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Content and language integrated learning in higher technical education using the *inGenio* online multimedia authoring tool

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Abstract

The future professional world of today's students is becoming a life-long learning process where they have to adapt to a changing market and an environment full of new opportunities and challenges. Thus, the development of a number of personal and professional skills, in addition to technical content and knowledge, is a crucial part of their learning process and, consequently, of higher technical education and training. Among these skills, the knowledge of modern languages, especially English, stands as pivotal to achieve successful communication, which is a fundamental ability in an increasingly international world. This paper discusses the benefits of combining CLIL (Content and Language Integrated Learning) and technology-enhanced learning by means of the *InGenio* authoring tool and content manager.

Keywords: Computer Assisted Language Learning (CALL); Content and Language Integrated Learning (CLIL); professional skills; language learning; e-learning.

1. Introduction

Higher Education systems all over the world are facing new challenges and issues in their attempt to become competitive and efficient in the ever-changing environment of today's information and knowledge society and its global market. Some traditional learning and working styles, especially those in line with passive roles and attitudes, are no longer valid, and, therefore, academic institutions must reconsider key aspects of the teaching and learning process if they wish to provide high quality training and excellence in education. The professional world and the current labour market, in practically all areas, require students to possess a good command not only of technical content and knowledge but also of personal and professional skills. One of the best valued personal and professional skills is a good knowledge and fluent use of a modern language, especially English –the *lingua franca* of science and technology today-, together with the closely related ability of efficient communication within a given specialised professional or academic context. Needless to say, technical knowledge and skills remain to be of prime importance in higher education, but not in an isolated way –as may be the case in more traditional university

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paradigms-, but rather in close cooperation with a number of professional skills that help technical (or content) knowledge to be more efficient and useful.

In such an educational context, higher education institutions, on the one hand, must face new challenges, but are, on the other hand, equipped with new tools and resources. Among the new challenges we can include issues such as time constrains, a decrease in the number of contact hours, an increasing need to update technical knowledge speedily, large group sizes and lack of teaching space and resources. New tools and resources have also appeared on the scene, especially with the advent of the Internet and emerging Information and Communications Technologies (ICTs), which are here to stay and, in our view, to efficiently support and assist to deal with many of these new challenges, provided they are used with a sound pedagogical basis. These new tools and resources may be of a physical or a conceptual nature. Physical tools naturally include computers, Internet access, digital and interactive whiteboards, course management systems and platforms, virtual campuses, learning software and websites, and so forth. On the conceptual side, we can discuss different methodological and pedagogical concepts, constructs and approaches that lay the foundations on which the pedagogical use of physical tools stand in real practice: Language for Specific Purposes (LSP), Content and Language Integrated Learning (CLIL), communicative Computer Assisted Language Learning (CALL) and active learning methodologies.

This paper will briefly discuss some of these concepts when analysing the rationale of a project for the application and use of CLIL in higher education at the Universidad Politécnica de Valencia (UPV), Spain, carried out by the CAMILLE[2] Research and Development Group[3]. There will be a strong emphasis on CLIL, since this concept gathers together the teaching and learning of both specific subject matter –technical knowledge- and a foreign or second language. The project presented here describes the use of a Web-based authoring shell called *InGenio,* developed by the CAMILLE Group, to implement communicative CLIL in the context of teaching English for Specific Purposes (ESP) to Industrial Engineering students. Our discussion will start with the rationale of the project, providing the fundamental theoretical background to the experience. It will then move on to a more practical domain, with the presentation of the *InGenio* authoring tool and some of its pedagogical possibilities to implement an autonomous type of CLIL at the University. Finally, conclusions will be drawn both from the project and from the potential of CALL authoring tools to carry out the integration of technical/linguistic knowledge learning and teaching advocated by the CLIL methodology.

2. Rationale of the project

Among the fundamental aims of modern university systems, as can be clearly seen in the Bologna Process[4], are the concepts of lifelong and autonomous (learner-centred) learning, the shift towards more active roles on behalf of the learners, and the integration of several academic, professional and personal skills and abilities within a coordinated learning process. In order to meet the requirements associated with these three fundamental issues of higher education today, the teaching community has a number of tools and resources at their disposal, namely the use of ICTs and CALL (lifelong and autonomous learning), the application of active teaching and learning methodologies (more active learner roles) and the implementation of CLIL (integration of professional and personal skills). Each of these aspects, which provide the rationale of our project and proposal, will be discussed in turn below.

The concepts of lifelong learning and autonomous learning, different as they may seem at first sight, are actually closely intertwined, since it is difficult to conceive the former without the latter. Therefore, a basic objective is to train learners to become autonomous, i.e. to have the ability to control, monitor and be responsible for their own learning process, as well as to be able to conduct constructive self-evaluation and assessment. These ideas are present in the so-called *learner-centred curriculum* approach (Nunan 1988). But learner autonomy should not be left to improvisation, since it is a complex skill that should be trained and supported by good quality learning materials and resources that must be carefully designed. When the main aim of a learning resource is to serve as self-access materials –e.g. some Web-based courses–, it is a matter of prime importance to focus on elaborated pedagogical

[2] CAMILLE stands for Computer Assisted Multimedia Interactive Language Learning Environment.
3 The CAMILLE R&D Group, led by Ana Gimeno, has been working on CALL research and development since 1992.
[4] For further reference, see <http://ec.europa.eu/education/higher-education/doc1290_en.htm>.

design to minimize the negative side-effects of the lack of a readily available human tutor or the absence of face-to-face interaction. It has been suggested that new ICTs, especially those based on computer networks can positively foster the development of autonomy in the learning process, as long as they are used appropriately and upon serious reflection (Pennington 1996; Warschauer et al. 1996). One could build on this idea by saying that *appropriately* here means applying pedagogically-driven criteria. And, consequently, there must be a strong concern for the importance of instructional design (Felix 2003). Computer Assisted Language Learning is therefore a field that has a crucial contribution to make to achieve the ultimate goal of autonomous learning. The project presented here makes use of *InGenio,* a Web-based CALL language-independent authoring tool that seeks learner autonomy by providing a series of support resources for learners of a second or foreign language.

As regards the second aspect at the basis of our approach, the move towards fully active learner roles can only be attained through active teaching and learning methodologies that imply a radical shift away from traditional learning attitudes where the teacher or instructor played the main role in the process and the student was regarded as a mere receiver of static knowledge. A collection of diverse teaching and learning methods and philosophies advocate a more active role of the language learner, some of which are included in the following list:

a. Communicative Language Teaching: language is ideally (or even only) taught, learnt and practiced through the continuous and active use and communicative interaction, rather than by formal instruction, since the latter would only lead to a situation of *language as usage*, as opposed to *language as use* (Widdowson 1978).
b. Learning by doing: it involves a type of learning which is basically experiential, whereby learners, instead of facing theoretical knowledge, follow a more practical approach and carry out specific and authentic tasks and projects that help them acquire certain skills. Thus, some learning methodologies closely related to the overarching concept of *learning by doing* are *task-based pedagogy* (Nunan 1989; Skehan 1996), *project-based learning* (Debski & Gruba 1998) and *problem-based learning* (Savin-Baden & Wilkie 2006), among others. According to some researchers, the Web and the Internet are ideal environments to implement a *learning by doing* approach in the field of languages (Felix 2002).
c. Collaborative and cooperative learning: collaboration is a type of interaction among learners in order to achieve a common goal or deal with a common task or problem. Therefore, this sort of learning has a lot to do, on the one hand, with communicative interaction –key to language development–, and, on the other hand, with teamwork, which is one of the personal skills that are most demanded by the professional world and the labour market. ICT in general, and the Web in particular, have been considered to be an ideal environment to promote the integration of collaboration and language learning (Warschauer 1997; Felix 2002, 2003).
d. Cultural exchange: language is culture, so when learning a language, learners should be, by some means, encouraged to get in contact with the corresponding L2 language. In the case of Languages for Specific Purposes, language learners should also acknowledge the behaviour and culture of that specific group of speakers. The benefits of the Web in terms of increasing the cultural awareness of language learners have been described previously in the literature (Osuna & Meskill 1998; Godwin-Jones 2003; Müller-Hartmann 2000).

Content and Language Integrated Learning (CLIL) is the third facet we mentioned as part of the project's rationale, and "refers to situations where subjects, or parts of subjects, are taught through a foreign language with dual-focussed aims, namely the learning of content, and the simultaneous learning of a foreign language" (Marsh 1994). According to this researcher, CLIL has also a very strong motivational component, since learners feel they can successfully *do* things –and acquire real content knowledge– with language (Marsh 2000). In fact, with CLIL, students are playing an active role and taking part in two totally different learning tasks, with different goals, content and methods: learning a language and a different subject simultaneously. In this respect, it has a lot in common with the learning of a Language for Specific Purposes (LSP), where students learn a target language *in the context of* a specific subject matter, rather than *through* the first-hand acquisition of that subject matter (content knowledge). Therefore, CLIL could be seen as a step ahead of traditional LSP, since it activates both professional and personal skills, which are traditionally dealt with separately. And, in doing so, CLIL is also more realistic and authentic, if we understand *authenticity* as a kind of behaviour which puts together what learners do in the language classroom and what they may do outside it, in this case, learn about a given subject matter.

Because of its multifaceted and interdisciplinary nature and philosophy, CLIL is the learning methodology that best integrates the other two methodological and pedagogical aspects that we incorporated earlier on in our project's

rationale: autonomous/lifelong learning and active methodologies. Moreover, CLIL has a further advantage, since it fits perfectly within the learning paradigms advocated by ICT, especially the Internet and the Web, because these environments are appropriate scenarios to deliver CLIL, i.e. the content-knowledge side of it, in a constantly updating technological and professional world. This is the reason why the suggestion in our project is to implement CLIL in a higher education context through the use of modern ICTs, i.e. by means of an authoring tool known as InGenio, whose purpose here is to develop CLIL resources at a Spanish university. In fact, one of the major drawbacks when it comes to implementing CLIL at university level (and otherwise) is normally the lack of human/material resources (it nearly always requires team-teaching) and large group sizes (it is usually associated with learner-centred approaches). And the use of networks and other technologies can certainly help to solve these challenges. In the next section, the InGenio authoring tool is presented and its possibilities discussed.

3. The *InGenio* authoring tool and content manager

When designing dual-purpose learning materials, close co-operation between the language specialist and the subject specialist becomes crucial in order to design and implement pedagogically sound materials that serve the acquisition of knowledge in two disciplines. Due to the fact that these two disciplines –foreign language learning and the given subject matter– may rely on different approaches to knowledge acquisition and teaching methodologies, both the language and the subject-matter specialist have to design learning tasks and activities that complement each other, serve both purposes and are well balanced.

InGenio is a web-delivered language-independent authoring tool capable of managing databases on a remote server and allowing teachers from around the world to design and publish materials to suit their students' particular needs. When designing online study and practice materials, it provides a suitable environment to foster the types of activities and tasks that are most appropriate for both of the disciplines involved in a CLIL subject. The implementation of the materials is based on the template approach to software authoring, with predefined templates[5] that integrate video, graphics, audio and text (Gimeno 2008). The system includes a "content manager" enabling subject specialists to create a database from which to share and select materials by organising the multimedia components and materials (learning objects) according to a number of specifications (e.g. language, level, skill, target group, etc.), thus creating a pool of multimedia exercises and resources. The authoring tool automatically converts the contents into learner-ready materials in the form of an online course, delivered via the InGenio online Learning Environment. Additionally, the system incorporates a student assessment utility that allows tutors to supervise student scores, written input and general progress.

InGenio distinguishes four types of user; i.e. authors, who are subject specialists or content writers with permission to create new or modify existing learning materials; students, who are registered users of the courses available via the Learning Environment; tutors, who serve as instructors to registered learners; and translators, who have permission to adapt the materials into different languages, other than the one/ones introduced by the authors themselves. The authors, who in a CLIL course will consist of a language specialist and a subject matter specialist, can design a large variety of activities to suit this dual requirement. To this end, the *InGenio* authoring tool comprises 15 exercise templates that, in combination with current Web 2.0 applications, can be used to create a vast number of tasks. It also comprises a template to create reference materials –e.g. grammar notes or use of language explanations– and a template to create monolingual or bilingual sound-enhanced glossaries. All the templates can be used to design practice activities and they can also be used to create exams to test learner progress or final achievements. When the templates are used to design test items, the number of attempts the learner is given and the time spent on a given exercise can be limited. The *InGenio* Learning Environment is particularly suitable to create motivating technology-enhanced learning activities to support different teaching methodologies. There are a number of teaching approaches such as task-based learning or problem-based learning that, together with more traditional methodologies, can be implemented to the advantage of both subjects in a CLIL setting. Task-based learning involves completing everyday tasks using the target language. These tasks, conversely to exercises in a language class, normally aim at non-linguistic outcomes. They focus on meaning rather than on form and seek to achieve a practical goal (Nunan 2004). In problem-based learning, on the other hand, learning is driven by challenging, open-

[5] For a more detailed description of the templates included in the *InGenio* authoring tool, please refer to Gimeno 2008.

ended problems; students engage in collaborative group work, and teachers adopt the role of "facilitators" rather than "knowledge-providers". Problem-based learning is also believed to enhance content knowledge and foster the development of communication and self-directed learning skills (Gimeno 2008). In a CLIL context posing open-ended problems to our students can obviously take on many forms depending on the content subject we are intertwining with foreign language instruction. Technology, therefore, can play a major role in facilitating the key elements in order to carry out a learning task.

4. Conclusions

In a traditional classroom setting where CLIL takes place, students will always be aware that the prime focus of the class is that of the subject matter. However, language learning will benefit greatly from the fact that students will be receiving twice the amount of contact hours, those in the subject matter class and those in the language class proper.

Tasks can be designed for any wealth of subjects included in a curriculum; however, tasks that combine a content focus and a linguistic focus require the careful planning of both specialists involved, i.e. content and language. If students are provided with a well structured online course which combines two study programmes into one (subject matter plus foreign language), the contents have to be evenly balanced albeit the prime focus of the courseware should necessarily be directed towards the particular subject matter being targeted.

The *InGenio* authoring tool and content manager has been designed to cater the dual goal of teaching subject matter and a foreign language by providing a number of templates that can be authored with very little computer literacy to create activities to suit two different curricula, and fosters several teaching approaches such as task-, problem-, or project-based learning. These are thought to be particularly appropriate for CLIL because they encourage, in addition to the acquisition of content and foreign language, other skills that are currently crucial in today's professional world and labour market.

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