CLIL Materials as Scaffolds to Learning

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Abstract
Four features common to CLIL materials used in Spain appear to act as instructional scaffolding to facilitate learning:

Illustrations with labels and captions are used to define key terms, introduce topics, and examine steps in processes like photosynthesis. They often summarize the main points in longer texts, so they prepare learners for extended reading. As output tools, they enable learners to communicate at a basic level.

Content area texts communicate the genre, vocabulary, and language characteristic of the discipline. Some text types cross content ‘borders’ like instruction and information. Familiarity with text features prepares learners to understand authentic materials.

Graphic organisers like Venn diagrams, tables, and flow charts present information visually. As output tools, they help learners with limited language skills to communicate intelligibly.

ICT applications convey information in a virtual ‘hands on’ format which suits kinaesthetic learners. Rich visual support coupled with interactivity enables students to learn through active participation.

These four features provide flexible instructional support, adaptable to many content areas and appropriate for learners of different ages.

Keywords: scaffolding, genres, graphic organisers, ICT

Input – Output Scaffolding Tools
CLIL learners face considerable challenges as they cope with subject area concepts and language through a second or foreign language. Scaffolding instruction to facilitate learning can involve the use of strategies like activating prior knowledge, providing examples of outcomes prior to assigning a task, creating a motivating context, and facilitating student participation. The materials which CLIL teachers select or develop may reveal other useful tools for scaffolding instruction. Four of these identified in materials developed for Spanish CLIL contexts are examined here: a) illustrations with labels and captions; b) content area text types, vocabulary and language; c) graphic organisers; and d) ICT applications. Examples are drawn from primary and secondary art, science, geography and history contexts to show the range of their applicability. Each tool is analysed from two perspectives: how it facilitates the development of the critical thinking skills characteristic of content areas, and how it enables the development of language.
Illustrations with Labels and Captions

'Illustration' is used here to refer to realia and material in print or digital formats. Realia may be preferred for primary learners and some content concepts. However, given the curriculum for subjects like science or geography (e.g. human reproduction, the solar system, volcanoes), using realia may not always be feasible. In those cases, illustrations or models may be appropriate substitutes. Illustrations provide visual support for understanding content area phenomena, and developing critical thinking skills such as identifying or naming. As regards language, the labels or captions that usually accompany them support target language use at the word and sentence level.

Labelling illustrations often appears as a descriptor of language ability. Descriptors for reading and writing in the Common European Framework of Reference (Council of Europe, 2001: 96) state that A1 learners can “get an idea of the content of simpler informational material and short simple descriptions, especially if there is visual support” (Ibid: 70), and that they can “copy out single words and short texts”. At A2 level they can “pick out and reproduce key words and phrases or short sentences from a short text” within their competence (Ibid). The WIDA standards for English language proficiency across content areas (WIDA, 2007) provide examples of lower-level writing skills for learners aged 12–14 such as:

- Science: identifying types of energy represented visually
- Social studies: labelling illustrations which show features of government
- Language arts: producing words or phrases to convey basic information
- Mathematics: making a graphic representation of math terms and labelling them

Labelling in CLIL contexts yields similar examples (CILT, 2008).

An especially striking example of labelling was part of a science lesson devised by a CLIL science teacher in Catalunya (personal communication, 2007) for eight and nine-year old learners. Learners at that age normally study body systems with diagrams or models. However, this session involved the use of animal viscera from the local butcher shop: trachea, lungs, heart and liver. Learners examined the organs and experimented with some of their functions. Protected with smocks and rubber gloves, they used straws to blow air into the lungs through the trachea. Guided by labelled illustrations, they organised the viscera into an anatomically correct sequence on a large sheet of paper, and identified each organ with hand-written labels. Similar activities can be done with realia like food products: they can be labelled ‘plant’ or ‘animal’ to classify them by origin.

Labelling activities like those above are effective tools for recording hands-on experiences, but they can also be used to record information from other sources. For example, primary science materials developed in the Basque Country involved labelling the stages in the water cycle (Eusko Jaurlaritza-Gobierno Vasco, 2004-5). In Madrid, primary learners created a display to record their research into prehistoric life. Tools, animals, art, clothing and settlements were represented with drawings and photos, then classified and labelled (Pareja and Fernández Yubera, 2009). In summary, from the content perspective, labels identify key terms or concepts, and stimulate thinking skills like identifying, naming and matching (i.e. illustration and term). From the language perspective, labelling involves skills which are attainable goals for even very young learners.

The previous discussion focused on labelling as a lower-level thinking skill, however, using a taxonomy of critical thinking skills (for example, Bloom, 1956) as reference, teachers can transform labelling into a stepping stone for activities at other levels. For example, secondary learners studying Roman history can create maps of the empire. The empire developed in stages –monarchy, republic and empire– so they could differentiate the territories added in each period, search for their Latin names (i.e. Germania, Thracia), and create a key. By comparing this map with one of Europe and the Mediterranean region today, students can discover which countries occupy the original territories (Richmond Publishing-Santillana, 2008a). This comparison can help them predict where vestiges of Roman civilization may exist, and search
for photos to illustrate their maps. Learners may then create role-plays which capture the reactions of Roman time-travellers visiting those remains. In doing so, students see today’s world from another perspective, empathise with another civilization, and participate in an engaging activity which involves them personally. In summary, the labelling activity, map-making, develops history content and thinking skills like identifying, comparing, classifying, and recognizing parts (territories in the Roman Empire). Role-play language may involve functions like conveying factual information and expressing emotional or moral attitudes. Here, a map is the starting point for an activity sequence. In other cases, works of art provide support for part of a lesson.

Photos of famous works of art stimulate comparison of techniques in this example from a primary CLIL art class on ‘landscapes’ linked to the science topic of ‘light and dark’. An art unit designed for L1 learners (Crown copyright, 2008a) offers starting points which could scaffold learning in CLIL: students observe and sketch local landscapes under different light conditions. A science unit (Crown copyright, 2008b) suggests relevant vocabulary: light (dark-light, bright), source of light (the Sun), comparisons (lighter-darker, the lightest-darkest) and expressing reasons (because). Colours and shades (e.g. blue, dark green) might also be helpful. Language can be taught directly or introduced as needed during the observation and sketching phases.

By introducing works of art, CLIL teachers can build on the learners’ personal exploration so that they can perceive how other artists have captured landscapes and move on to develop their own work. Two of Claude Monet’s water-lilies paintings from the 1914-1917 series can be used: a bright day scene and another in darker tones. Like other Impressionists, Monet explored the effect of light on a subject, and often painted the same one at different times of the day. The teacher displays photos of the paintings, and asks learners to describe them (What can you see?) supplying or reinforcing language as needed. Further questions encourage closer examination, making inferences and drawing conclusions: How does the artist use line and colour? Why do you think he worked on this subject twice? Eliciting opinions (Which painting do you prefer?) encourages learners to state their preferences. This leads them to experiment with techniques, and express personal observations and feelings about a landscape. In this landscape lesson, illustrations stimulate close observation, draw on several thinking skills, and serve as catalysts for self-expression.

Illustrations with captions (phrases or complete sentences) abound in geography, history and science texts. Captioned illustrations provide more content input than labels, focus on significant information, and can also introduce learners to text organisation. A secondary level CLIL history lesson on Ancient Egypt uses a captioned photo of King Tutankhamen’s sarcophagus to focus on the elements that symbolize the royalty, power and protection associated with pharaohs: the vulture, headdress, beard, crook and whip (Richmond Publishing-Santillana, 2008a: 103), for example:

The vulture was the symbol for Upper Egypt.
The crook symbolised protection.

The position of the captions around the photo reflects an organisational pattern commonly used to describe human figures: head to foot. Thus, well-positioned captions function like an illustrated outline which reveals the organisation of longer, more complex texts learners may read on the same topic.
Content Area Text Types, Vocabulary and Language

CLIL practitioners strive to enable learners to experience the content and language common to the discipline studied. Authentic texts are often an essential part of their lessons. When selected from sources like websites or course materials designed for target language speakers, texts reflect the vocabulary, grammar, syntax, and organisation characteristic of the content area. As the input provided is more extensive than in captioned materials, (often several paragraphs accompanied by labelled or captioned illustrations), learners need better language skills to grasp the concepts and discuss them.

Highlighting Correlations between Content and Language

To make informed decisions on text selection, Brinton et al (1989: 90) recommend taking into consideration the level of difficulty: Are the materials appropriate for the proficiency level of the students’ language skills? How heavy is the lexical/syntactical load? As discussed earlier, selecting appropriate texts for CLIL is often difficult because the diversity of contexts currently exceeds the availability of CLIL-specific materials. Consequently, when using texts from other sources, teachers can facilitate learning by pointing out correlations between language features and content.

Some CLIL materials highlight these correlations by making both content and language objectives explicit. Table 1 offers an extract from a text on the hydrosphere (Richmond Publishing-Santillana, 2008b:96) in which content objectives are set out side-to-side with language functions exemplified by exponents drawn from the text.

<table>
<thead>
<tr>
<th>Content objectives</th>
<th>Key language</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this unit you will ...</td>
<td></td>
</tr>
<tr>
<td>Find out how water is distributed on Earth.</td>
<td>Expressing amounts</td>
</tr>
<tr>
<td></td>
<td>68.7% occurs in the form of ice and snow.</td>
</tr>
<tr>
<td>Learn about the properties of water.</td>
<td>Describing:</td>
</tr>
<tr>
<td></td>
<td>Water is attracted to other water.</td>
</tr>
<tr>
<td></td>
<td>Water is a powerful solvent.</td>
</tr>
<tr>
<td>Learn about ocean movement: waves, currents and tides</td>
<td>Expressing direction</td>
</tr>
<tr>
<td></td>
<td>Water filters into the ground.</td>
</tr>
<tr>
<td></td>
<td>Currents move through the sea.</td>
</tr>
</tbody>
</table>

Table 1. Expressing Correlations between Content and Language

Awareness of these correlations supports learning in three ways. First, awareness heightens teachers’ sensitivity to the language needed to develop the topic, and may enable them to incorporate more redundancy into their input. Second, the correlations guide learners as they work with the text, and may aid understanding and production. Third, the correlations can be shared with target language teachers so they can design focused language work: for example, have learners locate features in texts or incorporate them in guided production activities. When no correlations are provided, teachers may seek guidance from research or work like that of Swales (1971) to discover them. CLIL teachers can also focus attention on the genre or type of text: how information is organized.
Developing Awareness of Text Types: Scaffolding Input

Students come into contact with several oral and written text types, for example, dialogues, songs and narrations in foreign language classes. However, those classes give priority to social uses of language, so they may provide less exposure to texts which communicate instructions, explanations or cause and effect. However, these text types account for a large percentage of the reading matter in content area materials and websites designed for L1 learners: both sources of material for CLIL teachers.

Specialists in reading skills propose dedicating special attention not only to text features in these genres (Grellet, 1981), but also to non-text information (Nuttall, 1982). Following Nuttall (1982: 43-47), CLIL teachers may support understanding by drawing attention to the features of the text type. They can begin by focusing on easily-noticed non-text features: spacing, indentation, layout, choice of type, punctuation and symbols. For example, learners examining instructions for a lab assignment can look for words in larger or darker type (the title), lists of items set off from the body of the text (the materials required), numbered sentences (the procedure) and images which accompany them (clarifications of procedure). Teachers can then shift attention to text features: the presence of imperative verb forms or relatively short sentences, and sequencing words like first, then, finally.

When learners are familiar with a text type, they can examine other texts, search for similar features, and decide if they belong to the same type. Grellet (1981) offers detailed suggestions for developing sensitivity to text features like chronological sequence, description, comparison – contrast. On-line resources for the development of L1 literacy may also be useful in CLIL contexts (see the Teaching Pets and World vision sites).

Scaffolding Output

Awareness of content area text features provides a foundation for text production which CLIL teachers can further develop by guiding production with sentence stems, questions or instructions (see Llinares and Whittaker, 2009, for examples drawn from secondary history history texts). Table 2 shows these scaffolding tools in a science task: writing about an animal.

<table>
<thead>
<tr>
<th>Sentence stems</th>
<th>Questions</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The (name of animal) lives in...</td>
<td>Where does the animal live?</td>
<td>Habitat: describe where the lives.</td>
</tr>
<tr>
<td>(name of animal) eats ...</td>
<td>What does it eat?</td>
<td>Nutrition: list the foods the animal eats.</td>
</tr>
</tbody>
</table>

Table 2. Scaffolding Output: Sentence Stems, Questions, Instructions

Supporting learning with sentence stems provides more language guidance, whereas questions leave the learner more freedom. Categorised instructions (headings like ‘habitat’ and ‘nutrition’) make the underlying structure of the text more explicit, but place more language demands on the learner. Scaffolding output helps learners work with the information in texts. Especially helpful tools in this respect are graphic organisers.
Graphic Organisers as Scaffolding Tools

The Teaching Knowledge Test Glossary for CLIL (University of Cambridge, 2008: 10) describes graphic organisers as “aids which help learners to understand and remember new information by making thinking visible.” They are widely used in L1 classrooms: see Forte and Schurr (2001) for examples from social studies; Goldsworthy and Feasey (1996) for uses in science; Marzano et al (2001) and Mohan (1986) for a general discussion. Forte and Schurr (2001: 7) cite several reasons for the popularity of these tools in social studies, for example:

- Increasingly larger bodies of material must be studied in specific time frames.
- Sorting skills are a necessity in ‘information-saturated’ classrooms in which learners must be able to use facts and concepts in a meaningful way.
- Graphic organisers encourage the use of critical thinking skills and meta-cognitive reflection as well as visual discrimination and organisation.

Given the dual nature of CLIL objectives, tools which enable learners to extract relevant information from content sources, organise and work with it make graphic organisers useful in CLIL contexts. Of the many graphic organisers available, (see Forte and Schurr, 2001, and online sources like Education Oasis and TeAchnology), three are especially versatile: Venn diagrams, tables and flow charts.

Comparing with Venn diagrams

Classifying and comparing are common activities in content classes: for example, in geography, learners classify countries by climates; in history, they compare life in the Palaeolithic, Neolithic and Metal Ages; in art, they compare how different artists use colour and line; in science, they compare arthropod bodies. Venn diagrams with two or more overlapping circles permit learners to record common elements in the parts that intersect, and unique features in the others. For example, learners could complete a Venn diagram while observing or reading about insects and arachnids, and report their findings in a Venn diagram: see Figure 1 below.

![Figure 1. Venn Diagram: Fly and Spider](http://www.icpj.eu/?id=10)

The completed diagrams can support production of more extended language at several levels of complexity:

- *Flies have legs. Spiders have legs too.*
- *Flies have six legs, but spiders have eight.*
- *While flies have six legs, spiders have eight.*

As seen in the preceding example, Venn diagrams are especially suitable for comparing two or more things which share common elements. In other cases, tables may be more appropriate.
Classifying with Tables
Table headings guide learners to classify information as they observe a phenomenon, extract information or take notes. As a result, they structure input and subsequent oral or written production. See the example from a primary lesson on medieval settlements based on an illustration (Eusko Jaurlaritza-Gobierno Vasco, 2005-6) or Table 3 which guides analysis of a photo of Europe and Northern Africa taken by satellite at night. Urban areas which consume energy appear as white spots or lines of varying sizes in the photo. Filling out the table helps learners to focus on the distribution of energy use. The completed table supports oral and written comparisons like *Urban areas give off more light in the north of Europe than in northern Africa.*

<table>
<thead>
<tr>
<th>Urban areas give off more light</th>
<th>Europe</th>
<th>northern Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>... on the coasts of ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>... in the north of ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>... in the south of ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>... in the centre of ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. *Guide for satellite photo analysis*

In general, comparisons like these and the descriptions based on the Venn diagram above convey static views of reality. However, when the target content is characterized by dynamic elements or involves cause-effect relationships, flow charts are more appropriate organisers.

Expressing Sequence of Events or Cause and Effect with Flow Charts
Many topics in science, history and geography can be explained as sequences of events or cause-effect relationships: for example, photosynthesis, the growth of the Roman Empire, and the stages of erosion. Flow charts enable learners to show these sequences and relationships. They also guide follow-up discussions which often call for thinking skills like comparing, explaining patterns, and drawing conclusions. Like Venn diagrams and tables, flow charts can be completed with pictures, words or sentences. Thanks to their versatility, these graphic organisers are appropriate for learners of widely-varying language abilities. Similar versatility can be found in the learning support offered by ICT applications.

Scaffolding Input and Output with ICT Applications
CLIL teachers engage in a constant quest for presentation formats that motivate active participation in the learning process: for some, ICT applications provide that scaffolding. The number of training sessions offered across Spain suggests a growing interest in ICT. Jáimez and Pérez (2008) provide insight into the use of technology in plurilingual programs in Andalucia. Robledo Ortega (2008) offers a list of applications for CLIL and Fernández Fontecha (2007) proposes a materials design framework for the use of ICT in a wide range of L2 classrooms. Selected for discussed here are:

- PowerPoint presentations
- Activities with interaction: often found on-line
- Web research
- Webquests

The functions of these ICT tools may overlap, but the most common are: a) present content; b) stimulate learner participation; c) provide reinforcement and d) serve as a database for research.
PowerPoint Presentations
Teachers, especially in secondary level contexts, create PowerPoint presentations to introduce topics and stimulate oral interaction (see examples on Isabel’s ESL Site, and on the site run by the Department of Education, Generalitat de Catalunya). Both functions are often made possible by labelled or captioned illustrations (see earlier discussion of their language potential). Teachers introduce a topic orally, but support their delivery with visual input to insure understanding and maintain attention levels. Fernández et al (2009), for example, created a PowerPoint presentation of the Norman Conquest for secondary CLIL history students. They incorporated maps of Norman invasion routes, photos of the Bayeux Tapestry and extracts from the Domesday Book. As a result, their slides not only present information, they exemplify how historical research draws on a variety of sources. Learner motivation can also be achieved with interactive material.

Activities with Interaction
Interactive material with reliable CLIL-appropriate content can be found on institutional websites like the National Gallery of Art, the Natural History Museum, the Roman Baths, and NASA. Interaction may entail clicking, dragging, marking, drawing or in some cases, inputting short texts. The navigation, instructions, content or language characteristic of interactive material initially designed for L1 users may, however, constitute barriers for CLIL learners. If the website has a children’s or student section like the sites above, the activities may have the high visual content and interactivity that primary or lower secondary CLIL students need (see Mellado, Álvarez and Isabel’s ESL Site for a selection of interesting web pages).

Interactive materials can provide motivating reinforcement for concepts presented through other media or offer new opportunities for exploration. Language usually involves reading isolated words or simple texts. The thinking skills needed vary, but identifying and classifying seem prevalent. Interactive material usually allows the learner a moderately active role within a well-defined context in which the need for personal initiative or working with others may be small: quite the opposite of the skills required by web research or webquests.

Web Research
Research can involve searching for images or information. Image searches are easily done using key words like ‘insects’ or ‘dinosaurs’, so even young learners can use ICT this way. For example, learners aged seven downloaded photos and drawings to illustrate simple texts they had written about vertebrates and invertebrates (Pareja and Fernández Yubero, 2009). Older learners in the same context studied world landscapes. Inspired by Verne’s Around the World in 90 Days, they researched travel routes, climate and geography. As a result, their language needs extended to sentence and whole text levels. These examples suggest that what could be called ‘discrete point’ web research for photos precedes research involving more extended reading. Both may prepare learners for webquests.

Webquests
Webquests organised according to the format set out by Dodge (1996) incorporate a framework that scaffolds inquiry learning (see Abbitt and Orphus, 2008 for a summary of research). The characteristic sequence of incremental steps (introduction, task, process, evaluation, conclusion and credits) offers built-in scaffolding. Thanks to these steps, learners move from the generalities provided by the introduction to a detailed understanding of what final product is expected; where to get information; how to work (individually or in groups), and what criteria to use in evaluating final products and work processes. Interestingly, webquests often contain graphic organisers to facilitate data collection and presentation. Final products may be oral or written, so learners must take the audience into consideration. From the language perspective, webquests put learners in contact with varied input: illustrations, diagrams and content area text types (see Isabel’s Site for examples of webquests developed by teachers in Spain).
Student output in webquests can take many forms, but PowerPoint presentations are popular for the same reasons teachers use them. They enable learners to combine text and graphic information, support oral delivery, and maintain audience attention. Multimedia rubrics can guide the learners’ production by specifying content, language and technical features. Teachers can adapt existing rubrics (see Project-Based Learning with Multimedia and TeAchnology) to their needs. In addition to their usefulness in the CLIL classroom, ICT applications give learners the opportunity to hone their technology skills, a competence of special importance in many national curricula.

Conclusions
This paper has focused on four broad categories of materials which provide support for learning in CLIL classrooms: illustrations with labels and captions, content area texts or genres with content vocabulary, language and organisation, graphic organisers and ICT applications. All four scaffold learning as they contribute to understanding of subject area content, guide language production, and encourage the development of thinking skills. ICT applications also play an important role in developing the 21st century technological literacy which has become increasingly necessary for learners of all ages. Taken together, these four types of materials support the CLIL goal of preparing students for life-long learning in a world which, to use Forte and Schurr’s term (2001), is ‘saturated’ with information.

It is hoped that the preceding discussion will stimulate in-depth research into the materials dimension of CLIL so that practitioners can achieve their objectives with greater ease and efficiency.

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