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Teaching and learning terminology in secondary education: Towards specialisation through language

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ABSTRACT: Teaching a second language involves the elicitation and acquisition of the general expressions that may be useful for students in everyday situations in which the target language is spoken. However, in the present context of strong scientific development, many learners are also faced with the need to become acquainted with terminology (i.e. technical and/or specialised vocabulary) representing complex and abstract concepts. This holds especially true for immersion programmes, in which students must gain an understanding of curricular subjects such as mathematics or history entirely in a second language. A methodology is proposed in this paper for retrieving domain lexicons from texts which can contribute to the acquisition of specialised knowledge at later stages of pre-tertiary education. The paper first discusses the implementation of a five-phase learning strategy for students with no prior experience in terminology extraction and management, and then presents DEXTER, a tool suitable both for autonomous and in-class work. As it will be shown, the tool provides relevant results even with a relatively small amount of data, thus allowing a fast learning curve.
Keywords: Foreign Language Teaching, Terminology, Computer-mediated teaching, Secondary school education, Immersion programmes.

La enseñanza y aprendizaje de terminologías en la eduación secundaria: hacia la especialización a través de la lengua

RESUMEN: El aprendizaje de una segunda lengua consiste en identificar y adquirir las expresiones que se utilizan a diario en dicha lengua. Sin embargo, en el contexto actual de rápido desarrollo científico, muchos estudiantes se enfrentan a la necesidad de familiarizarse, no sólo con las expresiones generales, sino también con un gran número de unidades terminológicas presentes en la lengua meta. Por "terminología" se entiende el vocabulario técnico que se emplea para aludir a conceptos complejos y abstractos provenientes de las diversas ramas del conocimiento. Esta necesidad de especialización se observa especialmente en los programas de inmersión, donde los estudiantes aprenden materias como las matemáticas o la historia únicamente en una segunda lengua. Por todo ello, en este artículo se propone una metodología para la recuperación automática de léxico especializado que puede mejorar la adquisición de conocimiento curricular en una segunda lengua en etapas preuniversitarias. El artículo analiza, en primer lugar, una estrategia en cinco fases dirigida a estudiantes sin experiencia previa en la extracción y

gestión terminológicas. En segundo lugar, se presenta DEXTER, una herramienta diseñada tanto para el trabajo autónomo del alumno como para su uso en clase. Tal y como se muestra, la herramienta proporciona resultados significativos incluso con un número relativamente pequeño de datos, lo que favorece un aprendizaje más rápido.
Palabras clave: Enseñanza de Idioma Extranjero, Terminología, Enseñanza asistida por ordenador, Enseñanza secundaria, Inmersión lingüística.

1. Introduction

Technology and science development have significantly affected the way contemporary society perceives the world. From a linguistic point of view, however, the steady growth of scientific research has resulted in a continuous need for the non-expert community to understand the academic discourse — predominantly in English — which pervades the media and the Internet. Students who are close to entering university as well as vocational schools constitute a group that is particularly exposed to the wealth of technical vocabulary, since they are required to manage a great part of it proficiently within a relatively short time. Unfortunately, while general-vocabulary teaching has been a main topic of research across all levels of education, terminology (i.e. specialised-vocabulary) instruction has traditionally focused on undergraduate and postgraduate courses, with relatively scarce attention to secondary education.

The importance of this lack should not be overlooked, especially in the light of recent research which has argued that technical vocabulary in a second language (hereafter, L2) is one major factor challenging students' achievement during the first years at university (Evans & Green, 2007; Hyland & Tse, 2007, 2009; Ward, 2009; Evans & Morrison, 2011; Cervetti et al., 2015; Mežek et al. 2015). In many European countries (Ahern, 2014; Goris et al. 2017), for example, immersion programmes have helped alleviate the problem by improving students' lexical coverage of specialised domains prior to higher education, mainly on the basis of the repeated exposure to academic texts and speech. However, the approach to language in these programmes is mostly implicit so that terms are learned incidentally as they appear in the syllabus. In addition, there is not sufficient connection between immersion and the principles of terminological analysis, which, in fact, is the discipline that studies specialised terms and concepts from technical areas of knowledge such as computer science, biochemistry or economics (Sager, 1990; Cabré, 1999).

This paper argues that teaching elementary strategies for terminology acquisition at later stages of pre-tertiary education can have positive effects on L2 learning with regard to both general language and specialised discourse competence. The expected benefits may be more evident in bilingual programmes based on Content and Language Integrated Learning (CLIL) models, in which the students are instructed in curriculum subjects via an L2. General benefits may include: a) helping students expand previous knowledge acquired either in their mother tongue or in an L2, b) training students in necessary academic skills such as self-driven exploratory analysis, data curation and interpretation of results, and c) aiding students at making a principled decision about what degree to study or what professional career to pursue. The proposed framework may additionally be advantageous to content teachers who require to update subject syllabi regularly or need to create activities that emulate professional knowledge among the students.

The following section reviews the literature on specialised-language teaching with particular attention to vocabulary instruction, while the third section establishes the methodological underpinnings for terminology practice in the secondary education classroom. The ensuing sections include a description of DEXTER, a tool for the automatic extraction of specialised lexical units from text documents, focusing on its main pedagogical characteristics, as well as an outline of the techniques for teaching terminology in class. The final section provides a summary and the main conclusions.

2. Literature review in specialised-language teaching

Vocabulary teaching and learning have been studied extensively in the literature, including research on general language acquisition (Cook, 1993; Ellis, 1994), discussion on the dichotomy between meaning-centred and focus-on-form(s) methodologies (Long, 1991; Laufer, 2006), or quantitative analyses on the correlation between vocabulary coverage and L2 comprehension (Hirsh & Nation, 1992; Hu & Nation, 2000), among others. Likewise, specialised language has received a great deal of attention within the scope of Language for Specific Purposes (LSP) and Language for Academic Purposes (LAP), two major branches of study concerned with the description of scientific and/or academic discourse and the teaching of these genres mainly to postgraduate students as well as students in vocational schools and practitioners (Todd, 2003; Basturkmen, 2006; Fortanet-Gómez & Räisänen, 2008). Finally, specialist language has also been widely studied within the framework of Terminology, in which the main pedagogical focus is on training translators and interpreters as well as trainees from diverse expertise areas (Cabré, 1999; Fernández et al., 2009; Schnell and Rodríguez, 2010; Alcina, 2011; Picht & Acuña, 1997; Hsu, 2013).

As noted above, research on terminology instruction in pre-tertiary contexts is still scarce, particularly with regard to CLIL contexts, although some authors have already highlighted the importance that technical vocabulary plays in the education of young students. Gablasova (2015), for example, found that a group of high-school students who learned curriculum contents in their L2 showed greater difficulties than students taught in their mother tongue, due to the fact that the former misunderstood core theoretical concepts and their use of technical language was more imprecise. In the same vein, Mežek et al. (2015) provided evidence to suggest that both medium-combined teaching in an L2 and an added exposure to subject-specific contents in the first language contributed to the acquisition of new terminology by undergraduates during the first year at a Swedish university. Other studies have also called for the progressive introduction of academic language at even earlier educational levels. Zwiers (2006), for instance, supports the development of scaffolding strategies at middle school with non-native speakers of English in history classes. Similarly, based on a case study about the interaction between a teacher and a group of nine-grade students, Mohan and Slater (2006) argue for including scientific concepts gradually in classroom interaction in preparation for problem-solving activities.

Previous studies also noted the importance of carrying out preparation activities before tackling advanced linguistic skills in class. In this regard, it has been shown that beginner to intermediate students can deal with linguistically complex tasks, providing specific pedagogical requirements are met. Braun (2007), for instance, identifies the major problems that may occur when corpus work is established in secondary education, which relate mainly to teacher training, the (re)contextualisation of data and other general curricular constraints such as time and planning. The author, however, proposes a methodology that proves successful in raising students' interest towards corpus instruction. Braun's findings tie in with other authors who have also claimed that general frameworks for corpus analysis, which are closely related to the domain of terminology, must adapt to specific learning environments by taking into consideration both students' skills and the teacher's preferences as to what and how to teach (Kaltenböck & Mehlmauer-Larcher, 2005; McEnery & Xiao, 2011).

This brief review has revealed that, while the importance of technical vocabulary in the academic progress of L2-students has been attested, adequate methodologies are still needed in order to narrow the terminological gap. Integrating terminology analysis as part of the curriculum may constitute a promising approach in this direction.

3. Methodological underpinnings for terminology instruction

The question arises as to how terminological practice must be implemented in the foreign-language teaching and/or content classroom. This section answers this question by providing a didactic framework which puts students at the centre of the terminology-construction process. Essentially, the goal is that they learn to collect a set of scientific texts from selected sources and then extract specialised vocabulary from them automatically using dedicated software online.

A five-phase methodology is proposed. In phase 1 the teacher introduces academic language and technical vocabulary, focusing on its main features, such as abstractness, specificity and completeness. In this phase he/she also presents the notions of "terminological unit" (i.e. specialised unit of thought) and "corpus" (i.e. a principled collection of texts), which the students will need for the subsequent activities. By way of example, the teacher may show the lexicographic definition of several well-known terms, or, alternatively, let the class elicit some spontaneously. The importance of this initial step lies in that the students become aware of the differences between common and scientific discourse. For that purpose, the teacher must emphasise the importance of terminology regardless of the differences in the students' backgrounds and goals.

In phase 2 the students choose a topic of analysis taking the core subjects in the curriculum as the starting point. The aim is that they identify — with the teacher's support — areas that can be interesting from a terminological point of view and then refine them by means of keywords. Crucially, the teacher must build on the student's knowledge so as to identify topics of common interest among groups in the classroom and motivate greater engagement. He/she must also provide the students with online sources of scientific articles, which will form the basis for the exploratory activity later on. Two valuable resources for this purpose are the "New scientist" and "Frontier of young minds" websites, which offer informative readings suitable for a majority of young learners[1]. A WebQuest activity may be additionally suggested so that the students can conduct self-driven searches on academic catalogues and thematically related websites.

[1] The websites are found at https://www.newscientist.com/ and https://kids.frontiersin.org/, respectively

Phase 3 initiates the students' development of the activity. At this point, they browse the sources selected in the previous phase and collect a set of machine-readable texts on the topic in question. In order to find accurate information, they will need to use the keywords brainstormed in phase 2 along with logical operators such as "AND" or "OR". The major challenge is that they were able to reduce the initial number of results obtained after the query by randomising the texts that will constitute the tailor-made corpus.

Phase 4 includes work with DEXTER, a tool for the automatic retrieval of terminological units from texts[2]. As shown in Section 4, work with DEXTER proceeds sequentially with: a) data (i.e. corpus) uploading, b) automatic term extraction, c) filtering of non-relevant units, and d) data discussion. Thus the goal is that the students load the corpus on the tool and operate with it to obtain an interim list of "candidate terms", i.e. lexical units identified as terminological by the machine, which the users must eventually verify as "winning" or otherwise "false" candidates. Most work at this phase is done automatically with almost no effort on the student's part. Nonetheless, in order to avoid initial difficulties that may occur, the teacher can propose lead-in activities and in-class demonstrations of the tool using example datasets. Another helpful measure involves the use of surveys and pre-tests to assess students' skills in completing online routines such as web surfing, file uploading, form-filling, or data importing and exporting, which will be required throughout the process.

Finally, in phase 5 the students work with the list of winning candidates, i.e. the 1-to-20 topmost relevant terms on the list, in order to complete any planned activities. As will be further discussed in Section 5, such activities may range from traditional vocabulary exercises such as gap-filling and matching to demanding collaborative tasks for spoken language practice. This paper will propose an activity of the latter type as an example.

4. Teaching terminology with dexter

In order to implement the methodology outlined above, this section discusses that teaching students to extract terminology from texts can provide them with valuable insights into the nature of technical vocabulary while increasing their scientific knowledge. Terminology extraction is defined as the process of automatically retrieving single and multi-word units representing specialised concepts (Kageura & Umino, 1996; Periñán, 2015). Examples of such units are "antigen", "cytochrome" or "b-cell" in the field of medicine, and "algorithm", "assembler" or "debug" in computer science. Retrieving terminology commonly requires the use of ad hoc computational tools called "extractors", which are designed to gather terms from corpora (i.e. text collections, on the basis of pre-established statistical, linguistic or hybrid parameters). What is of interest to this paper is that term extraction poses an opportunity both for the teacher to update his/her didactic approach to the curriculum instructed in an L2 and for the learner to gain disciplinary knowledge by exploring new contents. The remainder of this section describes DEXTER, a novel online extractor that combines a robust statistical approach to term mining with a user-friendly environment.

DEXTER is the evolution of "FunGramKB Extractor", a previous version of the tool.

[2] DEXTER (current version, 2.2) is open to all Internet users upon registration at http://www.fungramkb.com/nlp.aspx

However, while the latter employed a Term Frequency – Inverse Document Frequency (TF-IDF) score for term extraction, the former uses a new composite measure called Salience, Relevance and Cohesion (SRC), which has been shown to outperform TF-IDF approaches (Periñán, 2015). "Salience" measures the weight or representativeness of each lexical unit in a corpus, that is, it helps estimate whether a candidate unit is terminological or otherwise belongs to common language; "relevance" calculates the terminological weight of the same unit compared to the entire domain under scrutiny, and not the corpus alone; finally, "cohesion" measures the semantic strength among the elements of multi-word expressions. The paper will not go into great detail explaining all the features of the software environment; here, only the aspects that are relevant from a didactic point of view will be discussed (the reader is referred to Periñán & Arcas, 2014; Felices-Lago & Ureña, 2014; Periñán & Mestre, 2015).

Pedagogically, the tool has three main advantages. Firstly, it is multilingual; thus, the teaching model proposed here can be applied to any content and/or foreign-language class regardless of the subject areas. It should be noted at this point, however, that during the data processing, the tool relies on language-specific filters to improve the relevance of the results; although these can be conveniently adapted for different languages. Secondly, candidate terms can be studied in context, since the tool allows the users to check the co-text of the elements retrieved so that their meaning can be easily identifiable. Moreover, to make the checking process quicker, the extractor enables the removal of functional and common words, since both are terminologically irrelevant, as well as non-lexical items such as numbers or symbols. Thirdly, DEXTER has a graphical user interface, which means users can easily interact with menus, thus making it especially suitable for non-proficient students.

It should also be highlighted that the implementation of terminological practice in high school courses is not without its challenges. One major constrain is that of training teachers in disciplines such as terminology, corpus linguistics and computer-assisted natural language processing. This is especially true for instructors who are mainly concerned with teaching contents of curriculum subjects, but could fail to have a proper epistemological approach to linguistics and specialised language discourse. Another challenge is to train teachers in the use of language processing software programs, such as DEXTER. This type of software includes complex statistical and lexical analysis tools that some teachers might have difficulty fully exploiting because they are not familiar with them. For space restrictions, this article does not address the two challenges mentioned above, but it leaves the door open for future research in this direction.

The remainder of this section describes the tool using a corpus of astrophysics as a demo dataset. The corpus consists of a random sample of four scientific papers (amounting to approximately 131,000 tokens) which were drawn from various peer-reviewed journals using the "ScienceDirect" database[3]. It will be used here merely for illustrative purposes and therefore no claim is made that it is either representative or balanced. As mentioned earlier, in order to compile the corpus, the students may choose texts for scientific popularisation instead of highly technical papers, if that contributes for a better selection of documents.

The main screen in DEXTER shows all the utilities available after the login (Figure

3 http://www.sciencedirect.com/

1). The first important element is the "New" tab, which allows the users to create a new corpus; for that purpose, the files that make up the collection of documents can contain either plain or formatted text. In this latter case, the tool removes any metadata and images that may potentially distort the results:

Figure 1. DEXTER's main panel

As part of the uploading, the "Corpus" option, which is accessed through the "New" tab, urge the students to complete four dialog boxes (Figure 2). The boxes record details about the title of the corpus, the language in which it is written, a short description of its contents, and a selection of semantic domains that characterise it:

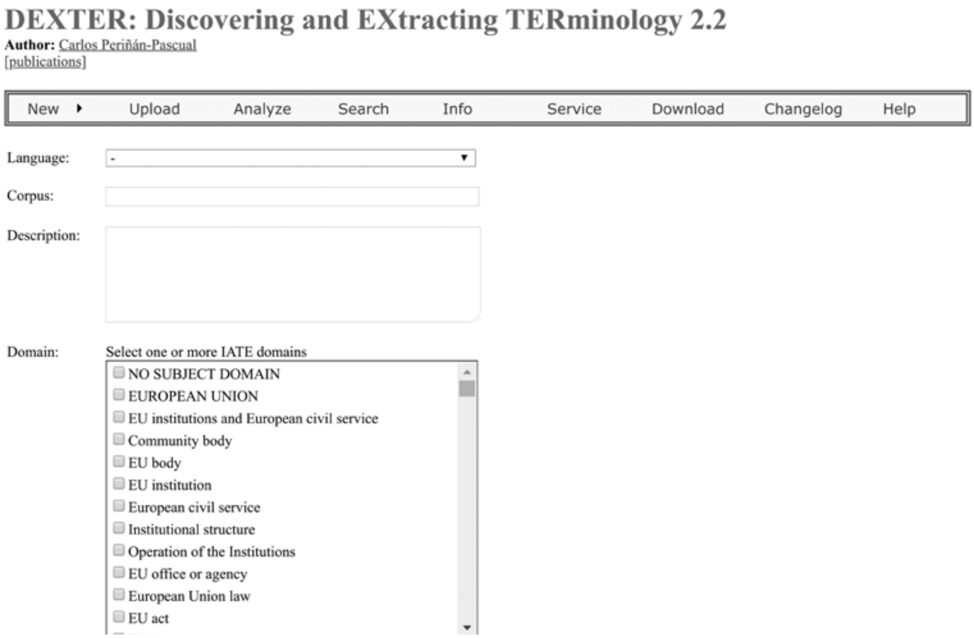

Figure 2. DEXTER's corpus management panel

Once the corpus has been successfully uploaded, the "Statistics" option —under the "New" tab too— triggers the SRC calculation, which shows the statistical information of the candidate units on the "Analyze" section (Figure 3). This includes a "weighting scheme" for each unit, i.e. a breakdown of the three values that make up the SRC score. For pedagogical purposes, statistical information can be incorporated or otherwise excluded from the students' interpretation of the results, at the discretion of the teacher. In fact, he/she may prompt a more intuitive way to interpret the terminological nature of the candidate units, namely sorting the list of candidates using the SRC column (blue row in Figure 3), thus, the units showing a higher (terminological) value will appear first on the list:

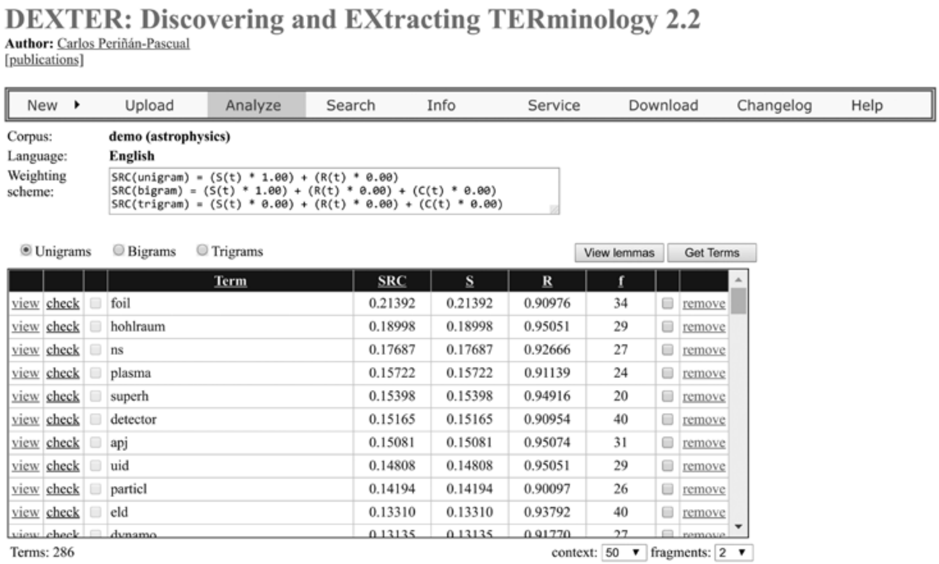

Figure 3. DEXTER's term management panel

As illustrated in Figure 3, DEXTER provides a set of unigram candidates (i.e. single-unit terms) from the astrophysics corpus. The unigrams are truncated in order to show a compact view of the different tokens (e.g. the unit "irradi" contains all the occurrences of "irradiation" and "irradiated" in the corpus), while the "view lemma" option allows to see the units in their full spelling. An important task at this stage consists in directing the students' attention towards the "check" option in the second column, which allows the examination of the context of the unigrams in the original text documents. Even when the demo corpus is critically short, the list of candidates shown in Figure 3 is intuitively relevant to the domain of astrophysics. For example, the units "plasma", "foil" or "hohlraum" refer to substances, objects and instruments that belong to the aforementioned field. This list constitutes a structured approach to the discovery of new concepts but is still insufficient for a complete acquisition of the terms and their meaning. For this reason, the next step is to link extraction with the specific techniques that will facilitate the understanding of the winning terms.

5. Integrating terminology in the classroom

This section elaborates on phase 5 presented in Section 3 by proposing a poster activity to be carried out in the newly created terminology classroom. The proposal will not claim innovation; rather, it will serve to stimulate discussion on how to combine complex-knowledge comprehension with L2 learning.

If, as shown above, the output of DEXTER consists of word lists, it seems natural to base subsequent activities on a selection of winning candidates, thus paying attention to form as a means into meaning. This idea departs from the so-called "planned focus-on-forms" approach, which involves the non-incidental learning of linguistic items or — in this case — of terminological units (Nation, 2001; Laufer, 2006; Norris & Ortega, 2000). Word lists consist of an enumeration of decontextualised linguistic expressions, and, as a result, their usefulness might be questioned, especially when compared to input-based models. This section argues, however, that word lists do not necessarily entail traditional presentation-practice-production approaches to language teaching; rather, they can be included as an integral part of task-oriented and role-play activities. In a recent book-length study, Nation (2016) reinforces the importance of word lists as relevant didactic instruments by stating that: "[any] discussion of vocabulary lists immediately triggers negative ideas of the deliberate rote learning of words out of context, However, when efficiently done with the right words, such learning is very effective" (ibid: 175). Regardless of efficacy considerations, putting word lists into practice may pose additional problems at a practical level. In particular, in the methodology for term extraction discussed above the teacher is constrained by the fact that there are no two identical corpora and thus no identical list of candidate terms, which substantially limits responses in terms of lesson planning and support material. Nonetheless, as noted in Chung and Nation (2003), the teacher must not necessarily be familiar with the technical words from every specialist area, but his/her role will consist in "[...] helping learners gain the more general skills of recognising technical words, interpreting definitions, relating sense to a core meaning, and learning word parts" (ibid: 114). The question is, therefore, whether word lists can be applied in content classrooms in a functional way (i.e. priming language competence without interfering with course contents).

This paper posits the importance of presentations in class as instruments for learning terminology. "Presentation" is used here as a cover term for a number of different formats, including posters, infographics, mind maps, leaflets, timelines, comics or computer animation, which add value to traditional slide-based presentations. Output-oriented activities based on any of these formats allow students to understand scientific concepts in a creative way as well as to develop professional attitudes that will be useful in future work environments. Creating a presentation involves three main tasks. Firstly, the students make up a glossary which contains a selection of terms together with a concise definition of each of them. The definition must establish the participants, processes, qualities, etc. denoted by the terms. Secondly, the students work on a graphical design which best illustrates the definitions. Thirdly, the students engage in peer-to-peer communication in class by using terminology actively in question-and-answer turns. In this third task the classroom is used as a meeting room where each student (or group of students) explains the most relevant facts about the various scientific concepts in their presentations, while the rest of pupils analyse and make comments on any specific aspect using the L2 as a means.

In order to illustrate the use of terminology in the classroom, a poster is shown in this paper in which the meaning of four terms from Section 4 is explained (see Appendix). Posters are used in scientific forums, precisely because they are suitable for presenting data in an informative way and because at a communicative level they facilitate immediate feedback from small audiences. The example case has been designed entirely online using a template from the "Poster my wall" website[4] . The number of tools for creating graphical content is virtually endless, with the web offering both commercial and open source alternatives. "Poster my wall" has been used in this case because of its easy-to-use layout and the open access option which it offers. As for the contents, the definitions have been taken from *Wiktionary*[5] and *Wikipedia*[6], while the pictures belong to the original template and the *Wikipedia*. The poster should be provided to students as part of a worksheet with instructions on how to carry out terminological extraction as well as hints on how to work with the graphical application.

The integration of terminology subjects in secondary school curricula as proposed by this paper is intended to spark in-depth discussion about the implications of teaching terminology in the broader context of CLIL and bilingual education. In this regard, the terminology extraction methodology suggested by this study not only aims to help students widen their technical vocabulary, but also to crucially assist them in acquiring the knowledge of content subjects in CLIL contexts. This is done by combining computer-assisted and data-driven techniques with more traditional pedagogical strategies to L2 learning, such as reading, writing and the use of a foreign language as *lingua franca*. This terminology-based approach to content subjects is also closely related to the concept of pluriliteracies (cf. Meyer et al., 2015; Meyer and Coyle, 2017), which "illustrates how teachers can mentor the acquisition of subject specific literacies by empowering students to make connections between the conceptualizing continuum and the communicating continuum of learning" (Meyer & Coyle, 2017:201). On this basis, the goals of using DEXTER and introducing science popularisation activities (e.g. poster presentations) in the classroom are to scaffold learners' multiple literacies and instruct them in acquiring meaning construction strategies. More specifically, the methodology suggested encourages students to make the most of information technology systems, and helps them improve their communication skills in multi-cultural, scientific and work contexts. Other skills involving the use of DEXTER for multiple-literacies development in secondary education students are the following: a) capacity to apply strategies to optimise the browsing and selection of different sources of information; b) capacity for proper data quality assessment; and c) understanding how information is produced and processed. The

4 www.postermywall.com

5 https://en.wiktionary.org/

6 https://en.wikipedia.org/

model is thus aimed at raising students' content awareness and encouraging them to play a pro-active role in deciding what counts as specialised knowledge. However, this paradigmatic shift to more holistic subject-specific literacy in the CLIL classroom should not exclusively be applied to upper-level courses, but it should be implemented since the earliest educational stages of students, which is the time when they pedagogically need it most.

6. Summary and conclusions

The main contribution of this paper has been to argue for the integration of elementary terminological practice into the secondary education classroom. Terminology instruction (i.e. the teaching of specialised language) has been traditionally aimed at university, vocational and professional contexts, with less attention to initial and intermediate education levels. As discussed, however, early exposure to terminology instruction may benefit students' academic progress, especially in immersion programmes, where a second language is used as a baseline for content subjects. The underlying assumption is that young students have the cognitive skills necessary for understanding complex concepts. Working with terminology, therefore, can help bridge the gap between the general education curriculum, on the one hand, and university and/or professional schools, on the other, so that the transition between both can be achieved gradually, particularly in terms of scientific-discourse comprehension.

The paper has addressed three main pedagogical aspects. Firstly, a 5-phase methodology has been proposed to guide students in finding terminological units from different areas of knowledge. The teacher's role in this process is to foster students' engagement by creating a supportive environment and by introducing them to the main aspects of speciality languages. Secondly, an online tool called DEXTER has been presented for the implementation of the proposed methodology. The tool can have two uses either as a learner-centred instrument for the automatic retrieval of terms from text collections or as a tool for teachers to develop didactic material. Computer-mediated approaches like this one are especially adequate for the targeted students, since they provide training in autonomous decision-making and reinforce digital competence. Thirdly, specific techniques have been argued which put terminology at the centre of content learning in a second language. More specifically, it has been proposed that activities based on poster and infographics presentation add a motivation factor to the straightforward use of word lists in class. Another major advantage of combining terminology with output activities is that critical thinking and spoken communication are favoured with minimal teacher intervention, whilst traditional vocabulary exercises such as flashcards, cloze tests or gap-filling play a supporting role. The framework in this paper, however, is limited in that it does not provide teachers with a deep analysis of syllabus planning or student assessment. Furthermore, future work is needed to evaluate the efficacy of the tool empirically and to monitor its uptake among teachers and students. Another subject of study for future research is the analysis of the limitations that teachers have to face when trying to implement terminology theory and practice in real secondary-education contexts.

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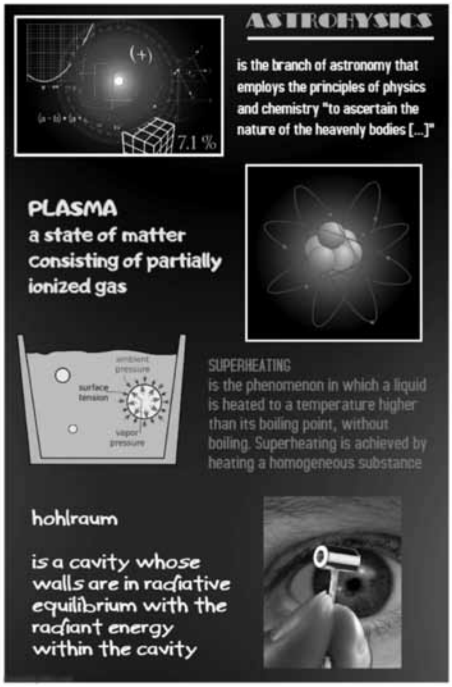
Appendix:

Example poster. Created using the “Poster my wall” applicationa
Sources used for the poster



Definitions (from top to bottom):

Definition of “astrophysics”: Wikipedia (accessed 30-9-16).
Definition of “plasma”: Wiktionary (accessed 30-9-16).
Definition of “superheating”:Wikipedia (accessed 30-9-16).
Definition of “hohlraum”: Wikipedia (accessed 30-9-16).

Pictures (from top to bottom):

Picture 1: Picture included in the original Poster my wall template.
Picture 2: Picture included in the original Poster my wall template.
Picture 3: By Spiel496 (talk) - I created this work entirely by myself, using Inkscape., Public Domain, https://en.wikipedia.org/w/index.php?curid=21883498 (accessed via Wikipedia 30-9-16).
Picture 4: Nif hohlraum.jpg (accessed via Wikipedia 30-9-16) (https://en.wikipedia.org/wiki/Hohlraum#/media/File:Nif_hohlraum.jpg).