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Cognitive Discourse Functions:

A Bridge between Content, Literacy and Language for Teaching and Assessment in CLIL

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As Bilingual Education programmes which adopt a CLIL approach grow, there is an ever-increasing need for conceptual and practical frameworks to help teachers integrate content, literacy and language in teaching and assessment. This article proposes that the construct 'Cognitive Discourse Function' or CDF (Dalton-Puffer, 2013) has clear potential for achieving a deeper integration of content, literacy and language than what is common in current practice. Cognitive discourse functions refer to how cognitive processes involved in learning academic content (such as describing, defining, explaining or evaluating) are realised in recurring linguistic patterns in the classroom. As the article argues, these linguistic patterns create a 'bridge' to link content, literacy and language and thus avoid the artificial separation of content and language that still pervades much CLIL practice. Reporting on a research study which examined 6th year primary CLIL students' production of one CDF (definitions) in a Spanish bilingual programme, the article suggests guidelines for how CDFs can inform CLIL practice at the levels of curriculum development, materials design, classroom teaching and assessment.

KEYWORDS:

Bilingual education; CLIL; cognitive discourse function; literacy; assessment.

Con el auge de los programas de educación bilingüe que utilizan el enfoque AICLE (aprendizaje integrado de contenidos y lengua extranjera), cada vez más se necesitan marcos conceptuales y prácticas para ayudar a los profesores en la integración de los contenidos, las formas de comunicación específicas para comunicar los contenidos ('literacy' en inglés) y el lenguaje. Este artículo propone que el constructo 'Cognitive Discourse Function' (función del discurso cognitivo) o CDF en sus siglas en inglés (Dalton-Puffer, 2013) tiene una potencial clara para ayudar a lograr una integración más profunda de los contenidos, 'literacy' y lenguaje de lo que se consigue en las prácticas actuales. Las funciones del discurso cognitivos (CDFs) se refieren a cómo los procesos cognitivos del aprendizaje de contenidos académicos (p. ej. describir, definir, explicar o evaluar) se realizan a través de patrones lingüísticos recurrentes en el aula. En el artículo se argumenta que estos patrones lingüísticos crean un 'puente' que enlaza los contenidos, 'literacy'y lenguaje para así evitar la separación artificial de los contenidos y lenguaje que todavía caracteriza muchas de las prácticas habituales en aulas bilingües. El artículo informa sobre un trabajo de investigación llevado a cabo en un programa bilingüe en España, en el cual se investigó la producción de una función (definiciones) de alumnos de 6º de educación primaria. Basado en los resultados de este trabajo, y el marco conceptual presentado en el artículo, se ofrecen unas pautas para guiar la práctica de la educación bilingüe con un enfoque AICLE en las áreas de desarrollo curricular, diseño de materiales, enseñanza en el aula, y evaluación.

PALABRAS CLAVE:

Educación Bilingüe; AICLE; función del discurso cognitivo; evaluación.

1. Introduction

Bilingual education programmes in which academic content is taught through a second or foreign language, and foreign language education programmes which teach language through content, are rapidly growing all over the world. Both these types of programme can come under the label of Content and Language Integrated Learning (CLIL), the former as 'hard' CLIL, and the latter as 'soft' CLIL (Ball, Kelly & Clegg 2015). Research findings and evaluations of CLIL programmes tend to find that, unsurprisingly, students make gains in learning the foreign language, in comparison to their counterparts in non-CLIL programmes. However, the outcomes of these programmes in terms of content learning, which is particularly relevant to the 'hard' versions of CLIL, are more uneven, as relatively few studies have focused on this dimension. Those which have looked at content learning have found mixed results, with some showing positive effects (e.g. Jäppinen 2005 and Surmont et al. 2016 on CLIL mathematics), and others showing possible negative effects (e.g. Anghel et al. 2012 on general primary education, and Fernández-Sanjurjo et al. 2017 on science). The context of the article is 'hard' CLIL programmes, as 'soft' CLIL approaches place less emphasis on having well-defined content learning objectives as the focus of teaching and assessment.

This division reflects a general problem with CLIL research and practice: the tendency (in spite of the acronym) to focus separately on content and language. Studies which focus on language learning tend to pay little attention to the content being studied, while studies which look at content learning outcomes do not usually have an explicit approach to language. Thus, 'soft' versions of CLIL see content as little more than a vehicle for language learning, while 'hard' versions tend to place their emphasis almost exclusively on the content, with little attention to language. This has important implications for CLIL teachers, as they may be left without any guidance or framework by which they can actually do justice to the CLIL acronym, that is, by integrating the teaching and learning of both content and language.

One source of these problems is that in education generally, we may be unaware of the key role that language plays in the learning and teaching of *all* subjects, right across the curriculum. Language is not just confined to the teaching and learning of language arts and foreign languages but should be part of a Language Across the Curriculum (LAC) policy. As Vollmer (2006) states, language learning and education occur "*in each and every subject in school*, in each and every academic/mental activity, across the whole curriculum (p.5, italics in original). Language in this sense does not refer to the teaching of isolated grammar or vocabulary, or language for everyday communication, but, as Vollmer (p. 5) puts it, "subject specific ways of thinking and communicating". These forms of communication which are specific to the different academic subjects are often referred to as *subject literacy.* Thus, CLIL teachers, just like all teachers, will need to keep in mind not only the conceptual content and skills belonging to the subject and specific language features needed to express them (e.g. terminology) but also the expected forms of communication (e.g. typical texts) through which this knowledge is expressed. That is why, in this article, I will argue that CLIL teachers need to connect the three dimensions of content, literacy and language, when planning and delivering instruction, and assessing their learners.

Connecting all three dimensions is particularly important when it comes to considering how students should be assessed in CLIL programmes. Assessment is seen as a thorny issue in CLIL, and many teachers complain of a lack of guidance in going about it (see Otto and Estrada 2019 in this journal). This uncertainty is understandable, and it stems from a lack of clarity about the balance and integration of content, literacy and language objectives in CLIL programmes. After all, if we are not clear about the relative balance and roles of content, literacy and language objectives when planning and teaching, we are unlikely to be clear about what, and how, to assess.

This article addresses this problem by proposing that the construct *Cognitive Discourse Function* (CDF), as formulated by Dalton-Puffer (2013) can act as a 'bridge' between content learning objectives, and the literacy and language needed to express them. The main argument is that many educational objectives across all academic subjects are expressed as verbs which describe specific cognitive operations, such as *define, evaluate, explain*, and that these operations, or functions, have specific linguistic realisations, that can be taught to students. CDFs form a link between cognition and language or thinking and speaking/writing. As such, they are a bridge between content learning objectives, the specific types of communication (literacies) associated with academic subjects, and the language used to express knowledge and thinking.

"CDFs form a link between cognition and language or thinking and speaking/writing. As such, they are a bridge between content learning objectives, the specific types of communication (literacies) associated with academic subjects, and the language used to express knowledge and thinking."

The rest of the article is organised as follows. The following (second) section prepares the ground for the introduction of CDFs by exploring in more depth the links between content, literacy and language in CLIL. The third section is where CDFs are introduced, and where it is shown that they can be a 'missing link' between content, literacy and language which can provide teachers with a conceptual toolkit for the integration of all three in CLIL teaching and assessment. Section four presents some results from an ongoing research project which looks at students' content and language development as they make the transition from primary to secondary education, and which uses CDFs as a central construct. The fifth section suggests some practical ways in which CDFs can be part of a framework for integrating content, literacy and language for teaching and assessment in CLIL programmes and suggests some future directions for research.

2. The relationships between content, literacy and language

The first 'L' in the CLIL acronym stands for 'language', but it could just as well represent another key element of knowledge necessary for academic success: literacy. While traditionally literacy was seen as having a rather restricted meaning – the ability to read and write, it now has a much more expanded meaning. It now refers broadly to the different forms of communication, through writing and speaking and other (e.g. visual) modes which students typically encounter and have to master in the study of academic disciplines. In the context of CLIL, where it is intended that students will gain literacy skills in more than one language, and indeed different types of literacies, we can also refer to this as *pluriliteracies* (Meyer et al. 2015).

Paying attention to literacy means taking into account that different school subjects such as science and history have their own specific types of communication, most often seen in the text types (or genres) which are typically used. For example, a typical genre in science is the laboratory report (the writing up of an experiment) and in history, it could be an historical account, which not only relates historical events but includes some explanation of them. Learning a school subject, then, means being able to comprehend and produce the types of texts or genres (both oral and written) through which knowledge in the subject is communicated. For a thorough discussion and illustrative examples of school genres typically used in CLIL, see Llinares, Morton and Whittaker, 2012.

Adding the 'L' of literacy to the 'C' and 'L' of content and language in CLIL enriches our conception of what CLIL is really about, and of the task facing students and teachers in making knowledge accessible in a second or foreign language. In fact, the 'C' and the two 'Ls' interact in powerful ways, and in understanding how they interact, we can approach the task of creating a much fuller integration of the three types of knowledge, thus addressing the problem

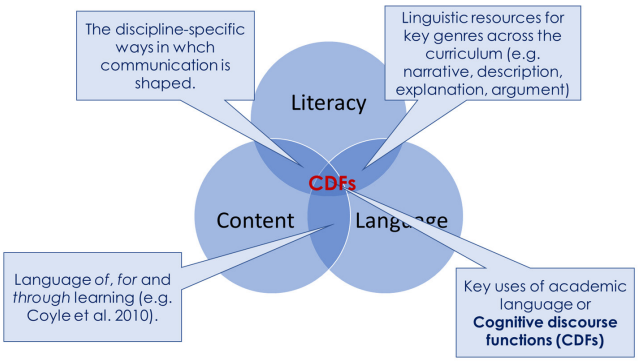

Figure 1. The relationships between content, literacy and language (adapted from Cammarata & Cavanagh, 2018).

of the separation of content and language described in the previous section. The three-circle Venn diagram in **Figure 1**, which draws on ideas in Cammarata and Cavanagh (2018), is a visual representation of the three types of knowledge and their intersections. Each intersection is discussed below.

The intersection between content and literacy has been discussed above. It is perhaps the most powerful intersection as it has implications for teachers of all subjects, in any language. Teachers need to not only know the subject and get it across to students, but they need to know the typical ways in which knowledge is 'packaged'in different genres and make this clear and visible to students. As CLIL teachers, if we get an understanding of the typical communication formats and genres in our subject and let our students 'in on the secret', we are already on the way to powering up our CLIL practice by really integrating content and language. Many of these genres, such as narrative, description, explanation and argument are general across a wide range of subjects (with some variations), so it can be argued that learning them is extremely useful as it is knowledge which can potentially transfer across the curriculum. That is, once students are 'in on the secret' of a how a genre works in one subject, they may be more able to adapt it and use it another subject.

The second intersection (content and language) is the one that has received most attention in discussions about CLIL. For example, Coyle, Hood & Marsh (2010) describe a 'Language Triptych' in which language has three roles: language *of, for*, and *through* learning.

Language *of* learning refers to the words and grammar which are minimally necessary to talk and write about a subject, most often the specific technical terminology, such as *photosynthesis* in science or *treaty* in history. Unfortunately, in too many CLIL and bilingual education programmes, this has often been the *only* conception of 'language' used – apart perhaps from some minimal correction of common errors.

Language *for* learning is the language which students need in order to participate in learning activities. For example, if we want students to discuss a topic and agree or disagree, we should provide them with the language resources they

need to do this, for example the language of giving opinions, agreeing and disagreeing. In many 'hard' CLIL contexts, teachers are reluctant to support students with language *for* learning, either because they do not know how to, or because they feel that doing so takes away precious time for content learning.

Language *through* learning is new language that students can pick up when applying their thinking skills in learning activities. It is often difficult to predict, as it can happen when students work independently on their own projects and chosen topics, and in so doing encounter new language.

The third intersection is the one between literacy and language. Each of the typical texts or genres that we encounter when studying a subject has its own 'language rules'. Thus, knowing a genre is not only about the overall structure of the texts – their various stages and parts, but it also goes down to the level of specific grammar and vocabulary. For example, a description will begin with a definition or classification of the thing described, and this is followed by stages or parts of the text which refer to different dimensions of the thing described. Each of these stages will have their own grammar and vocabulary. For example, a definition will take the form of something like: '*An X is a Y which lives in Z*'. To create a successful definition, the student needs to know that 'X' is the specific thing defined, this is followed usually by the verb 'be', 'Y' is a more general class noun, and this is followed by a phrase (often a relative clause) which provides more information about the thing defined. Definitions will be looked at in more detail later in the article.

Definitions are a clear example of what is meant by *Cognitive Discourse Function*. They are typical educational objectives or thinking operations – students are often asked to define phenomena in examinations – and, as we have seen, they have their own typical patterns of linguistic realisations. At a larger scale, when we expect students to produce whole texts, we prefer to refer to genres which are well known text types which occur across different subjects, such as laboratory reports in science. Cognitive Discourse Functions are placed at the centre of the three-circle Venn diagram in **Figure 1**. They can be seen as a 'bridge' linking all three dimensions – content, literacy and language. In the next section, the CDF framework is presented and the argument about their centrality in CLIL is further developed.

3. Cognitive Discourse Functions (CDFs) as a means of connecting content, literacy and language

When teachers think of 'content' they do not only think of chunks of knowledge that they want students to learn, but they also need to clarify what they want them to do with that content, especially in terms of cognitive operations such as remembering, analysing, applying, creating etc. These cognitive operations, or 'thinking skills' have been categorised in many different ways, with the best known being the taxonomy developed by Bloom and colleagues in the 1950s, later revised by Anderson and Krathwohl (2001). Bloom's taxonomy depicts thinking skills in a hierarchical fashion, going from 'lower-order' thinking skills like remembering and understanding to 'higher-order' thinking skills like evaluating and creating. While useful, it can lead to problematic assumptions such as the erroneous idea that knowledge and understanding are somehow 'inferior' to evaluation and creation.

An advantage of these taxonomies is that they provide a set of verbs with which, in theory, curriculum designers and teachers should be able to establish more precise learning objectives than they would otherwise. They allow teachers to stipulate what exactly they expect students to be able to *do* with the content. They are not normally seen as essentially linguistic in nature, as they are usually described as 'thinking'skills. However, it is not difficult to argue that these objectives are actually verbal in nature, not just because they can be expressed as verbs, but because they require quite specific language resources in order to be carried out. For example, evaluating requires the use of linguistic resources to judge the qualities of people and appreciate the qualities of things.

Across the world of education, a wide variety of learning objectives expressed as verbs has been used. A resulting problem is that the use of these verbs can be quite messy, with sometimes different verbs referring to the same thinking skill, or the same verb being used to describe different thinking skills. This can lead to teachers and teaching materials giving misleading information to students about the tasks they have to do. A common example is when students are asked to 'explain' a phenomenon when the teacher's real intention is that they simply describe it. This teaching problem can very quickly become an assessment problem, where the tasks students are asked to do in an assessment such as a test or exam may not truly represent the original learning objective. Whether or not we use specific verbs such as *describe, explain,* or *evaluate*, we need to be sure about the nature of the task we expect the students to do.

In the context of bilingual education, Gottlieb (2016) calls these operations 'key uses of academic language'. She gives the example of a unit on ecosystems where students can show that they have met academic language expectations by:

1. **Identifying** characteristics of various ecosystems.
2. **Describing** animal and plant adaptations to various ecosystems.
3. **Comparing** animal and plant adaptations in various ecosystems.
4. **Explaining** how animals and plants adapt to various ecosystems.
5. **Evaluating** the consequences of changes in various ecosystems.

Gottlieb, 2016: 82 (emphasis added).

Type	Communicative intention	Label
1	I tell you how we can cut up the world according to certain ideas	CLASSIFY
2	I tell you about the extension of this object of specialist knowledge	DEFINE
3	I tell you details of what can be seen (also metaphorically)	DESCRIBE
4	I tell you what my position is vis a vis X	EVALUATE
5	I give you reasons for and tell you causes of X	EXPLAIN
6	I tell you something that is potential	EXPLORE
7	I tell you about something that is external to our immediate context on which I have a legitimate knowledge claim	REPORT

Table 1. Seven cognitive discourse functions (Dalton-Puffer, 2013: 234).

Gottlieb suggests that these 'key uses of academic language' should be apparent in students' writing and can be organising frames for genre development. By this she means that we should draw students' attention to them, ensure that they are visible in students' writing and use them as building blocks to develop their literacy (writing) skills. By identifying what exactly we want students to do with content (the thinking skill) and its verbal analogue, we can achieve three very important aims: clarify our learning objectives so we can support students in achieving them; make sure assessment is more valid and fair in that tasks reflect the learning objectives; move towards a much deeper integration of content, literacy and language.

In order to impose some order on this messy area in the context of CLIL, Dalton-Puffer (2013) developed the construct of *Cognitive Discourse Function* (CDF). She reduced the wide variety found in educational objectives to seven communicative intentions, each one labelled as seen in **Table 1**.

Tidying up the key uses of academic language in this way has the advantage that CLIL curriculum developers, materials designers, teachers and students can have access to a shared terminology. This will help to remove ambiguity surrounding learning intentions and make any language-based interventions much more focused on the content-learning and literacy needs. For example, if we want our students to explain a phenomenon by giving its causes (content), we may ask them to produce an example of the explanation genre (literacy), and specific language for causality (language). The CDF *explain* provides a building block to help us capture all three dimensions. This again explains why CDFs are paced at the centre of the Venn diagram in **Figure 1.**

Although CDFs are a very useful way of tidying up the messy area of learning intentions and their verbal representations, they do not stipulate *exactly* which language (at the levels of lexis and grammar) students have to use. For example, the CDF *explore*, which Dalton-Puffer characterises as 'I tell you something potential', could refer to predicting the future, speculating on the past (what could have happened, but didn't) or imagining a different reality. In terms of lexis and grammar, these would involve students using, for example, modal verbs (*will, may, might*) and conditionals (present and past). Other CDFs, such as *define* (as discussed below) constrain much more tightly the language which can be used to express them.

However, whether a particular CDF requires a more or less restricted range of linguistic options, using CDFs as building blocks provides a much more focused and principled integration of content, literacy and language than simply dealing with language in a random or incidental fashion. They also provide a framework for assessing learners' academic language competence, and this can be used both by teachers and researchers. The next section looks at a research project which was designed to do just that, in the context of the transition from primary to secondary education in a bilingual programme.

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4. The TransCLIL Project: Assessing students' academic language competence with CDFs

TransCLIL is a Spanish government-funded research project carried out by the UAM-CLIL Research Group based at the Universidad Autónoma de Madrid (Spain). The context of the project is the bilingual education programme in the Madrid region. One characteristic of this programme, which is not generally shared by other bilingual programmes in Spain or elsewhere, is that the students are divided into two streams at the secondary school level (grades 7 to 10). One stream has a much more intensive bilingual curriculum (approximately 40% in the foreign language), and the other has much less exposure to instruction in the foreign language, with often only one or two subjects taught using a CLIL methodology. One aim of the project was to investigate the effects of this streaming on students' development of academic language competence as they made the transition from primary to secondary education. The project also aimed to investigate whether there were differences in teachers' practices across the two streams, and to obtain students', parents', and teachers' perceptions of the pupils' experiences and performance in both streams. More detailed information on the project can be found at the group's website: https://uam-clil.org/research-projects/current/.

In achieving the aim of investigating students' development of academic language, the construct of CDFs was used. Working with 6th grade primary students, the researchers designed tasks with prompts which elicited spoken and written CDFs. For example, in one task students were asked to speak and write about a field trip in which they learned about ecosystems. The prompts elicited seven CDFs: *define, report, describe, compare* (a sub-category of *classify*), *explain, explore* and *evaluate*. The excerpts below show examples of two students' texts (**student A** and **B**). Before continuing to read the article, it would be useful to look at the students' texts and see if you can identify the seven CDFs. It would also be useful to compare the two texts, in terms of how well each shows content knowledge about ecosystems, as well as any language criteria you would use if you were grading them.

Student A

An ecosistem is like a foodchange, in an ecosistem we have producers, consumers and decomposers. When I went to Hervás we did a route in the mountain, everyday we throught the trash to the bin.
The rabbit is a mammal, is herbivore, is small and soft.
We have in bouth places a lot of trees and houses but there we have more cars.
I think is better the rabbit to live in Hervás because there they have less polution.
They would have a lot of rabbits there.
Yes, I think is important to protect the environment. Because is better for the plans, the animals… traveling less by car.

Student B

Hi, my readers.
I am going to talk about the ecosystems. An ecosystem is a community formed of a habitat, living things, and interactions between living things themselves and the habitat. In Hervás I have helped a lot to the environment: I threw the rubish to the trash can, I haven't killed animals like ants, and i have recycled the rubish. If I wanted to introduce a new specie, I will choose the dinosaur. It is a strong, savaje and very big. The name of the dinosaur would be T-rex.
The ecosystem of Boadillia is a calm and clean ecosystem. The ecosystem of Hervás is a mountain ecosystem. I will introduce the peregrine falcon in Boadilla because of there are a lot of mouses. In Hervás, the monkeys because there are a lot of trees. And the dinosaur.
It is the best ecosystem to the dinosaur because there are a lot of animals to eat. So there will be less animals.
Yes it is very important because if we do not protect the environment we can die. I won't pull up plants or use less our cars.

In **student A**'s response, we can see that in spite of a range of spelling errors (some of which affect key vocabulary such as *ecosystem, food chain, pollution*), this student was able to produce, at least partly, the relevant CDFs, and some accurate information and reasonable ideas. However, the student doesn't provide a formally complete definition (preferring to compare an ecosystem rather than define it, and list what it contains) and the other CDFs are rather brief and have language inaccuracies.

Student B's response seems to show more control of the blog genre, for example in the way in which the reader is addressed at the beginning. The student has responded to all the prompts and has produced attempts at the relevant CDFs. These attempts appear to be fuller and more elaborated than student A's. For example, the definition is much more well-formed and accurate (it identifies the class to which the defined entity belongs – a community – and provides further information). However, the comparison just describes features of the two ecosystems without explicitly comparing them (which student A attempts to do). In terms of content knowledge, Student B's choice of an extinct animal - a dinosaur – is of somewhat dubious relevance to the task!

For both students, or for the whole class if answers share similar features, it would be possible for the teacher to provide feedback indicating areas for improvement, and these could be built around CDFs. For example, some (anonymous) examples of definitions could be shown, and the whole class asked to comment on them. This could form part of a formative approach to assessment in which students are supported in producing formally complete and accurate CDFs as part of a genuine CLIL approach which focused on content, language and literacy.

As part of the TRansCLIL project, the research team carried out studies on students' performance of particular CDFs, especially those which have been highlighted in the CLIL literature as important for expressing subject knowledge and being teachable, as is the case of definitions (Dalton-Puffer, 2007). One study on definitions focused on grade 6 primary students' production of this CDF in the context of the curricular topic of ecosystems (Nashaat & Llinares 2017). This study was guided by the following research questions:

RQ1:

Are there differences between the definitions produced by 6th grade primary CLIL students on the same topic (ecosystems) in English and in Spanish?

RQ2:

Are there differences in the production of definitions across modes (spoken and written)?

RQ3:

Are there any relationships between the production of definitions and students' results in a general academic test at the end of primary education?

Below is an example of what a well-formed definition in this topic area would look like:

> An ecosystem (1) is a community (2) formed by a habitat, living things and the interactions between living things themselves and the habitat (3)

The example shows that a good (formal) definition should include (1) the thing being defined (*ecosystem*), (2) a general class word (*community*), and (3) an expansion, which can consist of exemplification or further classification (*formed by a habitat, living things and the interactions between living things themselves and the habitat*). Examples of definitions written and spoken in English and Spanish by around 80 6th grade primary students were collected and analysed using corpus linguistics software.

The results showed that there were significantly more formal definitions in their written texts, and significantly more semi-formal definitions (i.e. definitions which had some, but not all, of the expected components) in their spoken performance. The students used more general class words in their written than in their spoken production, but significantly more expansions in their spoken performance. In terms of the comparison between English and Spanish, there were very similar definitions across both languages in both modes (spoken and written). As for the relationship between production of definitions and students' general academic level as seen in the end of stage test, the results showed that those who achieved more on this test used more formal definitions when writing in English.

These are preliminary results which looked only at the students' work at primary level. A further study (Nashaat & Llinares forthcoming) compares the same students' productions of definitions at the beginning of the second year of secondary education. Together, these studies are producing useful findings which can offer researchers and teachers vital clues about the effect of mode (spoken or written), code (Spanish or English) and general academic achievement on the production of academic language as seen in CDFs. Further studies can also compare students' success in producing CDFs with their results in general English tests such as Cambridge KET and PET. It may be that measures of general English proficiency do not capture the specific academic language competences students need to be successful in bilingual programmes.

5. Guidelines for using CDFs to integrate content, literacy and language in CLIL teaching and assessment

The conceptual framework of the connections between content, literacy and language, the construct of CDFs as proposed by Dalton-Puffer (2013), and the emerging results from research such as the TransCLIL project together

show promise in offering CLIL teachers guidelines for a genuinely integrated approach to teaching and assessment in bilingual education. However, these frameworks and research findings need to be translated into practical tools and blueprints for action that will assist in curriculum planning, materials design, classroom instruction and assessment in these programmes. In this section of the article, some practical guidelines are proposed for each of the three levels of curriculum and materials design, instruction and assessment.

As far as curriculum and materials design are concerned, as argued above, there is often a lack of a truly integrated approach in current CLIL practice. Subject knowledge is presented either as it would be if it were being taught in the first language, or in a more 'watered down' version, with less content covered and perhaps with more visual support. The aim is to facilitate or 'scaffold' access to the material without overburdening the students with dense linguistic material. There may be some kind of language focus, but this is often limited to glossaries of key terms, which means that 'language' is reduced to one aspect of language of learning, with the subject literacies in terms of key genres and their grammar and lexis being ignored. In this sense, the literacy and language skills that students really need to express subject knowledge and skills are rendered 'invisible' (see Llinares, Morton and Whittaker 2012 for more on the 'invisibility' of language in CLIL).

One way to improve this situation would be for CLIL curriculum guidelines and materials to be more explicit about the literacy and language objectives which accompany, and make possible, the content objectives. Reading and writing tasks could clearly identify the genre being used and provide explicit support for students in seeing the 'nuts and bolts' of how the genre works. From here, it is a relatively easy step to drill down to the specific CDFs which link the content and cognition objectives with their verbal representations. For example, if students have to produce definitions, they can be given explicit support by being shown how they work in terms of words and grammar. Some CDFs are wider in scope, such as explanations which can be seen as genres (an explanation text) or CDFs (e.g. a sentence giving the cause of some phenomenon). However, whether they are seen at text or sentence level, they provide, as Gottlieb (2016) suggests, building blocks for a real integration of content, cognition, literacy and language.

"Teachers need to be very clear about the objectives they are working towards both at the level of teaching units, and in individual lessons. Subject literacy in the form of key genres and CDFs should be an explicit focus in all content units."

In terms of classroom instruction, teachers need to be very clear about the objectives they are working towards both at the level of teaching units, and in individual lessons. Subject literacy in the form of key genres and CDFs should be an explicit focus in all content units. This of course will be helped if the materials are designed in the way set out above. One way to ensure that objectives are clearer, more explicit, and more likely to be achieved, is to reduce the number of objectives addressed in any unit or lesson. Fletcher-Wood (2018) gives an example of how a content teacher can have too many objectives in one lesson. The example below comes from a lesson on ecosystems:

a. Evaluate the dangers of toxic material in the food web.

b. Locate organisms on a food web.

c. Apply these ideas to a new ecosystem.

d. Explain energy transfer within a food web.

e. Remember the meaning of *producers, consumers, predators* and *prey.*

f. Analyse interdependence in a food web.

Fletcher-Wood (2018: 39-40).

As Fletcher-Wood points out, these are too many objectives to be adequately covered in one lesson, and he also notes that one of them (locate organisms on a food web) is not a learning objective, but an activity. Indeed, as teachers we can often have difficulty in distinguishing between our real, underlying learning objectives, and the specific tasks and activities which are intended to support students in achieving them. We need to remember that our true objective is not for the students to complete the task successfully, but to reach the learning objective that the task is designed to facilitate. Indeed, not completing the task successfully may be more of a learning experience.

Fletcher-Wood recommends reducing the number of objectives in one lesson. For example, in the lesson on ecosystems above, two or three objectives would be enough. Often only one is sufficient in one lesson (or even a sequence of lessons). This is because, as Fletcher-Wood argues, "If something is an objective, we need to offer students models, practice, feedback and time; we can only do so by choosing fewer, more focused objectives" (2018: 40). This is especially

the case in CLIL and bilingual education, where we need to go a bit more slowly, as students are coping not only with the content, but with the additional language. Both in CLIL and non-CLIL contexts, there is a tendency to rush through the curriculum, ticking off one objective after another as if they had really been learned by the students. This is extremely ineffective, as students need time to see the same content in different ways, revisit it, and get more practice if they are to have a chance to really learn it. This is even more important when the content is taught in a foreign language.

However, going a bit more slowly does not mean sacrificing deep learning of specific content and literacy objectives. This is especially the case if we integrate literacy and language objectives with our content objectives. If we look at Fletcher-Wood's objectives for the ecosystems lesson, we can see that two of them (a and d) are expressed as CDFs. If we did decide to focus on these objectives, we could identify the language students need to express the relevant CDFs, in this case the language of evaluation and explanation. Where the objectives do not stipulate a specific CDF, such as in c, e, and f which relate more clearly to thinking skills taxonomies such as Bloom's, it is also necessary to break them down into what exactly we expect the students to produce in terms of language. Often, we will also find genre and CDFs useful for this, for example recalling facts may be expressed in the form of report (either as a whole text – genre, or at sentence level - CDF).

Taking CDFs seriously when we formulate our learning objectives means that they will need to be addressed in the lessons we teach. This means that some time will be dedicated to clarifying for students what exactly they have to do in terms of producing language (an explanation, a report, a set of definitions, a description) and to providing clear models and opportunities for practice (see Morton 2010 for an example of how this can happen in a secondary history CLIL context). It needs to be pointed out here that this is not adding foreign language teaching to content instruction. Indeed, as argued above, there are compelling reasons for *all* teachers to do this, irrespective of the language used as medium of instruction. If that is the case, there is *even more* reason for CLIL/bilingual teachers to do it, as it means that the language focus is genuinely integrated with the content, cognition and literacy objectives, and not 'bolted on' in a random fashion.

Turning to the thorny topic of assessment, CDFs are also a useful tool for bringing into line our content, cognition, literacy and language objectives, the tasks and activities we employ to help students achieve them, and the purposes and methods we use to assess their learning. Their usefulness can be seen in terms of what Mahoney (2017) considers the first two key questions teachers need to ask when they assess their students:

(1) What is the purpose or focus of this assessment?

(2) What use will I make of the information I obtain about the students' abilities in relation to the focus of the assessment?

CDFs help teachers in CLIL and bilingual programmes answer the first question by allowing them to clarify, and unify, the specific content, literacy and language objectives. This will make it easier to design assessment activities which clearly focus on these objectives, and to assess more fairly the students' achievement of them. For example, if a short-answer exam question asks students to explain a phenomenon, we can identify the genre (an explanation text), the CDF (explain) and specific language they need to use (e.g. language of causes and/or consequences). These can then be stated as assessment criteria, and can be shared with the students using appropriate, student-friendly language. It will be even more useful if students get the chance to use the criteria to assess samples of work written by other students (e.g. in previous years). This allows them to develop expertise in what makes a piece of work more or less effective in terms of both content knowledge and language/literacy.

CDFs can help teachers when they answer the second question (what will I do with the information gained?) by providing a focus for the two main uses of assessment: formative and summative. When assessment has a formative function, evidence about student achievement is used to make decisions to improve the students' learning or to make the instruction more effective (Black & Wiliam 2009). Thus, assessment is formative when it is used to support, rather than just measure, learning. This support is often provided in the form of feedback that helps the student to see what needs to be done to improve. Often, in CLIL programmes, formative feedback on students' language performance is quite random and unconnected to the content learning objectives or the aspects of literacy needed to express them. For example, teachers may correct or point out random spelling errors, or grammatical problems that are not in any way linked to the content learning objectives. CDFs can help language feedback as part of formative assessment to be much more focused. For example, if students have problems with the language of explanations or definitions, this can be pointed

"All feedback should be action-oriented, which means that we shouldn't give feedback unless it is clear to the student what they have to do to improve. CDFs are a way of making language and literacy formative feedback much more relevant and focused."

out to them, and they can take specific action to improve in this area. They will know what they need to do. This will be much more effective than simply asking students to "write more clearly" or "check spelling errors". All feedback should be action-oriented, which means that we shouldn't give feedback unless it is clear to the student what they have to do to improve. CDFs are a way of making language and literacy formative feedback much more relevant and focused.

When assessment has a summative function, we use it to measure the extent to which students have achieved outcomes at the end of a period of instruction, and the information gained is converted into a final mark or grade. Summative assessment is high-stakes, as it often has serious consequences for the student (they pass or fail a course, for example). Often, teachers in CLIL or bilingual programmes ask whether they should take language errors into account in summative assessments. Some teachers do indeed penalise students for random language errors, taking away a number of marks from the total. However, as seen above, if these errors are somewhat random, and not directly linked to the content and literacy learning objectives, it could be argued that punishing students for these errors is unfair. After all, we should only assess what we have taught, and even the most 'soft' CLIL programme may not be designed to teach specific language structures. Here, again, CDFs can be the CLIL teacher's friend as they help to provide a much clearer focus for summative assessment, if it is decided that language and literacy should be taken into account. For example, rubrics can contain criteria directly related to students' performance of specific CDFs, such as definitions, and these criteria can be clearly graded. Students will then know exactly on which aspects of language they are going to be assessed summatively, and formative feedback can be directed at improving their performance in the specific area.

6. Conclusion

In this article I hope to have persuaded you that we can only do justice to the 'I' of 'Integration' in CLIL if we consider the complex relationships between content, cognition, literacy and language. I also hope to have convinced you that cognitive discourse functions (CDFs) can be a very useful tool in bringing together these key aspects of CLIL for planning, teaching and assessment. Of course, an article like this one can only hope to map out the territory and cannot provide specific guidelines for every CLIL or bilingual education programme. Each programme will be different in terms of the subject taught, the 'hardness' or 'softness' of the approach used, and the sociolinguistic context in terms of the kinds of roles the language of instruction plays in the surrounding community. However, in spite of inevitable differences between contexts, many CLIL practitioners all over the world are crying out for guidelines to help them with the complex task of combining content, literacy and language. I hope that this article has persuaded you that CDFs have a great deal of potential in helping teachers with this task, and it is now up to teacher educators, curriculum developers, materials designers, and indeed teachers themselves to 'translate' what we know about CDFs into effective and practical instructional and assessment strategies. ■

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