocopiable. They do not focus on one single subject, but provide suggestions of activities to generate interdisciplinary classroom activities. For instance, the unit entitled "Life Cycles" includes aspects from Science, Geography and Environmental Science; it also provides ICT material and it suggests expansion activities in the areas of art design and literature. The unit regarding physics, entitled "Forces and Motions", provides explanations by making reference to aspects of real life to which the targeted learners can easily relate. The materials go together with suggestions for teachers on how to use them, including websites where they can obtain further explanations through video-clips, or expand the topic with activities or games. The first photocopiable handout comes with a warm-up activity that provides the setting for the following input, delivered with an audio-track to carry out the gap-filling activity. The second handout comes with a very short text for the learners to process, but the teacher's page includes useful suggestions on the language features (comparative adverbs) and on the vocabulary set (a nouns-and-verbs table) needed to provide explanations regarding "friction". This material was considered as a good example for future CLIL teachers of how to simplify difficult and complex contents such as topics in physics.

4.1.2. Second analysis

Newton's Laws of Dynamics are the topic of a module, divided into three units, in a Pearson-Longman CLIL Physics package (Bianco *et al.* 2012) for high school students in their final year. At the very beginning of the module, the targeted competences are spelled out, so that both the learners and the teacher know what objectives the module is built around. Besides this, teach-

ers can make decisions with regards to what to focus their class work on. Being supposedly for B1-B2 English FL students, and considering that Physics is a subject for the high school graduation exam, the units are well developed in terms of quantity of material and depth of content provided. Notwithstanding this, they provide well-balanced and not overloaded content for the learners and the input-providing texts are fairly short. The reading/listening sections include comprehension questions but there are no pictures or graphic aids to scaffold comprehension, while diagrams are used in the practice section only. All units are organized in a similar way: there is an introductory section with warm-up activities, a content-providing part, and a practice section involving the use of integrated skills.

The warm-up sections provide real contexts to each unit's topic, or show an application of the topic to the real world, and make available specialized lexicon with relative paraphrasing in English (see *Fig. 2*).

The input-providing sessions have reading/listening texts broken down into different paragraphs. Although there are only a few pictures, there are other visual aids such as coloured or highlighted text parts or titles, or coloured arrows to draw attention to laws, concepts, notions, definitions or formulas. Furthermore, reading comprehension questions complement the paragraphs. The last content-providing section of the unit is an articulated cloze pair-activity where learners are asked first to focus on form, as they have to find the missing words, and then to check and correct by listening. The third part of the activity asks them to focus on content again to answer three comprehension questions (see *Fig. 3*). Cloze activities are commonly used in the S/FL classroom to practice or test inferencing skills, metacognitive competence or metalinguistic competence such as understanding sentence structure. However, the metalinguistic reflection on the syntactic role of words in the sentence seems to be misplaced at this stage of the unit and in this activity, which still focuses on content.

Focus on form is specific of the following section labelled "Practice" which includes two gap-filling exercises (see *Fig. 4*). The words needed are provided in both the diagram (Exercise 4) and for the sentences (Exercise 5). Yet, while in the former the given words do not need any morphological change, in the latter, the verbs provided are in the infinitive form and need to be conjugated. As a scaffolding strategy, the introduction of a table with verb tenses could be helpful at this stage; students would reflect on language features and the CLIL teacher would not have to engage in any possible language explanation.

LEAD-IN

1 Working in groups of three or four, state whether the following sentences are *true* or *false*, and correct the false ones.

- 1 If a book is simply lying still on a table, no forces are acting upon it. T F
- 2 An object can move when no forces are acting on it. T F
- 3 When the bus comes to a sudden stop, you experience a force which pulls you forward. T F

2 Match the terms (1-8) to their corresponding definitions (a-h).

- | | |
|---|---|
| <input type="checkbox"/> 1 Force | <input type="checkbox"/> a A physical entity with both an appropriate unit and a direction. |
| <input type="checkbox"/> 2 Dynamics | <input type="checkbox"/> b A coordinate system used to measure the properties of a physical entity. |
| <input type="checkbox"/> 3 Frame of reference | <input type="checkbox"/> c The property of matter that keeps an object in the same position, or keeps it moving at a constant velocity and direction. |
| <input type="checkbox"/> 4 Kinematics | <input type="checkbox"/> d The rate of change of velocity over time. |
| <input type="checkbox"/> 5 Acceleration | <input type="checkbox"/> e A physical entity with an appropriate unit. |
| <input type="checkbox"/> 6 Vector | <input type="checkbox"/> f The branch of physics that studies what causes the motion of a system, especially those causes which originate outside the system (external forces). |
| <input type="checkbox"/> 7 Inertia | <input type="checkbox"/> g The cause of every change in the velocity of an object. |
| <input type="checkbox"/> 8 Scalar | <input type="checkbox"/> h The study of motion in terms of position, velocity and acceleration. |

Figure 2. – A true-false exercise and a word/definition matching exercise used to introduce the content of Unit 1 (Newton's First Law of Motion) of the three-unit Module "Newton's Laws of Dynamics" in Bianco et al. (2012, 8).

An Observer's Frame of Reference

LISTENING ACTIVITY

With your partner, consider the words in the text to the right. Try to guess the missing words in each space, or what kind of words (nouns, verbs, connectors, etc.) might be used to fill them. When you have finished, listen to the text and copy what you hear. Were they correct?

COMPREHENSION QUESTIONS 3

Answer the following questions.

- 1 Why do the books fall onto the car floor when you brake suddenly?
- 2 How do the driver of the car and the observer on the pavement see things from their different perspectives?
- 3 What conclusion can you draw about Newton's first law from this example?

Actually, an ¹ standing outside the car sees the car and the objects inside moving ² before it starts to accelerate. When the car's velocity suddenly ³ due to the braking action, the observer outside sees the books and other objects freely moving at constant velocity, but sees the passengers, who are firmly tied to ⁴ , slow down. So, you can see that when the observer's frame of reference ⁵ , the same phenomenon ⁶ different. An observer standing on the pavement won't perceive any change in the velocity of the sliding ⁷ This is in agreement with Newton's first law, since there is no net external force applied to them.

This and many other examples demonstrate that Newton's first law doesn't apply in an ⁸ reference frame (also called a noninertial reference frame); it holds only in reference frames that are static or are moving at a constant velocity.

Earth is generally ⁹ to be an inertial frame, as the effect of its rotation can be ¹⁰ for most purposes.



Figure 3. – Articulate cloze pair activity from Bianco et al., *Students' Book* (2012, 10).

PRACTICE

4 Fill in the gaps in the diagram with the appropriate words.

Newton's First Law of Motion

If you know:

that a body is ¹	that the ⁵ of all the forces applied to the object is? ⁶ zero
or	then
it is moving at ² velocity	if the object is still, it will still ⁸
then	otherwise
you assume that the ³ force is equal to ⁴	if it is ⁹, it will continue moving at a ¹⁰ velocity

5 Use the correct form of the verbs to complete the following sentences. Finding the verb elsewhere in this unit will help you!

1	The 'net' force (also called the resultant force) is the vector sum of all forces the object.
2	Forces the acceleration of all objects, but static conditions as well.
3	Internal forces objects at rest.
4	Newton's laws of dynamics only in reference frames that are static or moving at a constant velocity.
5	A phenomenon will differently to an observer depending on whether his reference frame is moving at a constant velocity, is stationary, or is
6	Newton's first law of motion the law of inertia.

to call
to move
to act upon
not to cause
to accelerate
to remain
to cause
to be associated with
to hold
to appear

Figure 4. – Practice activities with language focus from Bianco et al., *Students' Book* (2012, 11).

In each unit, the section “Applied Physics” includes a variety of challenging problems and group tasks based on the transferability of knowledge to different real-life contexts and situations, the solution of which requires integrated skills. The problems in *Figure 5*, for instance, do not only require the simple application of formulas to the given contexts. In order to solve the problems, they ask learners to observe, measure, model, evaluate, infer, deduct, summarise, decide, and eventually present the results.

4.1.3. *Third analysis*

As for the previous textbook, the units in a CLIL textbook on Physics (Fabbri *et al.* 2015) for the last year of the upper secondary school are organized in a similar way. As in the other textbook, the content-providing texts can be listened to while reading, which helps both learners and the teacher with pronunciation. The unit on electromagnetic waves starts with a warm-up section on specialized lexicon, it continues with content-providing paragraphs, with periodical checks on comprehension, with a longer content-expansion text, which includes a focus on a pragmatic function, and it closes with a recap section, a knowledge test, and some problem solving activities.

The warm-up activities, where learners have to draw a conceptual map with the words provided, to do a word-definition matching activity, then to fill in the gaps of a text with a listening activity, seem to be useful for retrieving previous knowledge and introducing the topic; they pave the way to text comprehension. The texts included in the first four pages of content-providing material on electromagnetic waves is divided into short paragraphs, written using simple language, and backed up by diagrams and graphs (see *Fig. 6*). However, while some diagrams are very clear and even explained with a listening activity, further on in the unit, there are additional input-providing reading texts without scaffolding activities for comprehension. For instance, a text explaining how microwaves function has no activities to go with it, if not a redundant picture of a microwave. The CLIL teacher will have to provide scaffolding tools and activities, at least to check for comprehension.

In this unit there is no reference to linguistic features that might hinder comprehension, although the content texts and the tasks at the end of the unit make frequent use of passive verb forms.

- 7** You have decided to suspend a valuable antique chandelier (mass=100 kg) from the ceiling with a chain of negligible mass, which has a maximum strength (tension) of 900 N (beyond which the chain will break). Is it safe to suspend the lamp from this chain? Would you happily lie down and relax underneath it?

Known

lamp mass $m = 100 \text{ kg}$
 chain maximum strength $T_{max} = 900 \text{ N}$
 acceleration caused by Earth's gravity $g = 9.81 \text{ m/s}^2$

Find

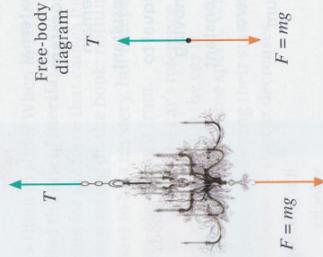
Is it safe?

Analysis

Look at the free-body diagram to the right, which shows the chandelier (represented as a point) and arrows indicating every force acting upon it. Because the suspended chandelier is motionless, Newton's first law of motion is valid. This means that the sum of the opposing forces is zero. So, you can determine the value of the tension needed to suspend the chandelier:

$$\Sigma F_{e,y} = T - mg = 0 \rightarrow T = mg = 100 \cdot 9.81 = 981 \text{ N}$$

This is the value of the force that the chain must exert on the chandelier in order to sustain it. Note that this value exceeds the maximum strength the chain can apply. Are you still going to use this chain? Would you feel comfortable relaxing underneath the chandelier in your chair?



Always draw a free-body diagram: it is a schematic representation of all of the forces (arrows) acting upon an object, which is shown as a point. Be sure to include every force acting on the object in question. But don't show forces acting upon other objects.

- 9** A United Airlines Boeing 777 is flying at a constant speed of 900 km/h, and is carrying around 300 passengers. The aircraft has a twinjet propulsion system which exerts a thrust force of approximately 500 kN. Can the effect of air friction be considered negligible? If not, can you evaluate the intensity of the frictional force, or do you need more data?

- 11** Working in groups, discuss the following questions and then write down your answer. When you have finished, compare your answers with the other groups.

- 3** At the airport, you are pulling your luggage with a constant strength of 10 N. If you move at a constant speed of 1 m/s, can you tell whether or not there is a friction force? If so, can you calculate its size?

- 13** Working in groups, explain how a space shuttle moves through space thanks to Newton's first law of motion. Use the web to find out when a spacecraft consumes most of its fuel: during take-off, or while travelling to a distant planet. Write your answer as a short report.

Figure 5. – Applied Physics activities from Bianco et al., *Students' Book* (2012, 12-13).

the change in the electric field E induces a variable magnetic field B which induces a variable electric field E

a variable magnetic field B induces a variable electric field E which induces a variable magnetic field B

Thus, a change in one of the two fields induces a sequence of variable electric and magnetic fields that propagate in space. This phenomenon is essentially a disturbance which does not carry matter or need material means in order to propagate. It is therefore known as an **electromagnetic wave**.

An **electromagnetic wave** is a wave produced by a variation of an electromagnetic field.
The electromagnetic wave transfers electric and magnetic energy.

The vector \vec{E} and the vector \vec{B} oscillate in two perpendicular planes.
The disturbance, i.e., the propagation of energy, is perpendicular to both planes: these are therefore **transverse waves** that are able to travel without any material medium and even in vacuum.

electric field

magnetic field

horizontal plane

vertical plane

direction of wave travel

λ

P

P'

\vec{E}

\vec{B}

The changes in \vec{E} and \vec{B} , which are repeated at regular intervals of time, follow a particular kind of pattern, called a sinusoidal curve.

In the figure above, the two fields oscillate in different planes, \vec{E} in the vertical plane and \vec{B} in the horizontal plane. The curves representing the respective changes, which are closely linked, follow the same pattern: though not identical, they are proportional, and so they rise and fall in exactly the same way (when \vec{E} is at its highest, so is \vec{B} , when \vec{E} is at its lowest, so is \vec{B} , and so on). The relationship between the magnitudes of the two fields is described by the formula $E = cB$ where c represents the speed of light.

The figure is essentially a snapshot of the travelling wave (photographic effect) at a precise instant in time t . The distance between P and P' indicates the length of the wave λ , since P and P' are two consecutive points subject to an identical change in the electromagnetic field.

Electromagnetic waves, like all other waves, exhibit the phenomena of reflection, refraction, interference and diffraction.
Their speed is given by:

$$c = \lambda \cdot f$$

! Keep in mind!
In vacuum, electromagnetic waves travel at the speed of light, which is approx. $c = 300,000$ km/s.

velocity of electromagnetic waves

Figure 6. – Content providing material from Fabbri et al. (2015, 30).

In spite of the fact that the material is targeted for B2 students, even if this linguistic feature was covered in the EFL class, research in SLA warns that language learning is not a direct outcome of teaching. Therefore, CLIL teachers will have to make such content-language relationships salient at least by making learners notice the presence of the passive form, perhaps by providing a grammar table or a language frame as a model of reference for learners to answer, for instance, the comprehension questions.

Eventually, the units of this Physics CLIL textbook include activities to check text comprehension or content knowledge with multiple choice questions, gap-fill exercises, brief group work, summarizing exercises, or problems that require the mechanical application of formulae. Production involving highly integrated cognitive skills is supposed to be present in the section “ideas and people”, which develops a content-expansion activity through a longer and more extensive reading, not adequately exploited or processed by the associated activity, which merely asks learners to underline information. The reading text regards the biomedical effects of electromagnetic waves, so one could imagine that the essay writing that follows is related to the reading, while it is in fact only incidentally related to it. The instructions given are as follows: “Search the Internet and use the information you can retrieve to write an essay about: *‘The risk related to occupational exposure to radiation’*. Focus especially on the different jobs that could be at higher risk and on the measures that might help to lower the risk”.

No scaffolding strategies are provided for this highly-integrated-skills production activity. There is no guidance for the Internet search; nor is there for the essay writing. Besides, the assignment goes far beyond the specialised content and vocabulary provided in the unit. Therefore, in order to help students work on the project, the CLIL teacher would probably have to create an ad-hoc unit around this new topic.

5. CONCLUSIONS

This study comes from the author’s professional interest in teaching/learning materials that can favour language acquisition and from her involvement as a teacher trainer in the education programmes for future CLIL teachers, run by the University of Cagliari Language Centre for the Italian Region of Sardinia. The investigation involved the analysis of several textbooks available on the

Italian market to teach a variety of subjects in English using CLIL methodology. These materials were used in the above-mentioned CLIL education programmes for subject teachers. The enquiry has taken a methodological viewpoint since the evaluation of the material available proved to be relevant in the training of the subject teachers. Teaching material assessment involves taking into consideration theoretical and practical issues affecting language acquisition, including aspects of language teaching, which are also relevant in the CLIL class. This is why an established framework for teaching material development (Tomlinson 2017) and the basic CLIL framework (Coyle 1999) were taken into consideration for the present work. At the same time, the presence vs. absence of concrete strategies implementing the frameworks' objectives was also evaluated. The final goal was to find practical tools for CLIL materials evaluation.

After adopting his five principles to evaluate coursebooks, Tomlinson came to the conclusion that the coursebooks analysed were not based on the principles and strategies that facilitate language acquisition, and that they rarely provided opportunities for real communication, not being oriented to the development of communicative competence, but rather to structured production. This study has led to similar conclusions. The qualitative analysis undertaken of the available school-subject CLIL materials has shown that the strategies adopted for providing content and affective and cognitive involvement are generally effective, although more satisfying in the CLIL materials for scientific subjects. Materials for humanities subjects proved to be decidedly poorer. With regard to language scaffolding and opportunities for communication and production, all CLIL textbooks assessed were 'faulty' in one way or another. They generally lacked occasions to help learners to reflect on language issues. Besides, the materials examined rarely provide opportunities for social interaction and activities that engage learners in real communication in the foreign language. Their output sections are chiefly oriented to structured production.

These results have led to the following considerations. The first is that the materials evaluated seem to be often designed without the contribution of language experts, whose input would have probably been beneficial to the materials as a whole. Given their importance in language courses, CLIL textbooks publishing could take advantage from the involvement of experts in language teaching and in SLA. The second consideration is that CLIL teachers need to be skilled enough so as to be able to evaluate the CLIL materials available and possibly provide integration activities for their classes. Since the

weak parts seem to be language and communication, cooperation with the FL teacher is highly advisable. The third and final consideration is that materials evaluation seems to be an essential part of training for future CLIL teachers.

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ABSTRACT

The Reform of the Italian school system that came into effect in 2012 introduced CLIL into the upper secondary school curricula. As a result, it has created ad-hoc teacher education programmes for subject teachers to learn to teach their subject in a foreign language using CLIL methodology. This revolutionary step has involved the University Language Centres in the teacher education and it has generated the publication of a large quantity of teaching material (TM) for all school subjects, as well as academic research in this field. It is relevant both for the teacher trainer and for the subject teacher to develop a critical perspective of the TM available. Thus, this article aims to examine the published TM currently available on the market from a methodological viewpoint. The material analysed and the methodology applied here were used in teacher education programmes for future CLIL teachers in which the author of this paper was involved as a teacher trainer of the University of Cagliari Language Centre. Certain critical aspects of language learning, such as comprehensible input and adherence to the 4Cs (communication cognition, content, and culture) of the CLIL methodology framework were carefully considered in the study.