CLIL + SCIENCE

CLIL + Science: New Directions in Content and Language Integrated Learning for Science and Technology

Editor Ruth Breeze
Foreword by Prof. Neil Mercer

Universidad de Navarra

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Immacolata ERCOLINO is a PhD student at the Camerino University, Italy, in Science teaching Life Science. The aim of her project is to create a platform in order to help teachers and learners to become more confident in teaching Science with CLIL methodology. Her research project focuses on CLIL methodology in Science teaching and she hopes to build contact with the international teachers' community to share ideas and projects. She has been a teacher for more than 22 years at a Science High School in Naples and is particularly interested in education and hands-on activities in Science.

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Anne GOLDSWORTHY taught in a variety of primary schools and now works with teachers as a Primary Science Advisor to help children learn about science and enjoy the experience. She provides interactive, enjoyable and practical sessions throughout the UK and abroad. She has written numerous books and articles including 'Science Enquiry Games', and is series editor for Pearson's Science Bug. She was asked to help redraft Primary Science in the latest National Curriculum for England. She still gets excited by children's reactions to primary science.

Fermín LORENTE DORIA has been teaching CLIL for 8 years. He works as a Natural-Social Science teacher at Escuelas Pías Tafalla. He has attended courses about Multiple intelligences, project-based learning, teaching foreign languages, and organic agriculture at school. He is always interested in new ways of teaching and tries to include activities and formulas to bring real life situations into school.

Dr Guzman MANCHO-BARÉS belongs to the Cercle de Lingüística Aplicada (University of Lleida, Spain). His main scientific interest has to do with the impact of English-medium instruction on lecturers' practices and beliefs in the European context. He has also done research on Business English curriculum development.

María Ángeles MARTÍN DEL POZO has taught English and Spanish as a second language since 1997 (Dublin City University, Universidad de Valladolid). She is currently lecturing on Language Didactics. She completed her thesis at Universidad Complutense de Madrid in the field of CLIL teacher training. In 2000 she was awarded the European Label for Innovative Language Teaching and Learning.

Neil MERCER is Emeritus Professor of Education, University of Cambridge, and Director of Oracy@Cambridge, the Hughes Hall Centre for Effective Spoken Communication. A psychologist with a special interest in the role of language in the classroom and the development of children's thinking, he regularly contributes to professional development activities for local authorities and schools. One of the main outcomes of his research has been the teaching approach called *Thinking Together*, created with Lyn Dawes, Karen Littleton and Rupert Wegerif, which has been shown to improve children's skills in communicating,

learning and reasoning. Neil Mercer has served as a consultant to several British government education departments and agencies, and the outcomes of the *Thinking Together* research programme were incorporated into the National Strategies for primary and secondary education and, more recently, the Teaching and Learning Toolkit of the Educational Endowment Foundation.

Aviva MIRELS LAURIA was a teacher in the US for twelve years. She moved to Italy in 2006 where she has taught elementary and middle school classes in English in bilingual and CLIL programs. She currently teaches in Arcivescovile's CLIL program in Rovereto. She has a BA in Psychology and a Master's degree in Education.

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Stuart NAYLOR began teaching in Manchester in 1971 and spent 13 years teaching in schools in the UK and USA. He spent many years at Manchester Metropolitan University, and during that period he trained and worked occasionally as an Ofsted inspector (but did not enjoy the experience). He now works at Millgate House Education, as a researcher, writer, publisher, consultant and course provider for teachers. He is well known, with Brenda Keogh, as the creator of Concept Cartoons, Active Assessment publications and the Puppets Project. He has a reputation for innovative publications, thought-provoking professional development and creative ways of enhancing teaching, learning and assessment in classrooms around the world.

Martin PARSONS has been teaching English to learners of all ages in Japan for 20 years. He is currently an associate professor in the Faculty of Business at Hannan University, in Osaka.

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Monika WOŹNIAK, PhD in English philology, coordinates the integration of English in the degree programme of Pharmacy at San Jorge University and teaches English in this degree along with Desirée Acebes, English philology graduate and PhD student. CLIL lecturers in Pharmacy comprise a multidisciplinary group of PhDs in areas such as pharmacy (Laura Lomba), chemistry (Beatriz Giner, Elisa Langa, Eva Terrado), veterinary science (Cristina García) and physics (Jesús Bergues).

FOREWORD

Neil Mercer, University of Cambridge

The Content and Language Integrated Learning approach has become increasingly popular in recent years. The acronym CLIL was coined as recently as the 1990s, and though the approach has its antecedents in older approaches such as 'language immersion', since then it has developed as a distinctive field of pedagogy and educational research. The chapters in this book illustrate well how it can be applied to the teaching of science and technology for students of all ages, from primary school through secondary school into higher education. Many of the contributions describe ways of using the CLIL approach which are innovative and yet practical. Some discuss theoretical and conceptual issues which are helpful for understanding and evaluating important aspects of language teaching (and the teaching of science and technology). Anyone involved in language teaching will benefit from considering the range of experiences, activities and ideas described by the authors.

FEATURED CHAPTERS

MAKING SCIENCE COME ALIVE

Anne Goldsworthy
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Abstract: In order to make Science come alive in our classrooms, we must engage children in their learning. We need to uncover children's initial ideas about the different areas of science. Next, we need to take their learning forward by providing evidence though practical activities, research or explanations from the teacher. We can then ask children to look back at their initial ideas and tell us what they have learnt and to report it back to us in different and engaging ways. For all this to take place, there must be an atmosphere in our classrooms where children know that their ideas are valued and that they are safe to talk without being judged. This paper illustrates these points with practical ideas for teaching and samples of children's work in Science.

Finding out and using children's ideas

There are many ways to find out young children's initial ideas successfully. Whichever way you choose, it is most important that children do not feel that they are being asked to come up with the right answer. They will need reassurance that you do not expect them to know the answer at the start of the lesson, or series of lessons, but that you are just interested in their ideas about the way things work. Let the children know that you expect them to give you a number of different responses.

One way you can find out children's ideas is to ask a question and then ask them to write and draw in response. Figure 1 shows what happened when an 8-year-old child was asked to think about why things rot and why bread goes mouldy. His response is that it takes a year for bread to go mouldy and that mould comes from the ground and looks like a small insect. Others in the same class of children thought that mould was a plant, others that it was a kind of gas whilst others felt it was already inside the bread and appeared over time. All the different ideas were accepted and gave a starting point for the work. After studying mould, through observation, teaching and research the children found out that mould was a fungus, so neither a plant nor an animal, and that it reproduced through tiny spores going through the air. On returning to their original pictures they realised how their ideas had changed and what they had learnt about mould. They had assessed their own learning.

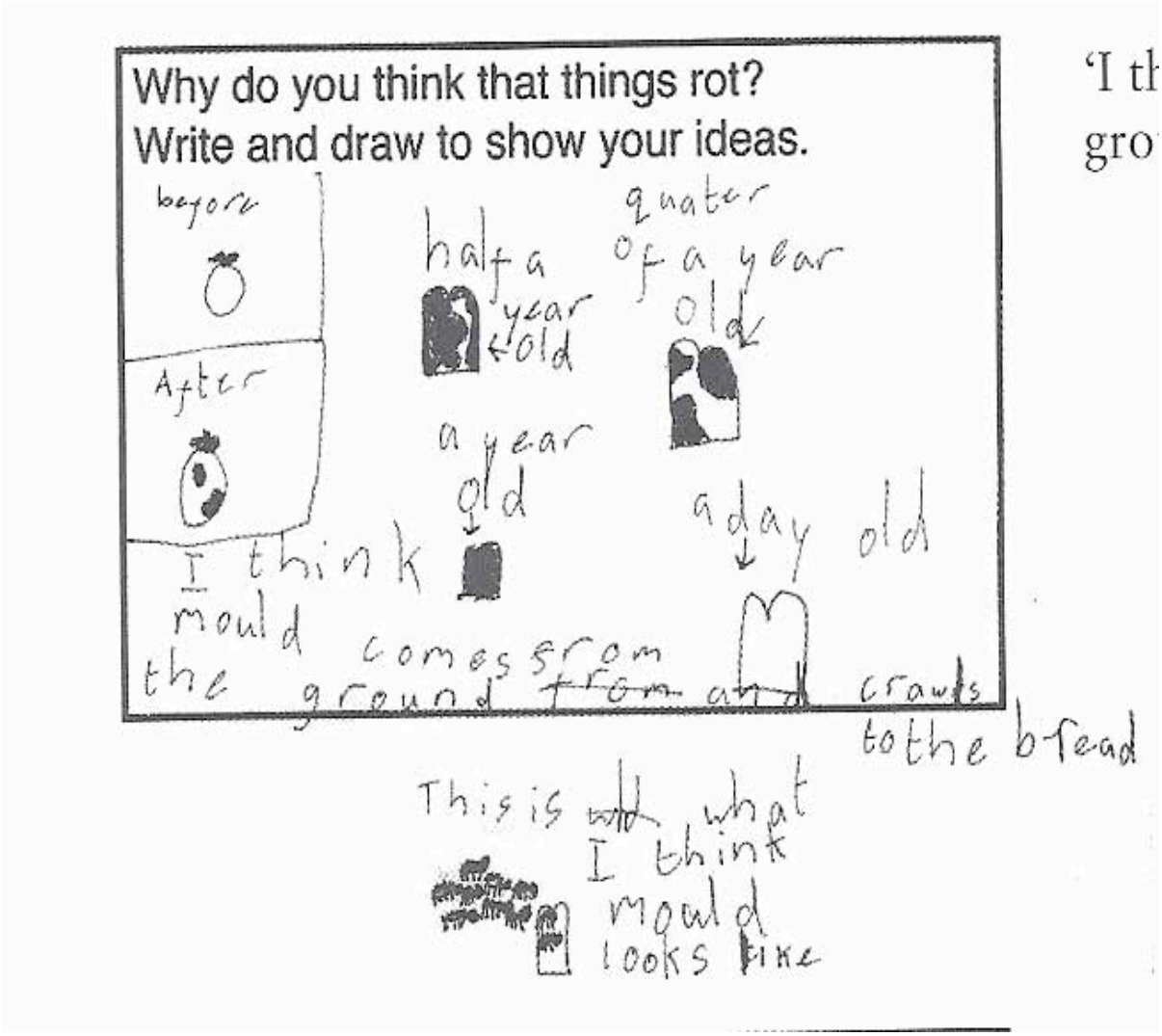

Figure 1. Finding out about children's ideas

In another example of this approach, 10 year old children were asked to think about what happens to food inside your body. The pictures below (Figure 2) show the same child's response before and after teaching. In the first picture she was asked for her initial ideas about the digestive system and to draw and write about it on an outline of a human body. After teaching she drew a sequence of pictures to describe the journey of a beef-burger through her body. When looking back at her initial ideas she made several comments 'At the start I didn't even know I had intestines inside me and I thought the stomach was much lower down than it is. I didn't know anything about bile coming from the liver.'

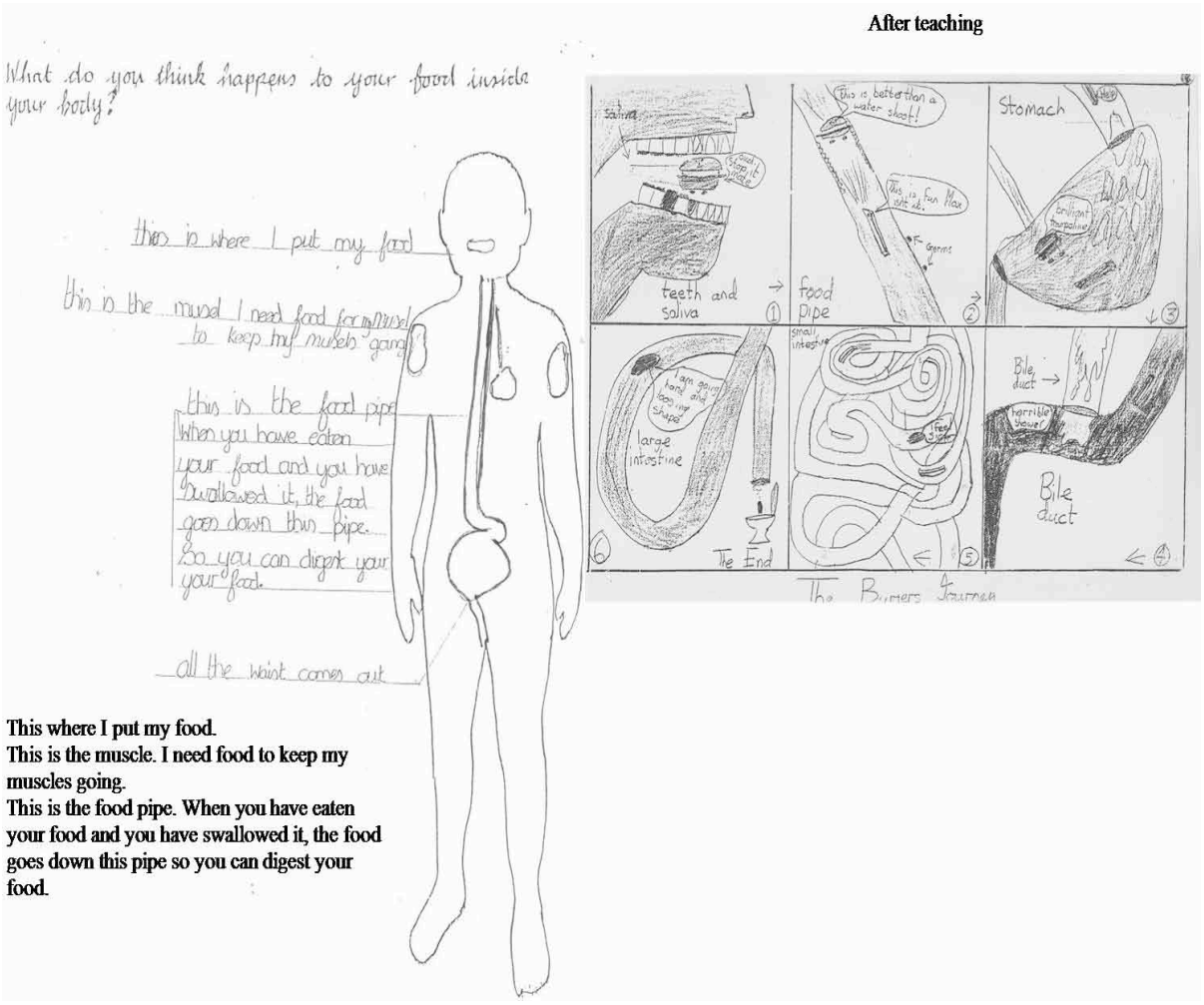

Figure 2. What happens when you eat food?

Another way to help children recognise their ideas is to prepare a set of questions and possible answers. The example below of three questions and seven possible answers were used with 10 year olds who were working on the Moon.

Questions:
How does the Moon move?
What makes the Moon shine?
Why does the moon change shape?

Answers:
The Moon doesn't move. The Earth orbits the Moon.
The Sun orbits the Moon
The Moon orbits the Earth
The Moon makes its own light like the Sun
The Moon reflects light from the Sun
The Earth's shadow falls across the Moon and covers different parts of it
The moon changes shape because we see different amounts of the lit part of the Moon as it orbits around.

All the possible answers were written on posters and stuck up randomly around the classroom walls. Each group of children were given three small sticky notes. The teacher called out each question in turn, allowed the children time to talk and then asked them to

decide which answer they thought was most likely. A representative from each group showed their decision by placing a sticky note on that answer. At any point during teaching, groups of children could change the position of their sticker from one poster to another. By doing this they showed the teacher and themselves what they had learnt. At the end of the teaching sequence all the stickers were resting in the same places and the class has reached the correct answers.

There are many other ways of finding out and using children's ideas in Science and they can be found in *Active Assessment* (Goldsworthy et al., 2005). However you find out their ideas, it is important to provide children with evidence for the scientific explanation. In some areas of science such as Earth and Space or the working of the internal human organs this will have to be through research but wherever possible, their experience of science should be learning through practical hands-on activities.

This whole approach depends on finding out children's initial ideas. This helps them become aware of what they are unsure of or do not know. As Hattie says (2008): "By knowing what we do not know, we can learn; if we were to make no errors, we would be less likely to learn (or even to need to learn)." By asking them to look back and identify what they have learnt after teaching, their learning becomes apparent to everyone. "The aim is to get the students actively involved in seeking this evidence (of learning): their role is not simply to do tasks as decided by teachers, but to actively manage and understand their learning gains. This includes evaluating their own progress, being more responsible for their learning, and being involved with peers in learning together about gains in learning."

Recording Children's Learning in Different Ways

We also ask children to tell us what they have learnt often by writing a scientific report at the end of a lesson or series of lessons. But do we ever ask ourselves whether this is the most effective way to help children remember what they have learnt? Children often see a written report as a chore. It can dampen down their enthusiasm for science very quickly. Instead try asking small groups of children to teach the science to younger children; or to complete an eye-catching poster telling people what they have learnt; or to act out a TV or radio interview in pairs where between them they come up with three good questions and three good answers to tell people about their science. Or, if you really want the information to stick, ask them to make up new lyrics to a well-known song such as this one written by 8 year old children about forces to the tune of Twinkle Twinkle Little Star https://learnenglishkids.britishcouncil.org/en/songs/twinkle-twinkle-little-star. The children had been investigating the breaking strength of threads measured in Newtons using forcemeters.

Newtons, newtons, what are they?
They measure pulls, we learnt today
Pull the string to do the test
Fair test, fair test they're the best
Strings they all go pong and ping
We learn science and we sing.

The children involved left their science lesson singing the song, talking about the science and smiling broadly. It was an excellent way to make their science come alive and stay alive. It was also an excellent way to help them remember what they had learnt.

Conclusion

In order to make children's science come alive we must engage them in their learning. This means that we need to find out and use their ideas about science, offer exciting activities to take their learning forward and help them to reflect back to see what they have learnt. We need to make sure that the atmosphere in the classroom is one where they feel safe to offer their thoughts and their half-formed ideas without judgement. Finally we must offer them different ways of recording their learning so that they remember what they have learnt. And don't forget to sing!

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CONCEPT CARTOONS: TALKING SCIENCE, THINKING SCIENCE

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Abstract: This chapter shows how concept cartoons can be used as a motivating and pedagogically sound way to help students grasp new ideas in science. Concept cartoons offer an immediate invitation to students to share their ideas and consider other possibilities. They create uncertainty and disagreement across the class, and this leads on naturally to some kind of follow up inquiry. Teachers are therefore able to take students' ideas into account in manageable ways, without having to find out or assess what individuals think.

Talking science, thinking science – what's the connection?

When I was at school a good lesson was a quiet lesson, and a quiet lesson was usually a good lesson. Fortunately most teachers have moved on from that view and recognise the importance of dialogue. Neil Mercer (2000) uses the idea of 'exploratory talk' to describe what students do when they are trying to work out the answer to a problem. He describes 'exploratory talk' as talk in which students engage critically but constructively with each other's ideas, using reason and evidence and considering alternatives before reaching a joint decision. Mercer's research shows how this type of talk helps in promoting understanding and developing reasoning skills, both of which are vital aspects of learning in science, as well as revealing the students' ideas to the teacher. Exploratory talk is especially valuable in helping students to discover that sometimes there isn't **an** answer, there are several **possible** answers, and talking together can help them figure out which is the best answer from the various alternatives.

Similarly Robin Alexander writes about dialogic teaching (2008), where the voices and ideas of the students are valued in lessons, and talking together (rather than just doing practical activities together) is viewed as a natural and obvious part of learning. Mortimer and Scott (2003) take this further, describing how classroom roles and relationships vary, and highlighting interactive, dialogic learning situations as especially powerful in challenging and developing students' ideas.

What these descriptions have in common is a view of talk that focuses on explanation rather than assertion, on evidence rather than authority, and on the expectation that students (including very young students) should justify their ideas using evidence and reasoning. This view of talk sees talking and thinking as inseparable. This is especially important in science, where sometimes hands-on activity can mask a lack of minds-on engagement. Talking is the key to unlock the thinking cupboard.

What's important about concept cartoons?

Concept cartoons consist of a picture with people talking to each other, where all the people have different ideas, so they represent dialogic talk in a visual way. They present a dialogic model of learning: all the characters in a concept cartoon contribute different ideas to the discussion, providing an explicit illustration of exploratory talk, and the only way that the

characters can resolve their difference of opinion is through evidence and reasoning. Concept cartoons normally have the following features:

- They are based on everyday situations, so students lacking in confidence shouldn't be intimidated by the science and are likely to engage in dialogue.
- They present plausible alternative views on the situation, including common misconceptions so these can be identified and addressed in the lesson
- All the alternatives have equal status. This helps less confident students say what they think. If their ideas are incorrect then they can put the blame on the concept cartoon character!
- They have a blank speech bubble to show there we can probably think of even more ideas.
- The concept cartoon statements and background text are written in accessible language, avoiding complex scientific vocabulary.

You can see these features in the example below (Figure 1).

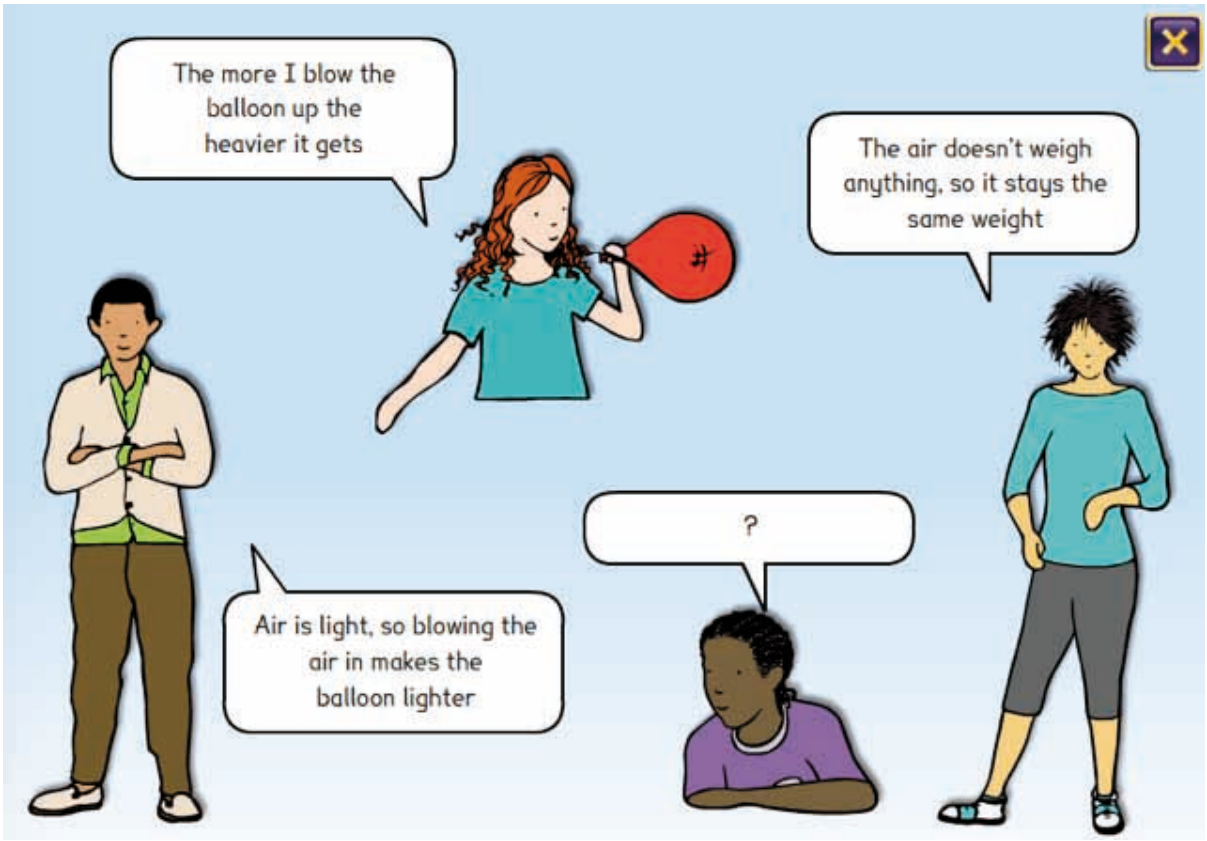

Figure 1. Concept cartoon "balloons" (taken from Naylor and Keogh, 2014)

Concept cartoons, talking and thinking

As well as representing dialogic talk in the picture of people talking with each other, concept cartoons are extremely effective at generating dialogic talk. Constantinou (2016) describes them as *a fantastic way to ignite discussion* in her classroom. Several aspects of concept cartoons make dialogic talk more likely. For example:

Concept cartoons draw on teaching experience and published research into common misconceptions, and build examples of these into the statements. The purpose of presenting plausible alternative views is to generate cognitive conflict. Students find themselves in a

position of having to give serious consideration to the alternative viewpoints, including those that are partly correct or correct in some circumstances, and this creates cognitive conflict. Fierce arguments are common! Students find that they have to think about a variety of viewpoints, weigh the evidence that supports each of them, reflect on their own ideas and decide to what extent their ideas are supported by evidence – in other words, they have to engage in metacognition. This can be a valuable step in getting them to think more deeply about scientific concepts (Keogh and Naylor, 1999) and can be especially important for confident, high-achieving students.

Concept cartoons offer an obvious and manageable way of taking students' ideas into account. The extensive research into constructivist perspectives on learning shows how important the student's existing ideas are in influencing learning. Concept cartoons offer an immediate invitation to students to share their ideas and consider other possibilities. They create uncertainty and disagreement across the class, and this leads on naturally to some kind of follow up inquiry. Teachers are able to take students' ideas into account in manageable ways, without having to find out or assess what individuals think.

Research into concept cartoons shows that they are remarkably effective at getting students talking and arguing about their ideas. Osborne et al (2004) note that students are more engaged when we give them opportunities to argue and debate in science lessons. The connection between argument and concept cartoons is obvious, when a concept cartoon is little more than an argument presented in visual form. Our research shows clear evidence of concept cartoons leading to increased motivation and engagement for learners of all ages and backgrounds and in a variety of circumstances (Keogh and Naylor, 1999). Purpose is an important aspect of this. As concept cartoons create uncertainty and disagreement, they also provide a purpose for follow up inquiry. This puts students in a position of wanting to engage in follow up inquiry to find out more about their ideas, not just because the teacher tells them to do it.

Concept cartoons also help to give students confidence to talk by using familiar everyday situations where possible, using simple pictures that illustrate dialogue, giving all the alternatives equal status, and putting students in the role of adjudicating someone else's ideas. All of these make it easy for students to 'join in with the conversation' without feeling exposed in the classroom.

If you talk to a colleague about the examples shown, you should be able to recognise these aspects when you reflect on your conversation.

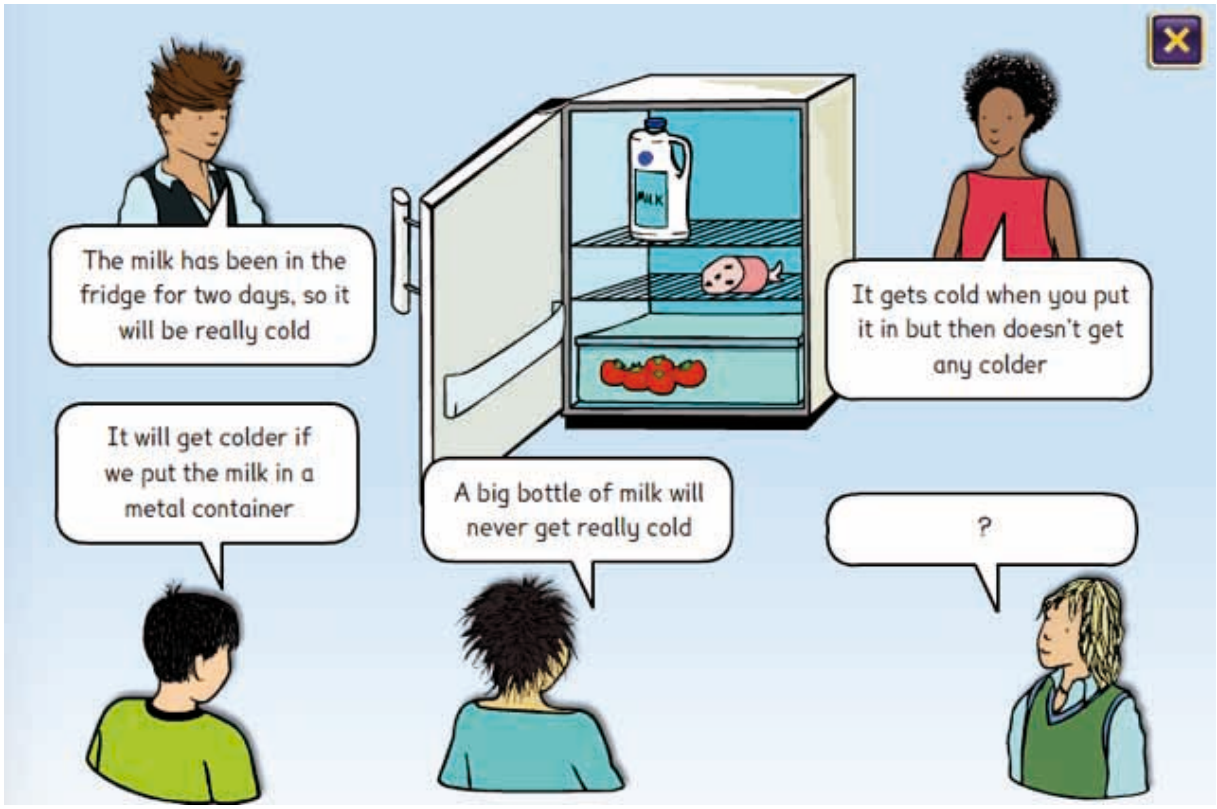

Figure 2. Concept cartoon "fridge" (taken from Moules, Horlock, Naylor and Keogh, 2015)

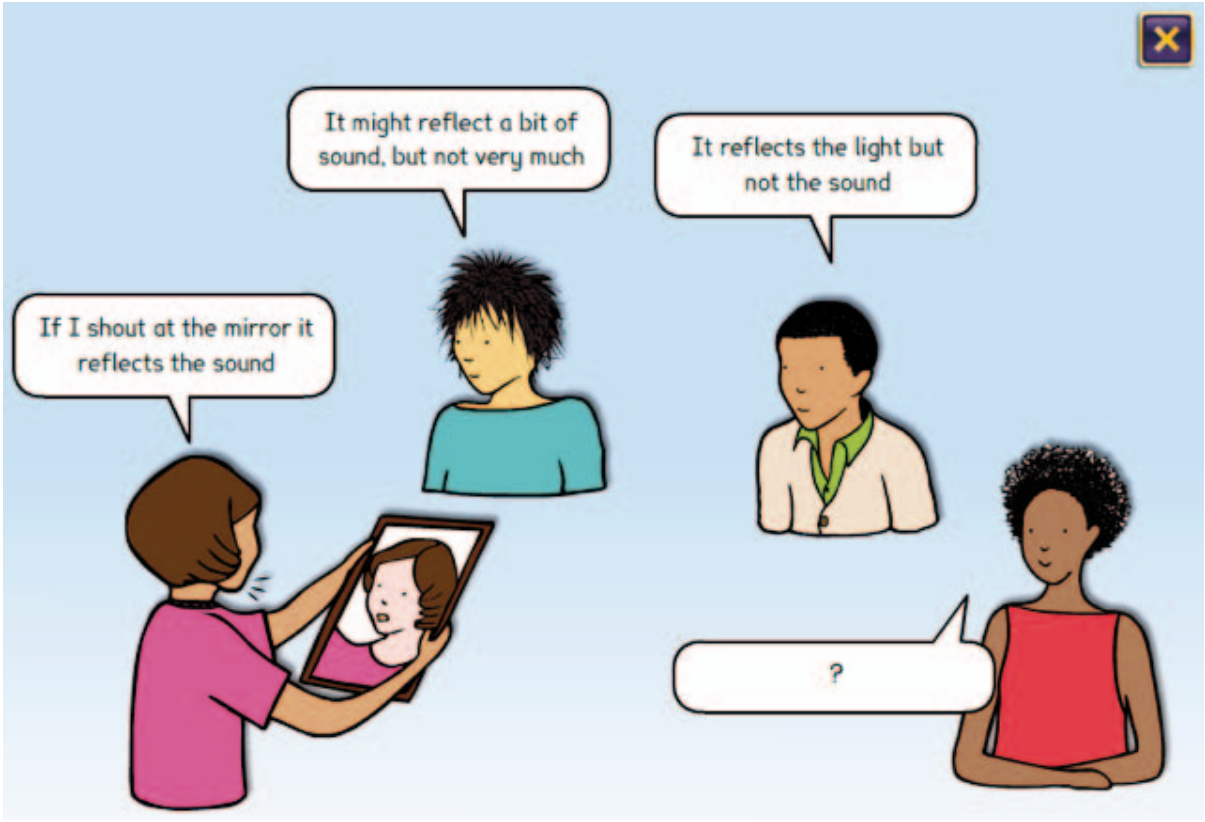

Figure 3. Concept cartoon "mirrors" (Naylor and Keogh, 2014)

Concept cartoons have proved to be popular with teachers in a wide range of countries, including countries where the local educational culture is very different from that of the UK. Quick, simple and effective ('deceptively simple', as one colleague described them) is what makes them attractive to busy teachers, and dialogue is the key to this. The dialogue between the concept cartoon characters draws learners in immediately, and the cartoon-style representation of a conversation between different characters makes it really obvious what is going on. But it's the dialogue they generate between learners that is critical. Of all the things we have learnt about concept cartoons over the years, this is the most important. Talking and thinking are inseparable: talking makes thinking better, and thinking makes talking more productive. Talking and thinking together enable learners to engage in the discourse of science, and concept cartoons can make a valuable contribution to making this happen.

Readers who are interested in reading more about research into concept cartoons will find a fairly extensive list of references on the Millgate House Education website, www.millgatehouse.co.uk.

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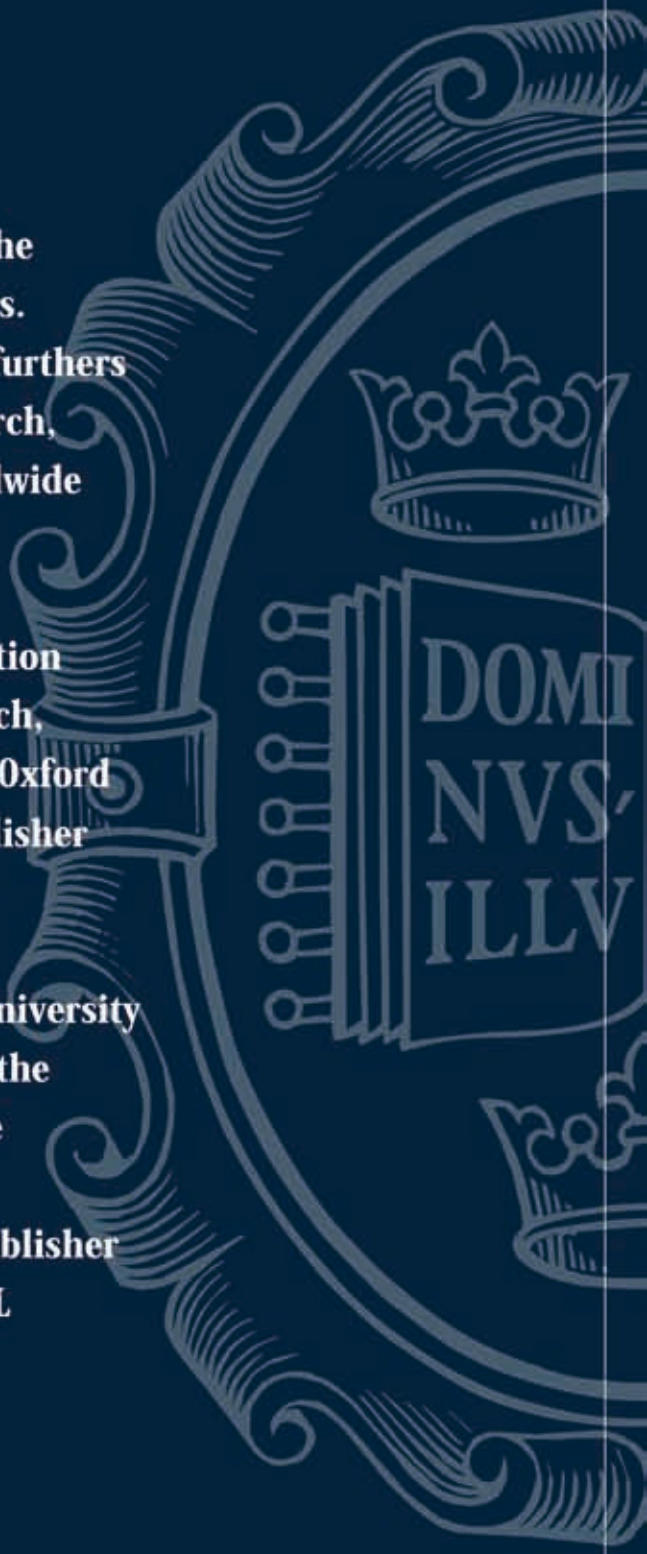

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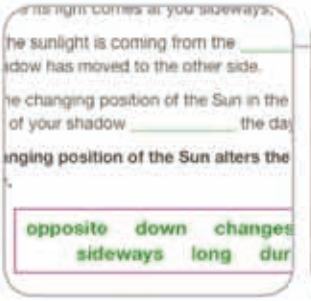


Transcript exercises

Gap-fill exercises using film transcripts – versatile as a reading or listening exercise.

Activity sheets and classroom visuals

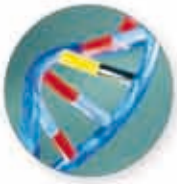
Engaging images and worksheets with built-in language support.

Interactives

Games, quizzes, and flashcards for practising key language.

Glossaries

Interactive glossary of scientific terms with audio samples to help students build their English skills.



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CLIL + SCIENCE

IN PRIMARY EDUCATION

MOVING TOYS IN PRE-SCHOOL EDUCATION

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Abstract: Mechanical moving toys are an excellent way to help children to develop multi-sensory cognitive skills and build their incipient understanding of scientific and technological concepts. Mechanical moving toys consist of a lower part containing a mechanism, and an upper section with moving parts. We use them to work on mathematics, handicrafts, creativity, trial and error, and mechanics. Our main aim is to arouse the children's interest in science.

It is vital to lay the foundations of scientific thinking from Pre-School Education onwards, by encouraging children to learn about their surroundings and promoting critical thinking, so that they become curious about the what and how of the phenomena that happen around them. To arouse young children's curiosity about science, we have to provide them with materials and experiences that help them to develop an interest in this area.

In our project, we do this by creating a Science Corner which is available for all the children, where they can experiment and discover the scientific principles in an entertaining way, using magnets, gyroscopes, kaleidoscopes, magnifying glasses and discovery bottles. Every week we carry out an experiment which encourages the children to formulate hypotheses, obtain results, and compare what they have seen with their ideas about what happens around them.

Figure 1. The science corner

One particularly interesting way of bringing science closer to children in Pre-School Education is by making mechanical moving toys. This helps them to become interested in mechanisms, and stimulates their curiosity about the way that things work.

Mechanical moving toys are mechanically operated objects which combine aspects of engineering with aspects of handicrafts. We use recycled materials, including bottle tops. In the lower part of the toy there is a mechanism, while the upper part of the toy has moving parts. The mechanisms can be placed in shoe boxes or plastic containers, but it is always a good idea for the workings of the toy to be visible so that the children can see how they function.

This activity helps the children to learn about the importance of engineering and technology. They are fascinated to see how creative play can be combined with the "magic" of the moving toys.

Figure 2. Mechanical moving toys: life in the ocean

Guidelines for building mechanical moving toys

- Find a theme that holds the project together.
- Decide what material is going to be used for the project, that is, recycled material, wood, plastic, etc.
- Remember that new ideas and materials will come up in the course of the project – this is not something static.
- Introduce the activity during class time.

- Schedule the activity into the curricular plan for the teacher.
- Reserve a space in the room to keep the materials and a table for doing the handicrafts.
- Guide the children in their learning path, and act as a moderator where necessary, but let the children play the leading role.

How to work

- Taking into account the interests of the children in the group, we start by watching a video on the topic they have chosen. We have made moving toys about the sunflower cycle, about animals, sports, and characters in films.
- Together, we decide what project we are going to do. With this age group, it is very important to be aware of the children's likings and interests, so that the project motivates them. It is essential that they can choose, and that their opinions are taken into account.
- The actual assembly of the toy is carried out in small groups with the teacher, while the rest of the students work in corners.
- After this, the mechanism itself is put together by the whole class, and problems that come up in the course of this are solved by all the students together. This encourages cooperation, and helps the children to learn to respect each others' opinions. It also creates a sense of community, as the students become enthusiastic about their joint project.
- The teacher directs the group, but the mechanism is made by the students by trial and error. We listen to all the ideas, put them into practice, and choose the one which works best.
- The first project is the most complicated one, because everything is new. As we go on, it gets much easier, because the children have learnt to visualise how the mechanisms are going to move.

Figure 3. Working together to make decisions.

EVALUATING THE IMPACT OF BILINGUAL PROGRAMMES ON THE DEVELOPMENT OF SCIENTIFIC COMPETENCE IN PRIMARY SCHOOL PUPILS

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Abstract: This paper investigates the efficiency of Content and Language Integrated Learning (CLIL) by focusing on its possible impact as regards students' development of non-language skills in bilingual programmes. We focused our attention on students' science skills development using specific tools, which were designed a*d hoc* for this investigation: context questionnaires and science content test. After data collection and early analysis, preliminary results suggest significant differences between groups can be identified.

This chapter looks at the role of bilingual education in Spain, and in particular, at the CLIL approach (Content and Language Integrated Learning), with respect to the development of scientific competence. Even though CLIL has only been introducted relatively recently in Spain, in comparison with other European countries, it has spread considerably in the last ten years, as Lasagabaster and Ruiz de Zarobe explain (2010). Since it has become so widespread in our educational system, the time has come to look at how CLIL affects content learning, a dimension which has so far received little attention in our country.

This project was carried out in state primary schools in the Principality of Asturias. We analyse the two main educational models: schools where teaching is provided only in Spanish, and schools affiliated to the bilingual education programme organised by the Regional Ministry of Education, Culture and Sport of the Principality of Asturias. We focus specifically on the teaching and learning of scientific contents, and assess whether the schools with bilingual programmes are applying "estrategias sólidas para mantener de manera eficiente el enfoque dual entre el contenido y el lenguaje" (Mehisto, 2008).

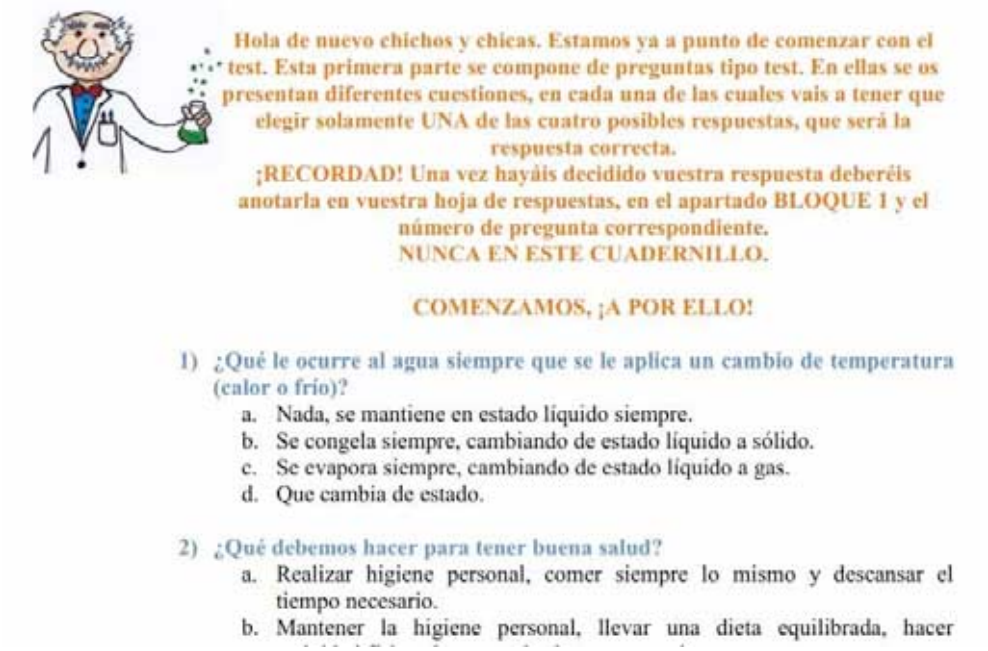
This innovative perspective, centring on content learning within a specific linguistic programme, represents an advance on the research carried out in such contexts in recent years, in which CLIL researchers have concentrated on gauging the impact of such programmes on students' linguistic development alone. The results of this research mainly demonstrate the benefits of CLIL in this respect, showing positive effects on students' attainment in both the target language and the first language (see Lasagabaster and Ruiz de Zarobe (2010), Ruiz de Zarobe and Jiménez Catalán (2009) or Ruiz de Zarobe et al. (2010)). However, many of these studies point out that more attention has been paid to the language dimension than to actual content learning (Lasagabaster and Ruiz de Zarobe, 2010). Along the same lines, Coyle, Hood and Marsh (2010) emphasise the undoubtable benefits of CLIL as regards language outcomes, but also point to the need to research more deeply what happens to the contents in subjects taught in English in bilingual programmes, even though the very concept of CLIL would seem to guarantee that content is being imparted: "CLIL es un término genérico y se refiere a cualquier situación educativa en la que una lengua adicional, y por lo tanto no el idioma más utilizado en el entorno, se utiliza para la enseñanza y el aprendizaje de asignaturas que no sean la propia lengua" (Marsh and Lange, 2000). The basic assumption in CLIL is that non-linguistic contents need to be taught and learnt adequately, since content actually takes priority in such settings, as some researchers have established (Cenoz and Ruíz de Zarobe, 2015).

Using this theoretical framework, together with a research basis in Bisquerra (2004) and Kerlinger (1985: 7), we designed a systematic empirical educational research process in order to gain in-depth knowledge of the classroom reality of CLIL in our setting, insofar as it enables children to learn about science and develop scientific competence in education. Our main objective was to establish how CLIL influences the development and acquisition of content, since "la investigación en contenido es extremadamente limitada" (Cenoz, 2014) so far, and as Ruiz de Zarobe states (2013), CLIL is not necessarily positive in every educational context in which it is applied.

The specific aims of our research can be summarised as: 1) to find out what level of scientific competence and knowledge of natural sciences our students reach by the end of primary school, in bilingual schools and Spanish-medium schools; and 2) to compare the results in these two settings to establish if there are any significant differences in this area between the two populations analysed. If differences are found, we will examine what kind of differences these are, and how important they are.

To carry out this project we took a large sample of 709 pupils in state primary schools, all of whom were in their final year (year 6, age 12). They were divided into 2 groups: pupils in bilingual programmes who were studying science through the medium of English, and pupils who received all their science classes in Spanish.

The tools we used were designed specifically for the present research project. Two questionnaires about the context, one for pupils (to measure their socio-economic and cultural background) and another for teachers (professional questions about their career and work, academic background, perceptions and beliefs). This part of the study is very important, even though it is not the main focus, since social research – and therefore research in the area of education – has to take account of the context in order to interpret the results properly (see Bruton, 2011, and Lorenzo, 2008). Finally, we also designed an instrument to assess content knowledge, in order to evaluate how far these students had developed scientific competence, in the specific area of natural sciences (see Figure 1). The questionnaires and tests were piloted and validated before being applied in the sample.



Hola de nuevo chichos y chicas. Estamos ya a punto de comenzar con el test. Esta primera parte se compone de preguntas tipo test. En ellas se os presentan diferentes cuestiones, en cada una de las cuales vais a tener que elegir solamente UNA de las cuatro posibles respuestas, que será la respuesta correcta.

¡RECORDAD! Una vez hayáis decidido vuestra respuesta deberéis anotarla en vuestra hoja de respuestas, en el apartado BLOQUE 1 y el número de pregunta correspondiente.

NUNCA EN ESTE CUADERNILLO.

COMENZAMOS, ¡A POR ELLO!

1) ¿Qué le ocurre al agua siempre que se le aplica un cambio de temperatura (calor o frío)?
   a. Nada, se mantiene en estado líquido siempre.
   b. Se congela siempre, cambiando de estado líquido a sólido.
   c. Se evapora siempre, cambiando de estado líquido a gas.
   d. Que cambia de estado.

2) ¿Qué debemos hacer para tener buena salud?
   a. Realizar higiene personal, comer siempre lo mismo y descansar el tiempo necesario.
   b. Mantener la higiene personal, llevar una dieta equilibrada, hacer

Figure 1. Example of test of scientific competence

Our results are preliminary in nature, since the project is still ongoing, even though it is now in its final phase of data analysis and preparation of conclusions. Despite this, we are able to provide some noteworthy results. First, our analysis of the research context has shown that the students in the bilingual programmes appear to suffer significantly less from stress than those in the Spanish-medium programme in the subjects "Spanish language" and "English as a foreign language". Even though we have not conducted a study specifically on academic performance as far as linguistic competences are concerned, these results are important indirect indicators of the benefits of CLIL, echoing the results found in previous studies, in which CLIL programmes benefited the development of students' linguistic competences, which could be perceived in both their L1 and the L2.

	N	Media	Desviación estándar	t	gl	Sig.
Bilingüe	352	14,9926	5,50067	-6,094	700,662	0.000
No Bilingüe	357	17,4152	5,07160			

Figure 2. Results on test of scientific competence (biling/non-bilingual schools)

On the other hand, our preliminary analyses of the test of scientific competence in both populations (bilingual programmes and Spanish medium programmes) (see Figure 2) suggest that there are significant differences in achievement, with better and more complete development of content knowledge/skills in the area of natural sciences among students who have been taught science in their native language. At the present time, we are carrying out an exhaustive analysis of these results, in order to weigh up the possible reasons and seek ways in which these programmes can be improved in order to boost their potential above and beyond their benefits as far as language learning is concerned.

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BRINGING THE WORLD INTO THE CLASSROOM

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Escuelas Pías Tafalla

Abstract: The session will show ways to change "book based learning" into "goal based learning". It'll be a practical session, sharing ideas which can be applied during our lessons by bringing real problems into the classroom. It focuses on students from 8 to 12 years old as they become teachers or nutritionists. They analyze an ecosystem and the human impact on it by using cooperative learning, their own experiences and skills to find information. The whole process tries to boost creativity and critical thinking skills because they know that there is not only one correct answer to a question.

My aim is to introduce four activities to get our students involved in real life situations. After eight years teaching primary students, I have found that book based learning is incomplete, incoherent, and basically boring. Two years ago I visited a Montessori inspired school in Catalonia, and I attended some courses about multiple intelligences and new ways of teaching. After this experience, I decided to use the text book as an information source and not as a guide to be followed step by step. I have incorporated some activities in my classroom that try to make students feel useful when dealing with real life situations. All the situations are based on text book units and the students not only use their book as a reference, but also for developing critical thinking skills.

1 - Human Impact Analyzers for the City Council (6th grade).

The teacher will show an example of the exam from the very first day. It consists of two pages, one will be a non-adapted article from a newspaper or webpage. It will contain information about any human action affecting an ecosystem; *forest fire, oil spill, overfishing…* The second page will include a table with three columns (see also Figure 1 later in this chapter):

HUMAN ACTION	CONSEQUENCES	SOLUTIONS

The student will analyze the information and classify; news information, theoretical concepts from the book, and their explanation or opinion in the corresponding column.

To prepare for the exam, we will have to go through two curricular units; **Ecosystems and Human Beings** and **Ecosystems** and develop several activities.

1a) Firstly, using photos or news from internet or newspapers we try to **grab students' attention** so we can motivate them.

1b) We use a **unit page** to draw an ecosystem they know. Then, they switch their notebooks with another classmate. In their classmate's notebook, they draw a human being acting in the ecosystem.

2a) **How does the action affect the ecosystem**?

Pairwork - How do we analyze an ecosystem? Using the book as a reference find the elements of an ecosystem. This refreshes concepts learned in the third year of primary school, such as: Fauna, Vegetation, Habitat, Natural & Man-made elements, and interactions between them.

2b) We analyze different ecosystems where the problems occurred; the habitat, vegetation, fauna and the interactions between the elements, including human actions.

2c) After refreshing the elements of the ecosystem, we focus on **human actions** by trying to classify them and checking technical names in our text book.

2d) We analyze and comment on two or three news articles (Lemurs in Madagascar, Fracking and Bamboo risk) as a mock exam in pairs.

3a) Once students are more familiar with the concepts and analyzing news, teacher present a project as a surprise. The class will also collaborate with **Tafalla's City Council working as "*Human Impact Analyzers"***. The Environmental Councilman will send us a couple of real problems that the area is facing.

3b) Using these descriptions teacher will divide the group into groups of 3 analyzers each. They will have to analyze the problems following the article analysis pattern; think of possible solutions and explain the problem with a drawing (poster style). Some students may search for information in the town; visiting the place, taking pictures, or asking their parents. They will be able to ask council member himself.

EVALUATION: will be based on the exam, group work and participation, analysis of news article, unit cover, and project (see Figure 1 on the next page).

Goodbye, Bamboo

Endangered giant pandas are facing a new threat: the loss of their food source, bamboo.

BURRARD-LUCAS/BARCROFT MEDIA/LANDOV

A giant panda feeds on bamboo in China's Qinling Mountains. The bears get water and nutrients from the plant.

In China's Qinling Mountains, giant pandas spend most of their day eating bamboo. The plant makes up 99% of the bears' diet, with some pandas eating about 40 pounds of it a day. But Qinling's pandas may soon have to find another food source. A new study published in the science journal Nature Climate Change reports that warming temperatures may cause the loss of most of the region's bamboo by the end of the century.

A team made up of researchers from Michigan State University and the Chinese Academy of Sciences used climate models to project the effects of climate change on the region's three main bamboo species. They studied the impact of rising temperatures on the spread and growth of bamboo. Bamboo is sensitive to temperature changes. "Even with a 3.6° Fahrenheit increase in temperature, we found that 80% to 100% of bamboo would be gone by the end of the century," Jianguo Liu, one of the study's authors, told TFK.

Protecting Pandas

The Qinling Mountains, located in eastern China, are home to about 270 pandas. That is about 17% of the world's wild panda population. The bear is one of the world's most endangered species.

In recent years, China has stepped up efforts to protect pandas from deforestation and poaching. But Liu says the country has yet to consider the long-term effects of climate change in its conservation planning. Aside from increasing nature reserve areas where pandas are protected, Liu wants China to lower its use of fuels that release greenhouse gases—as should the rest of the world. "The future of pandas," he says, "is in our hands."

HUMAN ACTION	CONSEQUENCES	SOLUTIONS
OVEREXPLOIT "deforestation + poaching" Pollution "want China to lower its use fuels that produce gases"	Loss of Biodiversity "Panda bear - one of most endangered "Bamboo - 99% of panda diet" "may cause the lost of the region's bamboo" CLIMATE CHANGE "climate change - increases temp"	Protect endanged species "protect pandas from Protect Natu Spaces "increases natural reserves where" "try to find another food for pandas" reduce pollution overexploit carefull

Figure 1. Human impact analyzers: the panda's ecosystem

2 - Students become teachers. (6th grade)
https://www.youtube.com/watch?v=aY2r7lsjMS0

From my point of view, one of the curriculum's weaknesses is the repetition of contents. You come across photosynthesis, the water cycle and animal/human reproduction twice or even three times in the Primary school curriculum. I have tried to take advantage of this by using 6th graders' knowledge and experience, getting them to become teachers for a day. 6th graders plan a lesson for 4th graders on Human Reproduction using the 4th graders' book.

1) **Instructions must be clear**, for example *"You'll have to explain male and female reproductive organs, with their parts and functions. You'll also have to explain the formation of the new baby. You will be working in pairs (arranged by the teacher) using our text books as information source. You can also use any other document you want. You'll have to use an A3 paper as a blackboard and another A3 paper with creative activities. You'll have to plan a 25-minute lesson*."

2a) The teacher gives the students two sheets of A3 paper, three of A4 paper and photocopies of the 4th graders' textbook where human reproduction is explained.

2b) First, students have to **check both textbooks** to see how different the explanations are. After this first step the class will take a **question time period** to ask any questions about the functions, and deal with the new content found in the 6th year textbook. We have this type of question time periods daily.

2c) Students have to **plan a draft "blackboard"** where they plan how to explain the ideas from the 4th graders' book. Teacher evaluate the draft: is it different from the text book? How clear are the ideas? Teacher should encourage students not to follow the textbook style.

The process also needs to be supervised group by group and we also use **15 minutes a day to guide and explain certain difficulties they might find**.

3) They use 5 sessions to complete the tasks: blackboard – poster, activities and lesson. Finally they have to explain everything to two 4th grade students and assist them in completing the activities.

EVALUATION: is based on draft, group work, poster, innovation of activities and blackboard, oral explanation and design.

3 - Students become nutritionists. Design a weekly menu (4th grade)

1) Firstly, they draw a **unit cover** starting from a question: Why do we need to eat? Most students will draw situations related to energy or growth, which is basically what the text book explains. Once they finish their covers they compare them with their classmates' and **answer the question with a sentence** "*We eat because….*" We complete their sentences using the book information that leads us to a sentence like "*We eat because food gives us energy, keeps us healthy and help us grow*". By **checking the book** they'll understand the fact that each type of food has a use.

2) Right after this we present the project **"*Create a nutritionist's office and devise a diet for a patient". What do we need to know to achieve our goal?* "** We start a **training period**, using the text book as a reference. Students classify food into groups (meat-fish/fruit and vegetables/cereals-bread/sugar & fats). Then, the teacher links these food groups with the nutrients they contain, explaining that the nutrients from food are the basis for their utility. They then compare this connection to a relation between symptoms and medicines to be used. They also draw on students' experience as sportmen-women, discussing how certain type of food are used as a source of energy.

3) The group then starts a training period using the activities from the student and activity book in order to frame these ideas. The teacher also hands out a puzzle-map photocopy (to be cut and reorganized in their notebooks) where they can find the basic contents of the unit.

Example of the nutrition puzzle-map:

Help us GROW	**Keep us HEALTHY**	**Give us ENERGY**
Proteins	Vitamins-Minerals	Carbohydrates - Fats
Meat – fish – pulses – milk - eggs	Fruit – vegetables	Cereals, pasta, bread…

4) Once we assess that the basics are understood by most students, the teacher will **create the working groups**. Each group should make up a **name** for their office and design their **logo**, both explained in their notebooks.

4a) Their first activity as an office will be to **analyze the school canteen menu**. They will have to label the nutrients contained in food and judge if it's a balanced or unbalanced meal. Some students might ask: "What does balanced mean? /Answer: The answer is in the book…" They will have to check in the book. After a few minutes, we will correct some menus while giving them some clues to deal with the rest of the menus. The teacher will let them continue for a while in groups but after 15 minutes we will look at the menus all together.

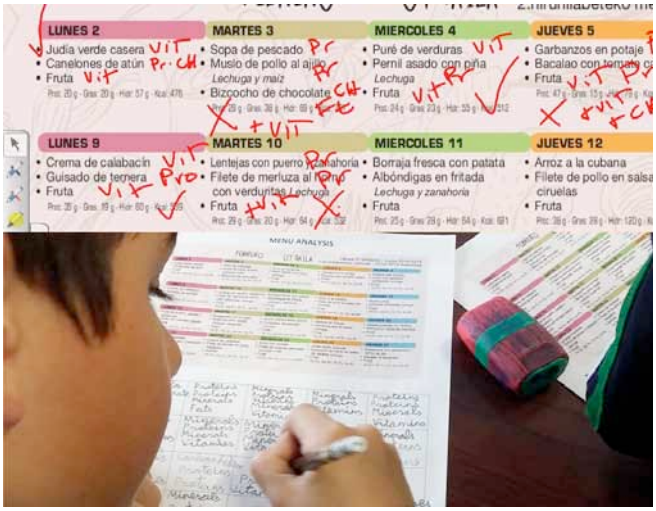

Figure 2. Drafting the blackboard

5a) After the training activities, we will initiate the **final project by introducing the potential patients**. Teacher needs to give a realistic air to the presentation so as to convince the students that they are truly working for real people.

5b) Each patient has a different profile; *some are vegans, some are allergic to milk…* and a different goal: *some want to lose weight, some want to increase muscular mass*, etc. We can present concepts such as: *celiac, vegetarian, vegan, different religious dietary guidelines.* Having clarified this, teacher will explain the task: **complete a 7-day menu, a paragraph explaining the menu and their logo for the nutritionist office and an explanation.**

We'll also have to underline the **EVALUATION CRITERIA** applied to the project: **accuracy of the menus to the profile and goal of the patient, variety of food and explanation of the menus, presentation and group work.**

There's not only one answer

Sometimes we become obsessed with answer sheets, guides, teacher's books and this kind of closed answer formats. They can be helpful to save time but they usually give one solution to a problem, which is something that almost never happens in real life. The human brain is not compartmentalized, therefore we shouldn't expect our students to find an isolated answer in a content unit. From a crossword to an activity such as "true/false", we can't expect THE ONE RESPONSE. I'll try to show some examples.

4 - Graphic representation of ideas

We're used to evaluating our students with oral or written questions. Some students' verbal skills might not be the best and we are not giving them the chance to show us how well they have understood the concepts studied. We need to define clear instructions so they can "translate" the functioning of a system ("*Compare the functioning of the circulatory system to the functioning of a machine you know*"), the differences between renewable and non-renewable energies or other concepts into a drawing ("*Design a logo for renewable and another for non-renewable energies*").

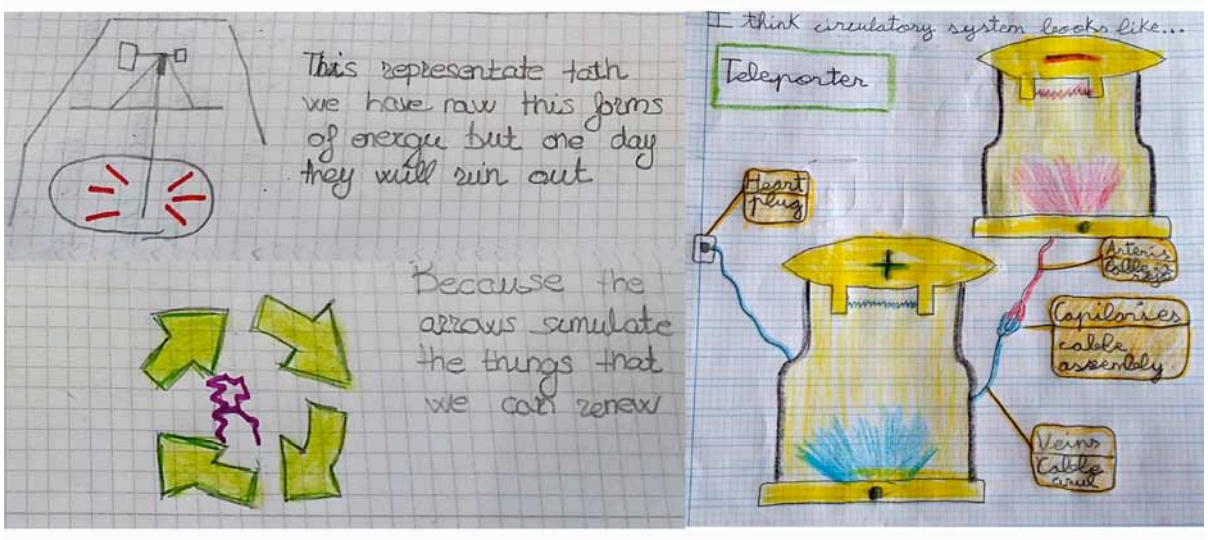

Figure 3. Logos for renewable and non-renewable energies

Final thoughts

These are some activities that have worked positively in my classroom. I think they are isolated attempts at changing the spirit of traditional evaluation, which unfortunately is predominant in our schools. I have been inspired by experiences in Ciutat Jardí School in Lleida, Montserrat School in Barcelona, and experiences that some colleagues shared in the Project Based Learning Congress at Navarra's Public University.

MULTIPLE IMMERSION IN GERMANY: A EUROPEAN PERSPECTIVE

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Abstract: This is an interim report on an immersion program designed to meet the 3-language-policy of the EU. The basic idea is to give more than one language the benefit of immersion by linking early immersion for one language throughout preschool and primary school and by adding late immersion for another language in secondary school. Details will be provided on the nature of the program and the outcomes, in particular, on the development of the three languages involved, i.e. L1, L2, and L3.

Foreign language teaching in Europe is increasingly being driven by the language policy of the EU. It stipulates that every child should learn at least 3 languages at a proficiency level functionally appropriate also for professional purposes. The EU recommends that one of the languages should be the native/family language; another one should be one of the major world languages (e.g. English, Spanish, Mandarin Chinese, or other); and the third one could well be a lesser used language. Since immersion (IM) is generally regarded as the most successful way to teach foreign languages the EU countries are well advised to opt for this methodology wherever possible. In this paper it is suggested to give every language the benefit of IM.

At the present we are experimenting with the following approach: The L2 is introduced via early IM in preschool and continues to be used throughout grades 1-4 of primary school. The L3 is added at the beginning of secondary school via the European late partial immersion program known as *Bilingualer Unterricht* in German (BU), *classes bilingues* in French, etc.

Note that early IM and BU are both well researched and reliable models for introducing a new language in school, although focused on different age ranges. What needs to be explored at this point is how best to link these two program types with respect to the EU policy. One of the key problems is where to find enough time without having to take it away elsewhere.

1. The German scenario

The German school system is well suited to allow for IM. Two points stand out: The nature of the teaching credentials; and the fact that preschools start at the age of 3;0 (three years and zero months).

1.1. Teaching credentials

Teachers at German secondary schools need to have credentials for at least two subject areas. This requirement eliminates the problem familiar from countries that require only one credential/subject area, such as GB, France, the US, or Canada. In such cases the schools/school boards need to recruit bilingual teachers capable of teaching their subject as specified by their credential in both their languages. This problem takes care of itself, if

teachers have two credentials, for instance, a foreign language targeted for IM plus some other subject so that the later can be taught in the foreign language without violating any regulations.

1.2. Early start in preschool continued in primary school

In Germany preschools start at the age of 3;0 or even earlier. This is a real blessing for two major reasons: First, it allows for the extension of the time span for contact with the new language by three years if these preschools are organized according to IM principles and if IM is continued without interruption in primary school. That is, linking the 3 years of preschool with the 4 years German children normaly spend in primary school gives us 7 years of continuous contact, which has proved sufficient for the children to acquire the new language at a proficiency level that meets or surpasses the demands of the 3-language requirement of the EU language policy.

The second major reason has to do with an organizational peculiarity of the German school system. At the end of elementary school in grade 4 all children are moved on to various kinds of secondary schools of their own choice. This results in a complete reshuffeling, which puts an end to any of the previous activities requiring continuity across grade levels. And this, of course, includes IM for the L2. However, this also opens up an opportunity to bring in the L3 and to solve the "time" problem for L3.

2. The IM-based 3-language model

The major outlines of the 3-language IM model are summarized in Table 1. The key aspects identified are the 3 languages, namely, the L1, the L2 and the L3; the point in time at which the respective language is introduced; the educational institution that is to provide the language input including the family; and the methodology according to which the input is being provided, such as family interaction, preschool IM, BU.

age	language	institution	method
0;0	L1	family	family interaction
3;0	L2	preschool	IM
6;0	L2 contin.	primary school	IM
10;0	L2 contin. reduced	secondary school	BT
10;0	L3	secondary school	BT

Table 1: Overall IM scheme for Schleswig-Holstein. IM immersion, BT bilingual teaching

2.1. The development of IM in the province of Schleswig-Holstein, northern Germany

English IM programs were fairly late in getting adopted in the public schools in Schleswig-Holstein. We started out with BU for secondary schools in the early 1990's and added early immersion in 1996. Both kinds of programs were carefully evaluated following more or less closely the Canadian pattern of IM research. Most of our projects on the development of the L2 were longitudinal in nature and the IM students were compared to their non-immersion peers. The research was primarily focused on the development of the languages, but it also included literacy, in particular, L1 reading comprehension, some of the subject areas, and whether there was a way to include late entry-children, i.e children who had missed a year or two at the beginning.

3. Major results

At the present time results are available for English as the IM language in both early IM (preschool + primary school) and late IM (BU); as well as for the development of L1 German reading comprehension in both kinds of IM models. As for the development of English there are results from achievement tests such as *Cambridge Young Learners English (CYLE)* and a host of psycholinguistic studies on a large range of structural properties as to how they emerge and develop in the course of the years the children spend in IM.

All in all, the results are fully in line with the IM research available from other sources, in particular:

- The proficiency level of the non-native language, i.e. the IM-language, surpasses the level that tends to be reached in a traditional foreign language class room by quite a margin.
- In fact, the results arrived at on the basis of CYLE suggest that the achievement level reached by the IM children by the end of grade 4, i.e. at the age of 10;0/11;0 after 7 years of exposure to English, ranks among the top results that can be achieved anywhere in the schools around the world.
- The development of the L1 is not impeded. This is particularly noticeable in the reading comprehension tests. The IM children in both types of program do at least as well as their non-IM peers. In fact, in many cases the IM children outperform their non-IM peers by a margin of 5% or more, although the former spend much less time in contact with German than the non-IM students.
- The many analyses of the development of a wide range of structural properties and how they develop in the course of the years illustrates that no target structure is beyond the reach of the children; and that no target structure needs to be explained either to make it learnable. For instance, the IM children even develop English word formation rules on their own, a structural aspect of English that, in general, is not even treated in any of the text books normally used to teach English in school.

4. The "time" problem

Most people, teachers included, tend to assume that 10-year-olds need to continue to be taught English until they leave school. There is no empirical justification for this view at all. To be sure 10/11-year olds need to continue to develop their L2 in age-appropriate ways and at age-appropriate proficiency levels. However, this need not necessarily be done on the basis

of traditional teaching. This kind development can be triggered quite well, if, for instance, one or two of the IM students' subjects in secondary school are taught via IM.

Such a move would also help to resolve the "time" problem mentioned in Ch.1.2 in conjunction with the introduction of the L3. The choice of the 2-subject solution for the continuation of the L2 absorbs only a small fraction of the teaching time originally required to get the L2 under way. The bulk of this time is now available for the introduction of the L3.

IN-SERVICE TEACHER TRAINING TO EMPOWER 2.0 CLIL TEACHERS

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Abstract: This chapter offers insights into how technologies are an integral part of the in-service CLIL training programs developed by the Departament d'Ensenyament (Generalitat de Catalunya). We will see the evolution of such programs and how technologies have become a key element in CLIL training. Nowadays, CLIL teachers are trained in the use of web 2.0 tools, apps and online multimodal and authentic materials and resources suitable for CLIL lessons.

In our digital era, CLIL in-service teacher training programs must empower teachers by providing them with the abilities and tools needed to integrate technologies effectively into their lessons so that communication, collaboration and creativity are fostered. CLIL teachers need to know the pedagogical uses of technologies and, especially, of mobile devices, as well as where to find suitable online resources and materials.

Technologies have a great impact on every aspect of students' lives; they affect the way they communicate, collaborate, play, socialize and learn. When learners are allowed to use web 2.0 tools and apps, lessons become more interactive, engaging and motivating and tasks become increasingly relevant and real for students.

These are some of the reasons why technology is paramount in CLIL settings:

- Techology fosters and enhances communication and collaboration among learners who use digital tools to interact and work collaboratively in CLIL tasks and projects.
- It provides teachers and students with multimodal and authentic materials. Presenting multiple representations of content facilitates understanding and caters for different learning styles. By using multimodal resources, teachers can provide varied input to make content more accessible and to scaffold comprehension.
- Learners gain access to virtual experiences, situations, times and places that would otherwise be beyond their reach. (i.e. experiments in virtual labs, access to remote places to explore, different times in history, the interior of the human body, etc.). Animations, simulations and interactive games allow students to relate experience (content) with language (meaning), thus making input comprehensible. Through technology teachers can design CLIL tasks that are truly experiential, contextualized, cognitively engaging and challenging.
- The use of technology improves learners' creativity, critical thinking, social skills, decision-making skills and problem-solving skills. It contributes to the development of soft skills which learners need to develop in order to be prepared for the challenges of the future.
- Technology enables students to personalise their own learning path.
- Technology helps teachers and students become lifelong learners by developing and actively using their Personal Learning Environments (PLEs).

Technologies in CLIL training programs developed by the Departament d'Ensenyament

Technologies have been an integral part of in-service CLIL training programs, courses and modules developed by the Departament d'Ensenyament (Generalitat de Catalunya) since the early times in 2007 when they were first included in the CLIL sessions designed within the ANIP program (*L'Ensenyament de l'anglès a l'educació infantil i primària*). ANIP was not specifically a CLIL training program but as a 90-hour-course on methodology and language for primary teachers of English, it offered a CLIL conference that brought together experts and practitioners in CLIL, and for the first time, the importance of integrating technologies into CLIL lessons was addressed.

The aims of my presentation on ICT & CLIL were the following:

1. To present participants with online resources and materials (i.e. animations, interactive games, visuals, multimedia dictionaries...) along with examples of how to use them in CLIL classes.
2. To introduce participants to networking and to the concept of Personal Learning Environments (PLEs) and to encourage them to create and use their own PLEs as a strategy for professional development.

The ANIP program, cancelled in June 2012, was converted into two 45-hour online courses named ANT1 and ANT2 (L'ensenyament de l'anglès telemàtic 1 & 2) which are still being offered to teachers today to primary teachers of English. Technologies are embedded into the courses and have become a key element in all the modules. Each one of the courses contains a block devoted to CLIL. Teachers are expected to design and implement CLIL projects that integrate the use of online resources and web 2.0 tools in such a way that they contribute to challenging their students' thinking skills. The development of teachers' PLEs is still considered a fundamental aim and throughout the courses teachers are introduced and required to develop their own.

Figure 1. Tools for creating a PLE

The Foreign Languages Unit (*Servei de LLengües Estrangeres*) at the *Departament d'Ensenyament* has been offering different blended courses on CLIL since 2013, which highlight the importance of integrating technologies effectively in CLIL classes. These courses are for teachers of English and subject teachers of all educational levels: primary, secondary and VET education. For the last three years, as part of their CLIL training, teachers doing the course *Metodologies integrades de llengües i continguts (AICLE) i l'avaluació competencial* (Content and Language Integrated Learning and assessment of competences) have been trained on how to make the most of digital tools in CLIL lessons and on how to use web 2.0 for assessment as well. Thus, digital portfolios, online rubrics and checklists

generators, and digital tools for peer and self-assessment have been presented and teachers have used them in their CLIL projects.

In 2013, a new CLIL program, *Grup d'Experimentació per al Plurilingüisme (GEP)*, was developed as part of the Departament d'Ensenyament policy for plurilingual education. Over 200 schools from all over Catalonia have participated in this project so far and up to three subject teachers from each school have taken part in a two-year training with the final objective of being able to design and carry out quality CLIL projects in their schools. Trainees need to have a command of the English language corresponding to a B2 level or higher of the Common European Framework of Reference for languages.

In its first year, the GEP training introduces teachers to tasks and cognitive levels, collaborative and project-based learning, differentiated instruction and competency-based assessment. Technologies are integrated into each one of the aspects the course deals with. It is in the second year of training when specific strategies for CLIL are presented and teachers are required to create a CLIL project per se along with a personal ePortfolio to showcase their projects. Concerning technologies, trainees are introduced to new digital tools, the focus being on the use of the tools rather than on the tools themselves.

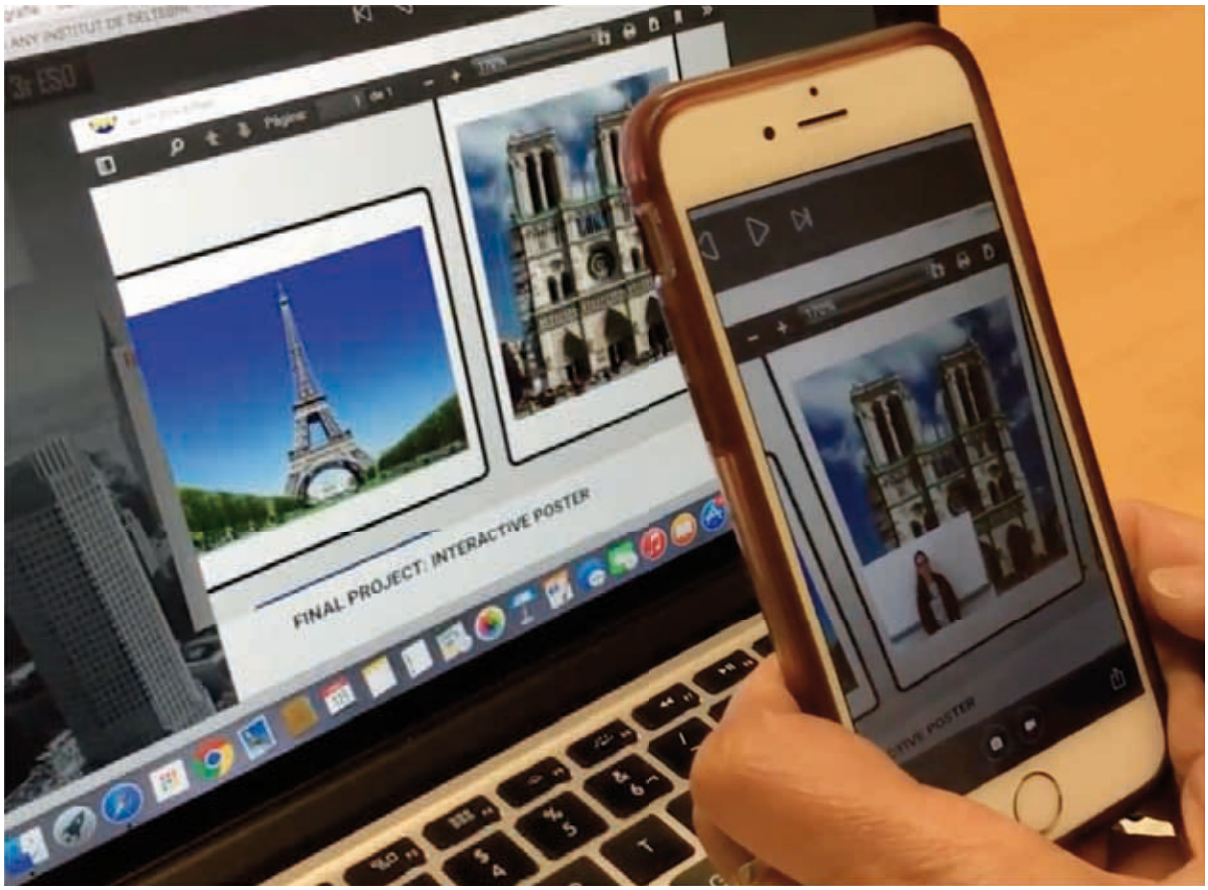

Figure 2. Teachers' digital portfolio

Nowadays, technologies and new learning models are of key importance in the GEP CLIL training. Teachers are trained in the use of web 2.0 tools and apps such as social bookmarking, podcasting, videocasting, interactive timelines, blogs and wikis, infographics, online visual organizers such as mindmaps, tutorials, geolocation tools, interactive maps, virtual reality, augmented reality, virtual labs, interactive games, social media, and tools for

flipping their classrooms, among others. Mobile learning and the use of apps in education is encouraged and more and more CLIL teachers are embracing it.

Trainees are also presented with online multimodal and authentic materials and resources suitable for CLIL lessons and they are encouraged to become content curators and share their resources in a network with their colleagues. Creating one's own Personal Learning Environment (PLE) is also part of the CLIL training.

CLIL programs and courses that integrate the use of technologies and online CLIL resources aim at offering training on how to provide the best learning environment for 21st century CLIL learners. This fact is highly valued by the trainees and it is often highlighted that, despite the difficulties they sometimes have to overcome, using tools that promote collaboration and communication along with methods that promote these skills can be truly transformational for their teaching and motivating and rewarding both for them and their students.

TRAINING IN SPECIFIC COMPETENCES FOR SCIENCE IN INITIAL PRIMARY TEACHER TRAINING PROGRAMMES

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Abstract: The Faculty of Education and Social Work (University of Valladolid) and some experienced Bilingual Primary schools are working together through the Innovation Project *Science-Pro* to do realistic pre-service teacher training, which focuses on bilingual education at school. The teacher trainees doing qualifying "mentions" in Foreign Language (English) and their Practicum II are the basis from which a new learning model is being designed at Higher Education level.

Our teaching innovation group *SciencePro* was formed in response to the need to prepare Primary Education undergraduates taking the specialty in Foreign Languages for their tutored work placement (Practicum II) in local schools. Subject specialists like Clarke (1995) and Zabalza Beraza (2011) emphasise that this kind of teaching practice should not be reduced to the mere transmission of knowledge, but should be oriented towards training *reflexive teachers* who understand the how and why of teaching-learning processes.

In accordance with the relevant legislation (Orden ECI/3857/2007), the regulations for the degree in Primary Education at the University of Valladolid (UVa) establish that the Practicum II should allow the student to collaborate in the practical life of the classroom and reflect on this experience. Students should develop the competences they have acquired in the course of their degree, put their ideas into practice, and analyse reflexively their own skills and the new situations they encounter.

Our experience of the Practicum II in the specialty in Foreign Languages over the last three years has enabled us to detect some shortcomings in our students' training, which could have their origin in the legislation (RD 1594/2011) and in the typology of specialist teachers, which associates this specialty only with Foreign Language teaching as such. The third provision of this law states that "the educational administration should regulate the additional training requirements that civil servants belonging to the primary school teaching profession are required to have in order to give classes other than the Foreign Language itself in a Foreign language, in schools whose educational projects include plurilingual teaching". Moreover, it adds that "these requirements, from the academic year 2013/2014, shall include a B2 level in the CEFR […], in the relevant Foreign Language." The term "civil servants belonging to the primary school teaching profession" refers to primary school teachers regardless of what specialty they have chosen at university. Unfortunately, the only requirement currently stipulated by the authorities is that of having a B2 level in the Foreign Language in question.

At no point do the regulations indicate that teachers should have theoretical or practical training in:

1. the use of the language in question as regards the classroom discourse of the subject that they are going to teach, or

2. the most appropriate methodologies for handling the teaching-learning process of non-linguistic contents through a Foreign Language.

In this context, we consider that the "Mention in Foreign Language Teaching" provides the best platform for training teachers to integrate the teaching of general contents with management of the Foreign Language in order to achieve effective and flexible communication in the primary school classroom using CLIL methodology (Coyle, Hood & Marsh, 2010). The use of this methodology implies a drastic change in the teacher's role, since he or she becomes a guide in the activities in which CLIL can be applied, such as Science, where "learning by doing" comes to the forefront (we focus here on Science, because this is the subject that is most commonly selected by schools with a bilingual programme in the Autonomous Community of Castilla y León). Similarly, the teacher not only needs general linguistic and communicative knowledge, but also requires specialised theoretical and practical training in the use of the Foreign Language as a vehicular language in the classroom, with appropriate mastery of Basic Interpersonal Communicative Skills and Cognitive Academic Language Proficiency (Cummins, 1979).

Against this background, the Faculty of Education and Social Work at the University of Valladolid proposes that the Degree in Primary Education should be characterised by close collaboration between the university centres in which teachers are trained and the schools themselves, with a special emphasis on the design of the new Practicum. In this sense, the legislation (EDU/641/2012) strengthens the bonds between universities and schools, by establishing the framework for some actions connected with the Practicum, among which we find the following point: "e) The universities should cooperate with the schools where their students do their placements in order to undertake joint projects in the area of educational research and innovation." (p.49431)

The innovative nature of this project rests mainly on aspects related to the diversity of agents involved, the methodology and the process. The participants are:

1) university teachers specialising in different areas – Experimental Sciences, English Studies and Foreign Language Teaching;

2) primary school teachers working in schools with bilingual programmes,

3) administrative staff in schools with bilingual programmes, and

4) students doing their Practicum in these schools.

The project envisages a transversal, integrative approach to the students' specialty subjects, and approaches the trainees' teaching-learning process as a process of helping future schoolteachers adapt to the new needs of the educational community, so that they can acquire specific competences with a view to providing high-quality teaching.

We therefore concentrate on enabling student teachers who are going to teach the subject "Science" in schools with bilingual programmes to develop the skills needed with reference to the following *key competences*: 2. communication in foreign languages; 3. mathematical competence and basic competence in science and technology; 5. learning to learn. In this context, our objectives are as follows:

- Training university lecturers in CLIL methodology.
- Creating interdisciplinary and inter-institutional working groups within the Faculty of Education and Social Work.
- Initial teacher training in Primary Education: equipping future primary school teachers with the specific skills they need to teach "Science" in schools with bilingual programmes.
- Creating work groups with primary schools.
- Our way of working is mainly collaborative, since all the participants recognise the need to cooperate with the others. In this sense, it has been necessary to have

frequent coordination meetings, which have proved to be of key importance in achieving our goals. Our activities were organised in the following stages:

1. We ensured collaborative preparation (with university teachers from Experimental Sciences, English Studies and Foreign Language Teaching) of the different courses that form part of the Mention in English, oriented mainly towards teaching "Science".
2. Student teachers created didactic units for teaching "Science", which they planned in collaboration with the lecturers in Primary Education and put into practice during their Practicum.
3. We designed questionnaires in order to find out more about the attitudes and reactions of the different parties involved: lecturers and students in the Faculty of Education and Social Work, and teachers in the primary schools.

We believe that the combination of all of these elements will lead to an improvement in the training of primary school teachers who are going to work in the bilingual programmes and projects of the Autonomous Community of Castilla y León.

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TASK-BASED TEACHING AND CLIL METHODOLOGY. AN EXPERIENCE IN INITIAL TEACHER TRAINING

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Abstract: This paper focuses on the basis shared by task-based teaching and AICLE/CLIL/EMILE when it comes to teaching natural science in bilingual programmes in primary schools, from the perspective of experimenting in the classroom. We will explain, in the form of an experiential narrative, the progress and future aims of the Teaching Innovation Project "SciencePro".

This paper sets out from the common ground and shared strengths between the task-based approach (Breen, 1987; Long, 1985) and the methodology known as AICLE/CLIL/EMILE (Coyle, Hood, & Marsh; 2010; Ball, 2015) for teachers specialising in bilingual education who have recently faced the new challenge of teaching *Science* in bilingual primary schools. As we know, in CLIL methodology the attention is focused on both content and language, centring principally on the content, that is, the teaching of a non-linguistic discipline, but in the expectation that the students will pick up the target language. This approach differs somewhat from EMI (*English as a Medium of Instruction*), in which students' full English competence is assumed, and language learning is not one of the main goals.

What the task-based approach and CLIL methodology have in common is that learning occurs through the process of authentic communication in the target language, which is understood as the vehicular language for the teaching of disciplinary contents. In our case, the discipline to be taught is experimental science, that is, the subject described as *Natural Science* in the official syllabus.

Starting from the area of using experiments to learn in the classroom (Piercy, & Caldwell, 2011), we identified a set of interdependent pedagogical principles and approaches, which included:

a) *Cooperative work* generated through interaction, starting from the importance of classroom organisation: classrooms must be arranged communicatively so that students use the language as a means of conveying ideas and information, rather than as a way of learning about language itself (metalinguistic knowledge). This means that the procedural dimension of language takes precedence (*learning by doing*) (Schank, Berman, & Macpherson, 1999), and we can track the students' individual progress and encourage peer-to-peer teaching and learning. These principles are fully compatible with the basis of experimental and experiential learning required by CLIL methodology in the subject *Natural Science*.

b) Development of *learning strategies* (Oxford, 1990) – through the variety of activities used in the classroom –, with an emphasis on the importance of affective and cognitive strategies, because:

-these are important both in task-based learning and in language learning, since the language the students encounter is contextualised and may be subject to considerable repetition. This helps the students to acquire better language skills (Krashen, 1982).

-they take us back to the 4Cs that underpin CLIL methodology: learning content (*Content*), communicating in the target language (*Communication*), activating cognitive skills (*Cognition*) and acquiring *Culture* which, in the current context, could mean scientific knowledge or skills, or even aspects of citizenship (*Citizenship*). Seen in association with the

Common European Framework of Reference for Languages (European Commission, 2002) the *Citizenship* component contributes to the development of key competence no. 6 in the *Recomendación 2006/962/CE del Parlamento Europeo y del Consejo, de 18 de diciembre de 2006, sobre las competencias clave para el aprendizaje permanente [Diario Oficial L 394 de 30.12.2006]*, which is needed to successfully meet the challenges posed by *Natural Science*.

c) The *classroom atmosphere*, in which participative learning environments are created where the target language can be used without pressure, which has a positive effect in that it lowers the affective filter which is thought to inhibit productive language use among learners (Krashen, 1982).

d) Strong links with the world and the social context, since communicative situations come about that are highly realistic, and which help students to acquire the key competences identified in the syllabus.

The obvious interdependence of these pedagogical principles means that it is possible to integrate them, so that task-based learning fits perfectly with AICLE/CLIL/EMILE, and the principle of *learning by doing* is introduced into each activity. As the students carry out experiments in the classroom, they develop learning strategies in a positive environment, in parallel to the real world outside.

In this context, we must point out that all of these principles form the central pillars of the methodological approaches adopted, and favour enrichment, integration and appropriation of disciplinary subject matter and skills. This takes on a concrete form in the sequencing of tasks according to the different objectives of each level of primary education. The programme thus a) guarantees the full development of the key competences established in the school syllabus; b) culminates in final tasks which can be assessed in terms of whether or not the students have mastered the key concepts; and c) encourages the teaching-learning process and promotes learner autonomy, as well as peer and self-evaluation (Oskarsson, 1978).

Against this theoretical and methodological background, our aim is to offer an experiential narrative of the Teaching Innovation Project "Sciencepro", which started in September 2014 in response to the need to modernise the degree in Primary education in line with what schools require. Its objective is to improve the initial teacher training given to the students who take the Mention in Foreign Language Teaching (English) in the Degree in Primary Education, who are likely to teach *Science*, since this is the subject that most bilingual schools choose to offer in English.

Since teaching *Science* is a complex matter, the project focuses particularly on areas of the subject which require scientific, methodological and linguistic competences. This task is undertaken jointly by staff from the Departments of Science Teaching, English Philology and Language Didactics, who work together and share their knowledge with a view to optimising the teacher training provided. The project brings together task-based learning and CLIL: work groups are formed on two levels: initial training in the Faculty of Education, and teachers working in the bilingual schools. The ultimate aim is to conduct an exhaustive study of the primary school classrooms where our students will work, and achieve a high degree of collaboration between our own students and the schools where they will take their Practicum.

At the present stage of our study, it is useful to mention that we align ourselves with the suggestions about methodology outlined in the study by Escobar Urmeneta and Sánchez Sola (2009) published under the title *Language Learning through Tasks in a Content and Language Integrated Learning (CLIL) Science Classroom*, who state that we should not "leave aside rigorous research into methodological options adopted, […]. It is the responsibility of universities, […], to carry out conclusive research to check whether the adopted pedagogical options produce the desired results." (p. 80).

On this point, we need to say that our experience so far, and the information we have gathered, are leading us to formulate some provisional conclusions concerning methodology

which promise a notable improvement in student teachers' professional competences in the area of bilingual education. However, we will have to wait until our methodological approaches have been fully implemented in order to test whether the results obtained are consistent and reliable.

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BALANCING THEORY AND PRACTICE IN THE MIDDLE SCHOOL SCIENCE CLIL CLASSROOM: A UNIT ON HEAT ENERGY

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Abstract: One of the biggest challenges for CLIL teachers is to communicate with the students in L2 (English) without sacrificing depth of content knowledge and higher order thinking skills. The authors will discuss how they facilitated first-year Italian middle school students' acquisition of content knowledge with the employment of the scientific method as they study the topic of heat energy in their L2. Essential elements of planning and execution of lessons about a unit on heat transfer will be presented. Samples of experiments, student projects and presentations, student notebooks, written tests, slides and additional resources will be shown. The authors will then discuss how students demonstrated the knowledge and the skills they have gained as well as the various ways they were evaluated.

The context of this experience was a first year CLIL middle school class (aged 11-12) in Rovereto, Italy. The class was comprised of 25 students, eighty percent of which had completed an elementary school CLIL program at the same institution. Approximately forty-three percent of the required class hours per week were in English, two of which were consecutive hours of Science. The science professor of the class (S. E.) was a certified instructor with advanced degrees in science and a high level of English. She collaborated with an American English mother-tongue teacher (A. M. L.) who obtained teaching certification in the United States.

Four different experiments were conducted as part of the heat transfer unit. (Figures 1, 2, and 3)

Figure 1. Glow sticks in water emitting different light intensities at different temperatures

Figure 2. Paper spiral spinning at a speed varying with the wattage of the bulb

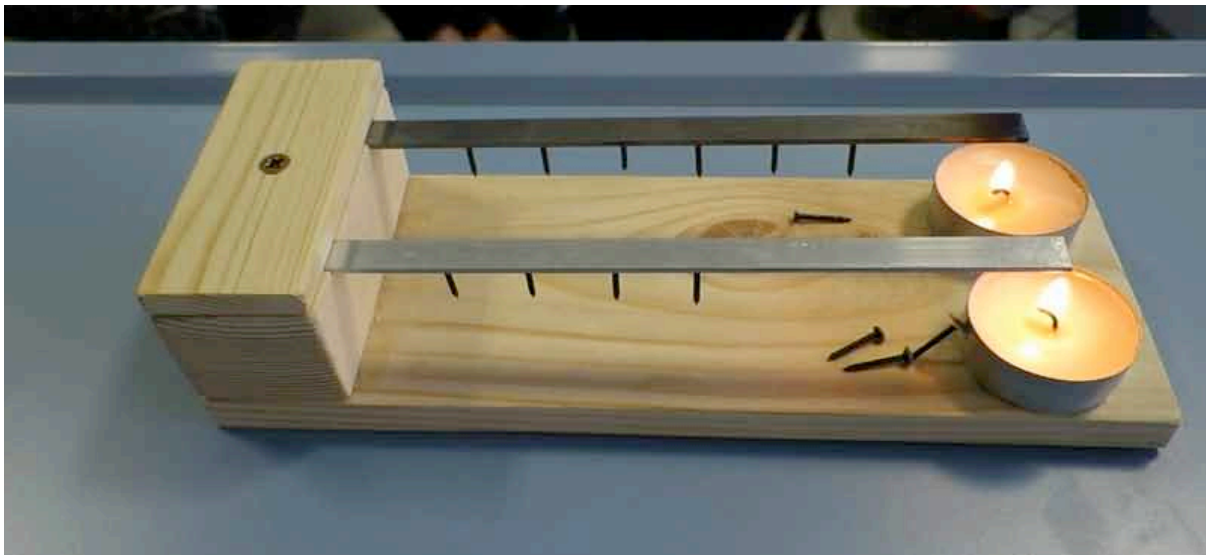


Figure 3. Bars of different metals showing different rates of heat conduction

The first of these was a very simple experiment in which we partially immersed one beaker full of hot water inside a larger one filled with cold water, and then had students take the temperature of each at regular intervals to demonstrate that heat energy moves from the hotter source to the colder one. In a conceptually similar experiment the increasing intensity of light emitted by glow sticks immersed in water at increasing temperatures provided a highly effective display of heat transmission and temperature-related energy content. Another involved heat transfer by convection, in which we balanced a paper spiral on a needle tip over a table lamp, and observed what happens when changing the wattage of the

lightbulb. The fourth was an investigation of heat conduction through two types of metal using a candle as the heat source and wax-attached nails as visual temperature sensors.

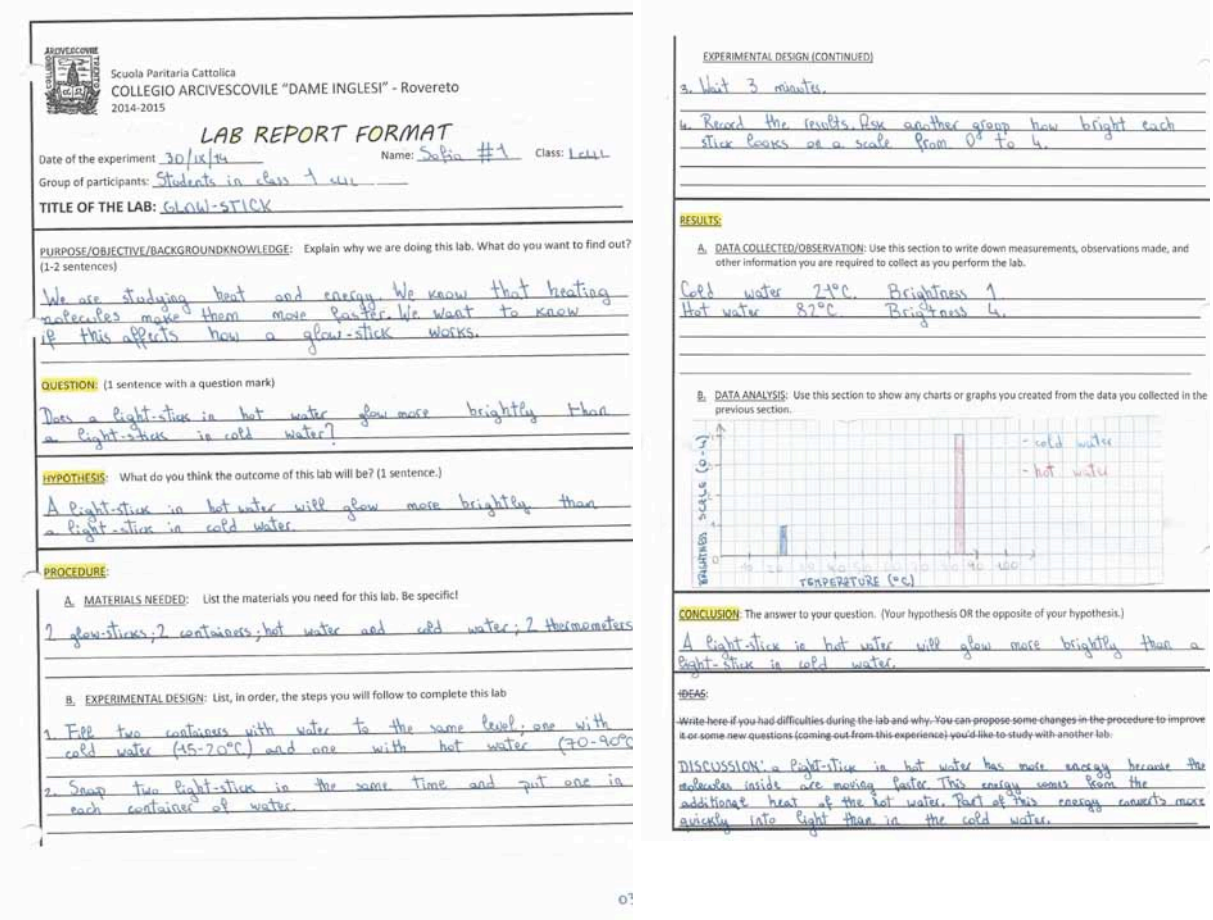
The structured teaching of the scientific method is an excellent opportunity to reach some of the most important goals in teaching in general, and in particular for CLIL. Both lower order and higher order thinking skills are required and as a result many cognitive skills are developed.

A wide range of educational tools are available to effectively support the students in learning science in a non-native language. Among these the authors adopt teachers' slides presented on an interactive whiteboard, selected educational videos, student's notebooks, worksheets and structured lab report forms. These tools represent an advanced container, which then needs to be matched with an adequately stimulating subject.

According to the scientific method, the first crucial step is to define the research question. This requires predicting, hypothesizing, reasoning and creative thinking skills. Activities that the authors apply include brainstorming, pyramidal discussion and group discussion. These approaches give students the opportunity to improve communicative competences as well as their scientific skills.

The pupils make use of standardized English structure to pose their research questions. They discuss what their questions are before writing them on the lab report (Figure 4). At the beginning of the school year the students are guided in formulating questions, and then later they use what they learned as a model. Collaborative work is encouraged and with teacher guidance natural scaffolding is a result.

Whenever possible, the authors ask the students to pose a research question with a dichotomous answer. From the scientific point of view, this implies that they need to clearly identify the goal of the experimental activity, focusing on one variable. This approach facilitates L2 production, since the linguistic scaffold used in the research question can be adopted in affirmative form both in formulating the hypothesis and in the final conclusion.



Scuola Paritaria Cattolica
COLLEGIO ARCIVESCOVILE "DAME INGLESI" - Rovereto
2014-2015

LAB REPORT FORMAT

Date of the experiment 30/12/14 Name: Sofia #1 Class: LcLL
Group of participants: Students in class 1 LcLL
TITLE OF THE LAB: GLOW-STICK

PURPOSE/OBJECTIVE/BACKGROUNDKNOWLEDGE: Explain why we are doing this lab. What do you want to find out? (1-2 sentences)

We are studying heat and energy. We know that heating molecules make them move faster. We want to know if this affects how a glow-stick works.

QUESTION: (1 sentence with a question mark)

Does a light-stick in hot water glow more brightly than a light-stick in cold water?

HYPOTHESIS: What do you think the outcome of this lab will be? (1 sentence.)

A light-stick in hot water will glow more brightly than a light-stick in cold water.

PROCEDURE:

A. MATERIALS NEEDED: List the materials you need for this lab. Be specific!

2 glow-sticks; 2 containers; hot water and cold water; 2 thermometers

B. EXPERIMENTAL DESIGN: List, in order, the steps you will follow to complete this lab

1. Fill two containers with water to the same level; one with cold water (15-20°C) and one with hot water (70-90°C
2. Snap two light-sticks in the same time and put one in each container of water.

EXPERIMENTAL DESIGN (CONTINUED)

3. Wait 3 minutes.
4. Record the results. Ask another group how bright each stick looks on a scale from 0 to 4.

RESULTS:

A. DATA COLLECTED/OBSERVATION: Use this section to write down measurements, observations made, and other information you are required to collect as you perform the lab.

Cold water 21°C. Brightness 1
Hot water 82°C. Brightness 4.

B. DATA ANALYSIS: Use this section to show any charts or graphs you created from the data you collected in the previous section.

CONCLUSION: The answer to your question. (Your hypothesis OR the opposite of your hypothesis.)

A light-stick in hot water will glow more brightly than a light-stick in cold water.

IDEAS:

~~Write here if you had difficulties during the lab and why. You can propose some changes in the procedure to improve it or some new questions (coming out from this experience) you'd like to study with another lab.~~

DISCUSSION: a light-stick in hot water has more energy because the molecules inside are moving faster. This energy comes from the additionage heat of the hot water. Part of this energy converts more quickly into light than in the cold water.

Figure 4. Lab report

The second step is the formulation of the hypothesis. This requires predicting, comparing and contrasting, hypothesizing and applying reasoning skills. Usually each student decides his/her own hypothesis and writes it on the form. This approach gives students an opportunity to improve their autonomy in interpreting information, inferring from the context and writing in L2.

With the hypothesis in mind, students are next asked to formalize a procedure by which to test it, detailing the steps needed to execute it. This requires thought ordering and planning, learning words for lab tools and materials, and encourages creative thinking and analytical reasoning skills. Usually the authors guide the discussion and supervise the realization of the experience. In this phase the pupils cooperate with each other in observing phenomena, measuring and double checking measurements before collecting and handling data.

The next step is the data analysis, involving information organization, interpretation and problem solving skills. Often teachers require the students to summarize and present the results visually. This graphic representation allows students to internalize their knowledge irrespective of the linguistic competences and ability.

After examining the data, the students are required to formulate conclusions supported by the results they obtained. This phase implies summarizing abilities, but also critical appraisal. For non-native speaking students this is probably the most demanding task of the entire process. Group work is encouraged to help them formulate and write conclusions in

L2. The teachers periodically collect pupils' notebooks, giving written feedback and suggestions for improvements.

Finally, after the completion of the steps composing the scientific method, for homework the students are required to review the lab experience and fill an “ideas” section, in which they need to evaluate their work and discuss difficulties they had. This meta-analysis helps them to build effective learning strategies. Students are also required to propose alternative experiments to answer the same research question or, alternatively, to write new research questions solicited by the same experience. They are also asked to identify possible real world applications of the observed phenomena as part of their conclusions. These ideas are discussed with the whole class in subsequent lessons.

Research activity requires team work. Developing lab experiences at school following the scientific approach stimulates students' enthusiasm and encourages them to work cooperatively in heterogeneous groups. In this context students have the opportunity to contribute to, and learn from others learning strengths. The study of the scientific method not only represents content knowledge, but also allows its solidification in the context of the development of fundamental research and thinking skills.

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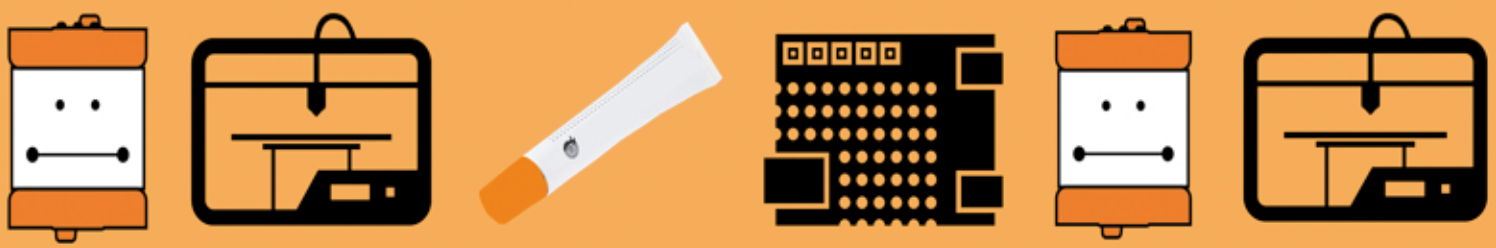

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BILINGUAL LEARNING

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IN SECONDARY EDUCATION

THE LIGHT ACADEMY

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Abstract: THE LIGHT ACADEMY is a CLIL course in physical optics designed for students with a B2 language skill attending the 4th year of secondary school. The global aim of the project - helping students to understand and discuss light waves in English - has been achieved by implementing a sequence of steps spanning from the initial scaffolding activities on the content obligatory language to student-centered activities aimed at enhancing receptive and productive abilities and collaborative skills using ICT.

The Light Academy is a two-month CLIL module offering a complete course in physical optics; it was designed for students with a B2 language skill attending the 4th year of the Liceo Scientifico LEONARDO DA VINCI in Milan.

When and where?

The complete unit took around 27 hours of teaching and school work between December 2015 and March 2016, 18 hours of homework done by the students and 40 hours done by the teacher for the selection and adaptation of texts and materials and the setting up of the teaching activities and tasks

It culminated in project group work that involved writing, speaking and listening language skills as well as a deep understanding of the subject from the scientific point of view, which can be viewed at the following link https://www.tes.com/lessons/ZwHbe7C7otN-uQ/group-work-on-light-waves, and a final project focused on writing skills and visual literacy that required the ability to synthesize the content of the unit by producing a unique communication in the form of an infographic: https://lsdavincimilano.padlet.org/topaina/zrdn9a7u0vf0.

Who and why?

The implementation of CLIL methodology in Italian schools is new, and it is mandatory in the fifth and last year of our high school only, so I was well aware that I could meet some resistance from my fourth year students, as working in L2 would make our curricular Physics course significantly more demanding.

Thus, before starting the project, I involved both the students and their families, highlighting that the CLIL approach not only promotes linguistic competence, but it also stimulates cognitive flexibility, helping learners in advancing towards a more sophisticated level of learning. It would therefore be an interesting and useful occasion for intellectual growth; in addition to that, in the wrap-up activity, I drew everybody in again, sharing the poll to vote for the best infographic http://www.tricider.com/admin/3DCNwNMHHfx/2pjpriPjX3Z .

Things were made easier by the fact that I have been teaching mathematics and physics to this class group since their first year of high school, and they are not new to a bilingual approach: in fact, since the very beginning of their first year I have used educational videos and written material in the L2 during my non-CLIL lessons to this class, with the intent of building up a bilingual culture aimed at empowering both the content and the language awareness of the pupils through the whole span of the five years of study, although it was still hard to get students to communicate in English

between themselves, even if I kept encouraging them to do so, focusing on fluency more than on accuracy and sticking to English myself during our classroom activities.

How?

The structure of the project was conceived and planned with the purpose of accompanying pupils from the construction of the new vocabulary concerning light waves to the understanding of the 18th, 19th and 20th century discoveries about light, discussing the significance of those discoveries in the history of Physics and relating them to other contexts and disciplines. The project involved the use of scaffolding and self-checking activities, interactive videos, gap filling worksheets, cloze tests, cooperative working and learning by doing strategies. Students were thus led gradually from the initial labelling task to a complete group project about a chosen topic that involved written and oral exposition.

Throughout the whole unit, lecture-style teaching was mainly substituted by student centered activities and Task Based Learning using ICT: whenever possible students worked in pairs or groups of four to solve a particular task explained by the teacher, in order to elicit communication and discussion among peers and between students and teacher as well as to develop the transversal key competences recommended by the European Commission.

The biggest challenge in the set-up of the project was the production of meaningful materials dealing with the subject with the adequate depth – as English and US existing high school textbooks do not go deeply enough into the subject – to guarantee that learners reach the equivalent academic standards in CLIL that they would have achieved in their first language. The entire project was rewarded by very comforting final feedback from the students, who reckoned that the CLIL experience was useful and empowering from a scientific and a linguistic point of view.

To sum up, the cognitive aims of this unit are:

- Learn the physics of light waves
- Learn the history of the measurement of the speed of light
- Be aware of the debate about the nature of light
- Learn to solve problems on light waves phenomena

The outcomes

- Find out/discover: specific lexis about light waves
- Recognize: waves and particle behaviour in light
- Comprehension: Equations describing light waves phenomena
- Synthesis: Wave-particle duality

And the linguistics aims are:

- Learn the vocabulary to describe light waves phenomena appropriately
- Learn to understand and discuss about light waves in English

A detailed list of the Teaching-Learning activities, complete with the resources used in the project can be found at this link http://v.gd/OvuVer. Examples of the material prepared using Quizlet are provided here:

Quizlet

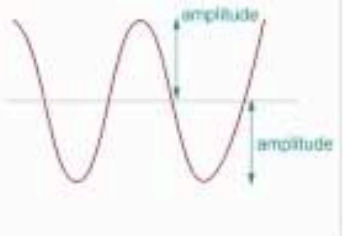
THE LIGHT ACADEMY

Study online at quizlet.com/_[illegible]

1. **Absorption**

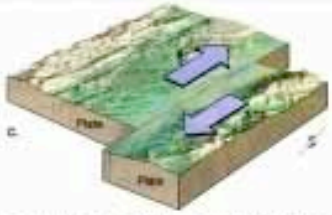
A phenomenon which occurs when a ray of light strikes a surface. The energy from the light is transferred to the surface material. The transfer creates heat.

2. **Amplitude**



The maximum amount of displacement of a wave's particle from its rest position. It is also connected to the amount of energy carried by a wave. A high energy wave is characterized by a high xxx; a low energy wave is characterized by a low xxx

3. **Boundary**



It is a line which marks the limits of an area; related to light it is the perpendicular to the normal and it divides two mediums

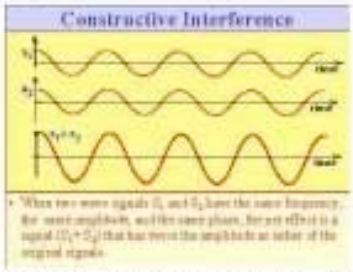
4. **Brightness**

The luminance of a body, apart from its hue or saturation, that an observer uses to determine the comparative luminance of another body. Pure white has the maximum xxx, and pure black the minimum xxx.

5. **Colour**

Property of a light wave determined by the frequency of the electromagnetic radiation

6. **Constructive (interference)**



This event happens when two light waves superpose with each other in a way that the crest of one wave falls on the crest of the second wave, and trough of one wave falls on the trough of the second wave (the resultant wave has larger amplitude).
By this event there are 2 effects:
•two waves of light reinforce each other
•a bright fringe is obtained on the screen

Figure 1. Example of quizlet activities for teaching about light

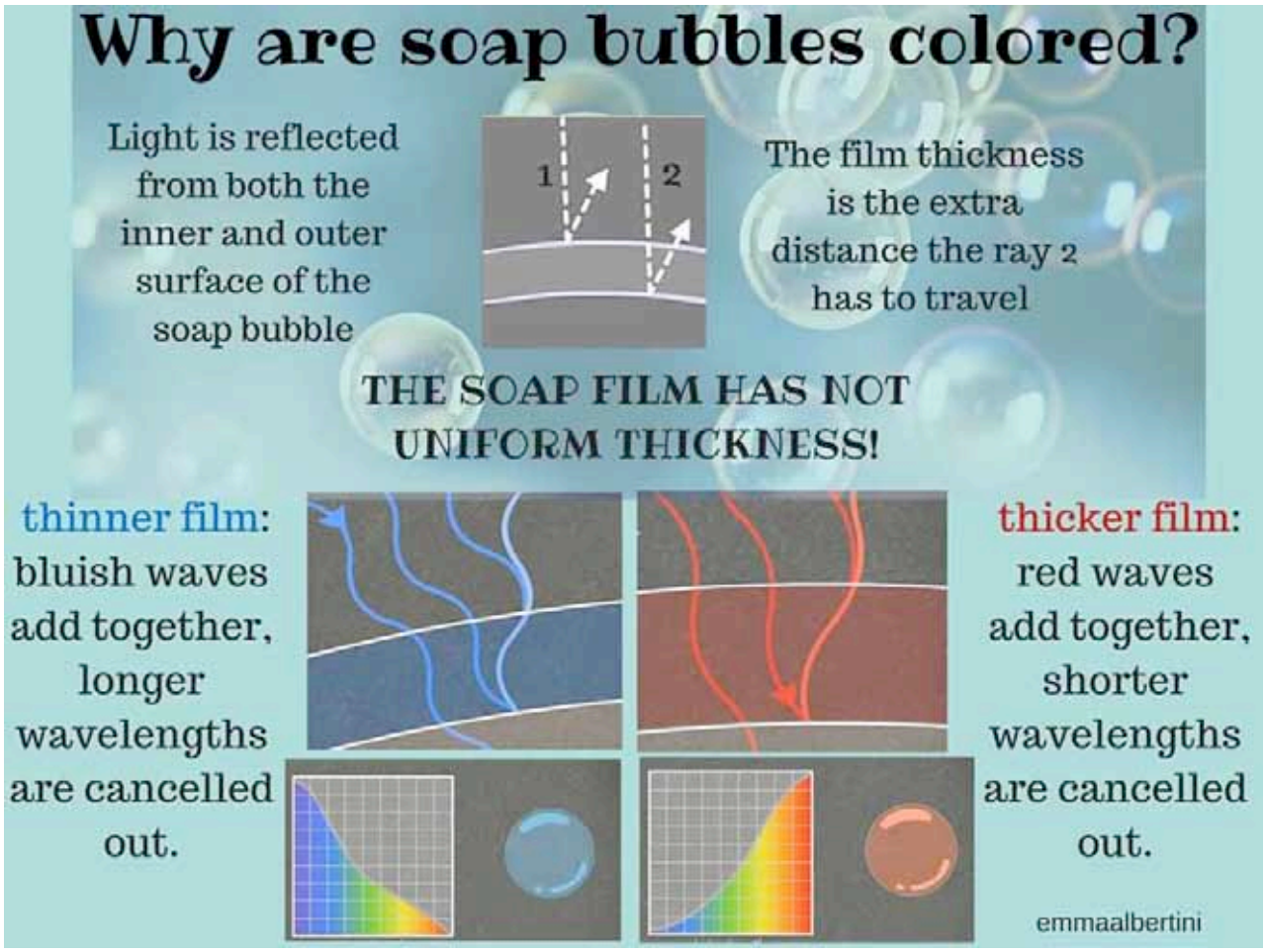


Figure 2. Example of visual material used to teach about light

The main steps we used in our module are as follows:

- **Building the language**: scaffolding activities to share the content obligatory language in terms of keywords and phrases with the appropriate pronunciation using videos, crosswords and online flashcards

CONTENT: BUILDING THE VOCABULARY
LANGUAGE: LISTENING, READING & READING ALOUD, WRITING
5 hours school work + 3 hours homework

- **Introducing the concepts**: hands on activities and tasks with materials created or adapted by the teacher: the activities are progressive in subject content and cognitive demand, supportive and varied in required skills.

CONTENT: REFLECTION, REFRACTION AND HUYGENS' PRINCIPLE
LANGUAGE: LISTENING, READING, WRITING, SPEAKING
2 hours schoolwork + 2 hours homework

CONTENT: DIFFRACTION AND INTERFERENCE – DOUBLE AND SINGLE SLIT DIFFRACTION, THIN FILM INTERFERENCE
LANGUAGE: READING, WRITING, LISTENING, SPEAKING
7 hours schoolwork+ 5 hours homework

- **Fostering confidence and promoting enquiry**: students centered activities aimed at enhancing receptive and productive abilities and collaborative skills.

CONTENT: GROUP WORKS ON OTHER LIGHT PHENOMENA - POISSON'S SPOT, POLARIZATION AND DOPPLER EFFECT
LANGUAGE: READING, WRITING, LISTENING, SPEAKING
4 hours schoolwork + 4 hours homework

CONTENT: THE HISTORY OF THE MEASUREMENT OF THE SPEED OF LIGHT
LANGUAGE: READING, WRITING, LISTENING, SPEAKING
3 hours schoolwork + 1 hour homework

CONTENT: THE DEBATE ABOUT THE NATURE OF LIGHT
LANGUAGE: READING, WRITING, LISTENING, SPEAKING
3 hours schoolwork + 1 hour homework

- **Wrap-up activities**: final activities aimed at helping students synthesize what they have learnt.

CLOSING ACTIVITIES: FINAL TEST AND INFOGRAPHICS
LANGUAGE: READING, WRITING, LISTENING, SPEAKING
3 hours schoolwork + 2 hours homework

Throughout the whole unit, I have monitored the students' comprehension about the topic and the language skills and awareness by the means of specific tasks aimed at

- ASSESSING UNDERSTANDING
- ASSESSING LANGUAGE SKILLS

Concerning the assessment of language skills, cooperation with the language teacher was sporadic and not very helpful: the linguistic review was delivered as a separate grade by the language teacher only in the first written assignment, but it boiled down to a mere confirmation of the grades already stated by the subject teacher and therefore was not very effective, so I resolved on grading all further assignments on my own, taking both content and language into account – with the due proportions – in order to produce the final marks, I assessed my students both formally and informally with a variety of different tasks and assignments during the whole unit aimed at offering each pupil the possibility to gain good grades that reflected his or her personal development.

Some of the students thought that there were too many grades, but this system meant that I had the possibility to keep an eye on their understanding throughout the module and at the end of it the average grade was positive for the whole class group: overall a very encouraging experience which lays solid foundations for the CLIL activities due in the next fifth year.

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PLURILITERACIES – MAPPING DEEP LEARNING PROGRESSIONS INTO CLIL STEM LEARNING

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Abstract: Pluriliteracies Teaching for Learning (PTL) constitutes a relatively recent development in CLIL. PTL provides pathways for deep learning across languages, disciplines and cultures by focusing on the development of subject specific literacies. Students become pluriliterate by actively engaging in subject specific ways of constructing knowledge and languaging their understanding at an adequate and increasingly complex level. We will discuss how such learning progressions can be designed by using the Pluriliteracies Approach to Teaching for Learning and introduce a research design that aims at assessing students' progress into the disciplines.

Learning demands have undergone a significant shift in the wake of globalization and digitalization and the impact of these processes on our societies. As knowledge workers, students have to collaborate in international teams and communicate their knowledge successfully in multimodal ways across subject-, language- and culture barriers. In order to do so, they need to master secondary discourse in more than one language (Meyer et al., 2015, p. 52) and thus become pluriliterate. As thinking, acting and talking like an expert of a specific field can only be learned in the respective subject, those discourse functions should be taught explicitly in school. Besides the language aspect, a growing need for higher order thinking skills or *21st century skills* (Pellegrino & Hilton, 2012, p. 1) arises as cognitive less demanding tasks are mostly carried out by computers. Rote learning of isolated facts consequently has to be replaced by conceptualized and internalized knowledge as well as automatized and subject specific skills, strategies and procedures. 21st century skills need to be easily retrieved and performed in order to enable knowledge transfer and thus deeper learning.

Deeper learning has been defined as "the process through which an individual becomes capable of taking what was learned in one situation and applying it to new situations (i.e., transfer)" (Pellegrino & Hilton, 2012, p. 5). This kind of learning rests, according to Meyer et al. (2015), on the acquisition of disciplinary literacies which in turn only develop when learners actively engage in subject specific ways of constructing knowledge. These subject specific ways of knowledge construction could for example be the performance of an experiment in chemistry or an analysis of climate graphs in geography. After 'doing' something by actively engaging in the act of knowledge construction, the verbalization of content needs to follow as the produced *meaning making potential* (Byrnes, 2013, p. 95; Ryshina-Pankova, 2013, p. 179) can only get internalized and made transferable through the process of *languaging* (Swain, 2006, p. 95). Therefore, further necessary steps in the learning process are organizing, explaining and arguing. As every single one of those four dimensions corresponds to a genre, students need to be taught to communicate their knowledge accordingly. Only those concepts which can be articulated appropriately and in an increasingly complex and subject adequate manner are truly understood and can eventually be transferred. Like a two sided coin, cognitive discourse functions (CDFs) fulfill two crucial tasks, namely knowledge construction and knowledge communication, both being of equal importance and indispensable for deeper learning.

Pluriliteracies Teaching for Learning (PTL) – a relatively recent development in Content and Language Integrated Learning (CLIL) – provides a pathway for mapping these deep learning

progressions across languages, disciplines and cultures by focusing on the development of disciplinary literacies. Accordingly, as knowledge and skills develop through experience and practice from the concrete to the abstract, learners will be able to process content at an increasingly complex level and communicate their understanding through increasingly sophisticated text types or genres. Sophistication of genres results from a better command of CDFs and the ability to language increasingly complex patterns as they move from a simple explanation pattern to a more advanced/complex one. Advanced learners, or pluriliterate experts, can move along both conceptualizing and communicating continua depending on the situation (compare image 1). They "'language' subject-specific concepts and knowledge in an appropriate style using appropriate genre moves for the specific purpose of communication in a range of modes" (Meyer et al., 2015, p. 52).

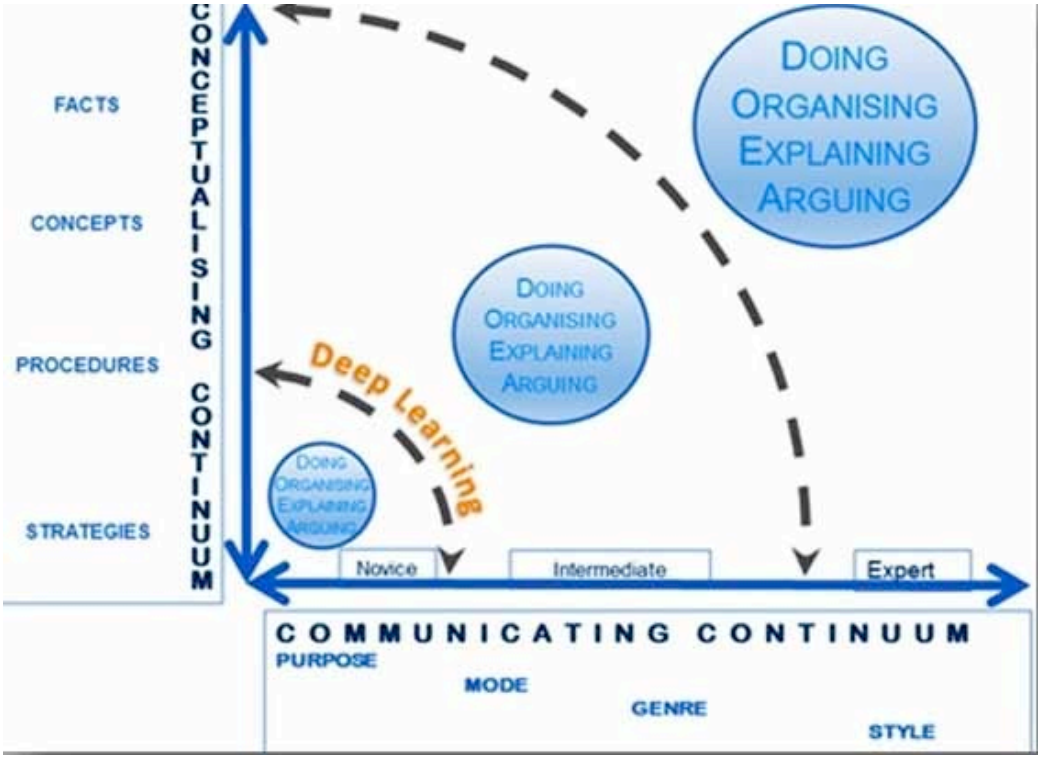


Image 1. Conceptualising and communicating continua

Practically speaking, academic language can be mapped by breaking down macro genres (like a lab report) into their sub-components or micro genres (CDFs like describing, explaining, defining, interpreting,…) which in turn can be scaled up or down according to the breadth and depth of the underlying concept. CDFs are the "zone of convergence as the cognitive processes involving subject-specific facts, concepts and categories are verbalized in recurring and patterned ways during the event of co-creating knowledge in the classroom" (Dalton-Puffer, 2013, p. 216). Their potential in fostering deep learning lies in flexible "schemata (discoursal, lexical and grammatical) for coping with standard situations in dealing with the task of building knowledge and making it intersubjectively accessible" (Dalton-Puffer, 2013, p. 231). Thereby, the learners' proficiency can range from a novice to an expert level.

In order to boost students' learning outcomes from such a beginning to an advanced level, explicit teaching is crucial for language learning (Rose & Martin, 2012; Dalton-Puffer, 2013) and should happen as spiral learning. Academic language "has never been anyone's mother tongue" (Bourdieu & Passeron, 1990, pp. 115–116 quoted. in Aull, 2015, pp. 59-60) and "writing abilities [do not] develop naturally and on their own" (Byrnes, 2013, p. 96). For many students, classroom interaction is the only opportunity to get in touch with academic

language and teachers should thus serve as a role model. Research shows that deep learning is possible as early as preschool if scaffolded correctly (Pellegrino & Hilton, 2012, p. 161). Also, academic language learning does not presuppose proficient acquisition of basic language skills but "learners may be expanding their CALP [Cognitive Academic Language Proficiency] more quickly than their skills in everyday interpersonal communication" (Dalton-Puffer, 2013, p. 226).

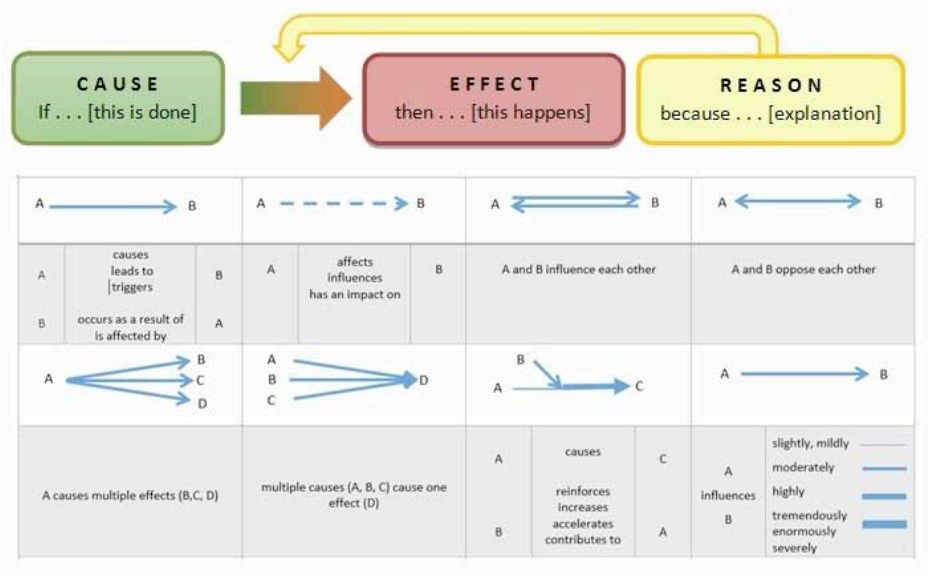


Image 2. Cause, effect and reason

The aim of the present study is to show ways of explicit and subject specific language teaching in bilingual chemistry classes (compare image 2 and 3) followed by an assessment of language and content development. The great potential of bilingual chemistry education to foster deep learning is based on its hands-on activities and a highly scientific discourse which students can easily distinguish from everyday language. Typical cognitive discourse functions are for instance observing, describing, explaining, defining and interpreting. As mentioned earlier, those micro genres taken together build up the macro genre of a lab report. Irrespectively of the learner's proficiency level, such a lab report can in all cases be completed but differing in the level of sophistication. This is due to the fact that experts know more facts, have a deeper conceptual understanding and show a better command of subject specific procedures, skills and strategies. Even though novices only dispose of very limited resources, they can still formulate hypotheses like: *"If I do this. . . I think . . . is going to happen"*.

Figure 3. Teaching material for chemistry

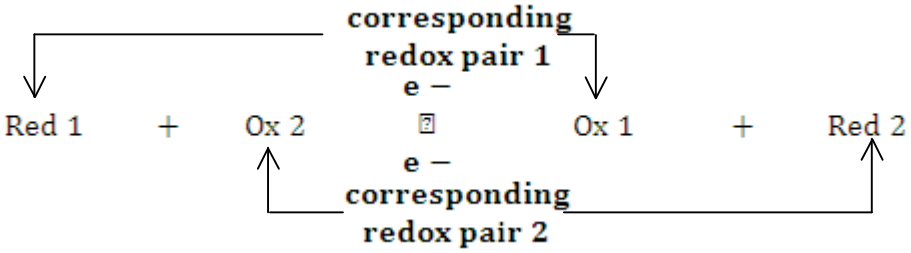
For a practical impression, two examples concerning different levels of definitions will be given as well as the effect of nominalizations described.

The first example shows definitions of redox reactions which are taught on three levels in German chemistry education. The recurring and patterned fashion of definitions would be *"A . . . is a . . . with the following characteristics. . . "*. Applying this structure to the topic gives the following results:

Novice: A combustion reaction with oxygen is called oxidation. The product is an oxide and heat is released.

equation: $\mathrm{X + oxygen \xrightarrow[\text{oxidation}]{\text{combustion}} X-oxide + heat}$

Advanced: A redox reaction is a chemical reaction of electron transfer changing the oxidation state of atoms, ions or molecules. Such reduction-oxidation reactions always consist of two corresponding half-reactions namely an oxidation and a reduction. During oxidation, an electron loss leads to an increase in oxidation state due to negatively charged electrons. Electron donors function as reducing agents as they are able to reduce other substances by getting themselves oxidized. Reduction reactions are processes, during which the electron acceptor or oxidizing agent gains electrons, gets itself reduced and oxidizes its reaction partner. As a result of this electron transfer, the reducing agent turns into its corresponding oxidizing agent and vice versa forming a corresponding redox pair. Electron loss and gain are always coupled and can be reversed.
equation:



The second example elucidates the increasing complexity of explanations through the process of nominalizations. Explanations transform words from the everyday- to the scientific field and thus create knowledge (Rose and Martin, 2012). This generation process can be seen in the following example:

Novice: If I eat too much chocolate, I will get fat.
Expert: Excess chocolate consumption causes weight gain.

To prevent empty jargon behind which students could easily hide, scientific terms also need to be paraphrased into everyday language by "de-nominalising" (Rose & Martin, 2012, p. 195) them. This exercise could be understood as an inward movement on the communicating continuum. As learning progression takes place, students can apply CDFs more flexible. A more advanced version of *A causes B* could look like the following explanation about the reaction of sodium in water:

> ...Because the reaction is exothermic, a lot of heat is released. The effect is that the reaction speed increases and thus more and more hydrogen is formed and heated up. Once a critical point is reached, the highly flammable hydrogen gas ignites itself and

causes yellow sparks and popping noises known from the glowing splint test. Due to this burning hydrogen, even more heat is generated which again causes the sodium to burn with its characteristic yellow flame. Eventually the temperature reaches a maximum and the metal explodes...

For further information on Pluriliteracies Teaching for Learning (PLT) including explanatory videos, sample material and theoretical information, visit the following website:
http://pluriliteracies.ecml.at/en-us/

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FROM LOTS TO HOTS
IN THE SCIENCE SPEAKING CLASS

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Abstract: Many times the spoken language produced by our students is quite simple and it only involves the use of Lower Order Thinking Skills. How can we develop students' communicative skills and move from using Lower Order Thinking Skills (LOTS) to using Higher Order Thinking Skills (HOTS)? In this seminar we will see what the teacher can do to help students produce more complex language in the science classroom.

Introduction

One of the core assumptions of CLIL (Content Language Integrated Learning) programmes is that "in a CLIL curriculum, learning is a process of progress from simple information processing to more advanced thinking skills" (Muszynska, 2013). This is true for all the different skills involved in the learning process...or is it? One of the guiding principles of CLIL is that communication in this kind of programmes "involves learners in language using in a way which is different from language learning lessons" (Coyle, 2010). Teachers frequently find developing students' speaking skills challenging and one of the main challenges they face is to promote their HOTS (Higher Order Thinking Skills) in speaking activities.

What can teachers do to develop students' speaking skills and make their speech more complex? According to Coyle CLIL teachers need to explore the kind of thinking skills they can develop. Key to this is the kind of questions teachers should ask to "go beyond display questions" and to get answers that go beyond simple sentences. I believe there are some basic strategies and tasks widely used in EFL contexts that can be transferred to CLIL settings and that, together with CLIL teaching techniques, teachers could use to encourage Higher Order Thinking Skills.

Strategies

1) **Task repetition.** Bygate suggests that the more familiar the students with the content the more attention they will pay to how they express meaning. The immediate consequence is that if students get an opportunity to repeat a task they will be better able to use Higher Order Skills. Task repetition will give students an opportunity to rehearse their language and therefore help them produce more complex utterances and make fewer errors.

2) **Thinking time (wait time).** When it comes to producing language one of the most important factors is thinking time. It is generally easier for a student to produce an extended answer if they have time to think about what they are going to say and what language they are going to use. Too many times teachers expect students to answer complex questions on the spot and that time pressure makes students produce lower quality language.

3) **Planning and rehearsal time**. "Generally, the more time to prepare, the easier the task will be" (Thornbury, 2005). If teachers want students to answer higher order questions, they need to make notes and rehearse what they are going to say. One way of doing this is to let students do the task in pairs or groups before doing it in front of everyone else.

4) **Collaborative tasks**. Giving students an opportunity to use language in meaningful contexts and different group settings will help them communicate more freely and will give weaker

students an opportunity to have a go at the new language without feeling the pressure of an open class task setting.

Questions

According to the revised Bloom's Taxonomy the cognitive process dimensions consists of six levels: remember, understand, apply, analyse, evaluate and create. The questions teachers ask in the classroom will shape these levels and for that reason they need to reflect on the type of questions they ask in class. Depending on the questions asked teachers will encourage the use of HOTS, such as hypothesising, or the use of LOTS, such as remembering. Indeed, teachers should choose from a variety of questions that will prompt students to simply organise information (e.g. by using *what, where, which, who* questions) or questions that will make them use more abstract skills (e.g. by using *why, how would/could you* and *what if* questions). As Harmer puts it, "LOTS give us answers to the question *What?* but HOTS are more interested in *Why?*".

When we ask our students "why?" and encourage them to question the texts and topics they come across, we are not only promoting greater autonomy of thought and action, but actively encouraging "critical thinking" (Harmer, 2015).

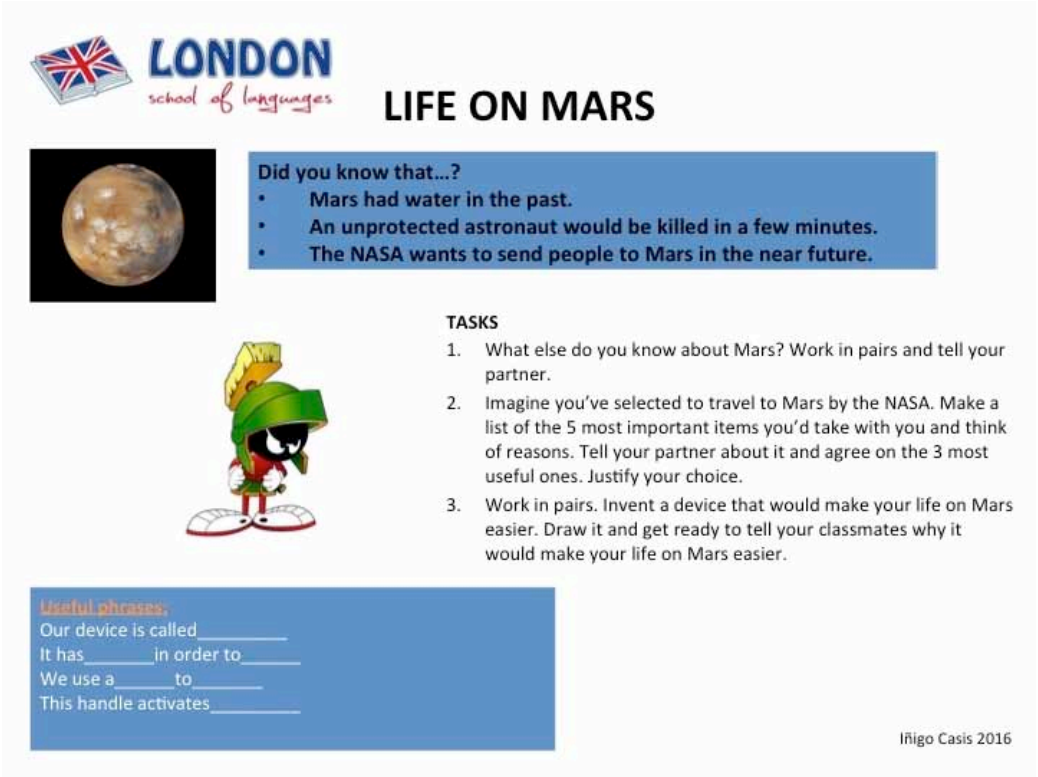

Figure 1. Moving from LOTS to HOTS

Language support

One of the basic assumptions of CLIL is that students acquire language through scaffolding and through learning functional language rather than from explicit language instruction. CLIL's main focus is subject language and therefore it is the teacher's responsibility to provide the students with the language necessary to express their ideas, hypothesise, draw conclusions, exemplify, etc. The

more available this language the more easily students will use it. "At level of formulation, automaticity is partly achieved through the use of prefabricated chunks" (Thornbury, 2005). It seems, in fact, that if students can focus more on *what* they say rather than *how* they say it they will be more able to focus their thinking skills on more critical language production. This means that it is essential to support students' language by facilitating the acquisition of lots of sentence frames (e.g. *the diagram shows..., they look as if they are...*). An example of this would be the language needed by students to answer questions like *How would you define...?* or *What do you call a...?* and that would include sentences like *a X is ... which you use for + -ing*.

Another way of giving language support in CLIL contexts is to use substitution tables. "Providing content and language support strategies which are appropriate but temporary is very important. For example, writing a substitution table on the board to support skills of expressing purpose" (Cambridge English, 2011).

Conclusion

It is suggested that learners should focus on the cognitive objectives but it is also important that they are able to communicate the knowledge acquired in the classroom. Students might find it difficult to express complex ideas in the CLIL classroom, not only because they have to do it by using a language that is not their L1 but also because of the complexity of the content involved: "especially in science subjects, learners have to answer higher order thinking questions at an early stage of learning curricular content" (Cambridge English, 2011).

Teachers play a major role in the development of these higher order skills and they need to be aware of the different questions they can use in class to promote them, progressively demanding more and helping students cope with the challenges involved in speaking about complex content in a foreign language. As Doyle et al. put it, "leaving these skills to develop by chance is not an option" (2010).

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INTEGRATING PRONUNCIATION INSTRUCTION INTO CLIL SCIENCE AND TECHNOLOGY LESSONS

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Abstract: The huge number of families in Spain wanting their children to achieve a good command of the English language, and also the students' desire to acquire a high level of accuracy and fluency in English is the main reason why CLIL programs have experienced a great demand, since they were set up a few years ago. Nevertheless, some people consider that the most salient problem in a CLIL classroom is perhaps problematic pronunciation, for both teachers and learners. We claim that it is possible to help our students to deliver an intelligible discourse in the CLIL classroom, through achieving greater fluency and more accurate pronunciation. In this paper, we propose some suggestions and ideas on how the integration of specific pronunciation instruction into CLIL Science or Technology lessons could be done, which, in our view, might contribute to the promotion of our students' and teachers' communicative competence.

1. Introduction

We all know that the first impression an interlocutor makes may depend on how good his or her pronunciation is. Learners who show better pronunciation skills have more opportunities to communicate with other English speakers, are seen as being more competent, and are given more job opportunities. In contrast, if speakers do not show good pronunciation abilities, their speech may not be intelligible enough to the listeners, no matter how well the speaker masters English grammar and vocabulary.

In second language learning, pronunciation is often is a serious obstacle for intelligibility, and the same problem also happens in the CLIL classroom. In general, our students should improve their pronunciation and produce their utterances more clearly to be understood when they speak, and also to be able to understand what others are saying.

Many students attending bilingual programs in Spain would like to achieve a near native accent in English. Although the teacher should actively encourage learners to set 'high' expectations in terms of pronunciation, for the majority of them, it seems that native like pronunciation could be an unrealistic goal. Perhaps, a more reasonable and realistic goal should be *comfortable intelligibility* (Kenworthy, 1992), according to which the non-native speaker can easily be understood, without necessarily displaying a near-native accent.

In spite of its importance for verbal communication, pronunciation instruction has lately been neglected in the English L2 classroom (Derwing & Munro, 2005), and it still seems to be the orphan in second language teaching. The unsystematic approach to pronunciation represents a serious problem for many learners, and proves ineffective to help them to deliver intelligible oral messages.

We claim that we must help our students to meet their pronunciation needs, and to achieve their goal to become more fluent and intelligible speakers in English. This help can be provided through integrating pronunciation instruction into CLIL lessons, which, in our case, means making pronunciation targets an inherent part of Science and Technology lessons.

In this paper, we propose some suggestions and ideas on how the integration of specific pronunciation instruction into the CLIL Science or Technology lessons can be done, which in our view, gives added value in terms of the promotion of our students' and teachers' intelligibility, and consequently of their communicative competence.

2. How can pronunciation be integrated into a CLIL lesson?

The Content and Language Integrated Learning (CLIL) methodology currently being used in our classrooms is, to certain extent, based on the same assumptions and perspectives as the Communicative Language Teaching (CLT) approach. Teachers see language learning as a process in which oral interaction between the learner and language users is crucial to produce meaning and to develop their communicative competence. This means that pronunciation, and consequently intelligibility, are crucial, in our Science and Technology lessons; but unfortunately the most frequent method we use in class to help our students to deal with their pronunciation problems is still the "listen and repeat" strategy, which has been demonstrated to be quite ineffective.

Scholars (e.g. Gilbert, 2001) have claimed that the best way to prevent mispronunciation and fossilization when learning English is to integrate pronunciation instruction right from the beginning into all kinds of classes.

In our case we adopt an *integrative-communicative approach* to include some pronunciation activities into Technology lessons. We mean a communicative approach, in the sense that teachers and learners pay more attention to intelligibility in spoken communication, and more attention is also paid to phonological forms, in the context of interactive communicative tasks.

The integrative aspect of our approach involves: a) teaching pronunciation features from the very beginning stages of learning, b) selecting contents and topics for pronunciation teaching that are useful, interesting and motivating to the learners, c) including specific tasks to raise awareness about pronunciation features d) explaining how to articulate the sounds, phonemes and prosodic features, e) motivating the learners to practice outside the classroom as much as they can, f) and providing feedback, guidance and assessment over their progress.

An excellent opportunity to integrate pronunciation instruction into CLIL lessons is the introduction of new vocabulary. When learning new words, students normally focus their attention on how the words are spelled, which gives the teacher an opportunity to also address patterns of pronunciation (Celce-Murcia et al., 2010). Teachers can point out challenging segments and lexical stress patterns in the new words and collocations. For example, they can explain how weak vowels are almost always pronounced as the schwa sound. This can be practised in micro-lessons, during oral activities, e.g. when students read aloud from a textbook or from their own essays and public presentations.

3. What does the CLIL teacher need to know?

One of the reasons why pronunciation instruction has been neglected in second language teaching is, in part, the teachers' lack of training in phonetics and pronunciation (Derwing & Munro, 2005), which means that they do not feel confident enough to help their students cope with pronunciation problems. Even though students in our CLIL classrooms ask for more instruction in pronunciation that is currently provided, generally speaking, teachers do not know what to do to help those students whose speech is unintelligible, apart from following the strategy of listen and repeat, which in many cases seems to be quite ineffective.

Understandably, teaching pronunciation in CLIL classrooms presents a considerable challenge. In order to provide effective support and help to learners, teachers need to receive knowledge and training in phonetics and pronunciation.

In particular, teachers need to know how vowels are described in terms of the tongue position, and depending on the relative tension of the muscles involved (tense or lax vowels). The most frequent vowel in English is the *schwa* sound /ə/. Learners should become familiar with this sound from the very beginning, and use it in real communication every day in class. Consonant sounds are another group of sounds teachers have to be able to describe in terms of place of articulation (where the sound is made), manner of articulation (how the sound is made) and voicing (if the vocal cords are vibrating).

But perhaps one of the most important dimensions of English that speakers use to convey meaning is *word stress,* also *called syllable stress* or *lexical stress*. Stressed syllables in a word are those longer, louder and higher in pitch. The other syllables are weaker. Teachers have to train their students to utter the stressed syllables slightly louder, making the vowel a little longer, and clearly pronouncing the surrounding consonants. Stress is crucial for intelligibility, and this is indeed a major problem for many students. The way we normally represent word stress is by upper and lower case letters, e.g.:

LA·bora·tory ; ve·LO·city

The rhythm of English is created by the alternation of stressed syllables and non-stressed syllables (Ehrlich & Avery, 2013). There is a tendency in English for the strong syllables to fall on content words (nouns, verbs, adjectives, and adverbs) and for the weak syllables to fall on function words (prepositions, articles, and pronouns) (Goodwin, 2001).

Native speakers normally speak faster than learners do in the classroom; they blend words together and change the sound of individual words in predictable ways. These are shortcuts that people use, not only in casual conversation, but also in a more academic context. They are an important feature of English rhythm that can represent a problem for learners. It is the teacher's task to train learners to produce long stretches of *connected speech* in a natural way; that will help them considerably to improve, both their intelligibility and their listening comprehension.

4. A framework for the integrating pronunciation into CLIL

Integration of pronunciation into the CLIL classes can be carried out in different ways. When the teacher designs a curriculum, the first step in the integration of pronunciation is setting realistic, limited goals in terms of intelligibility.

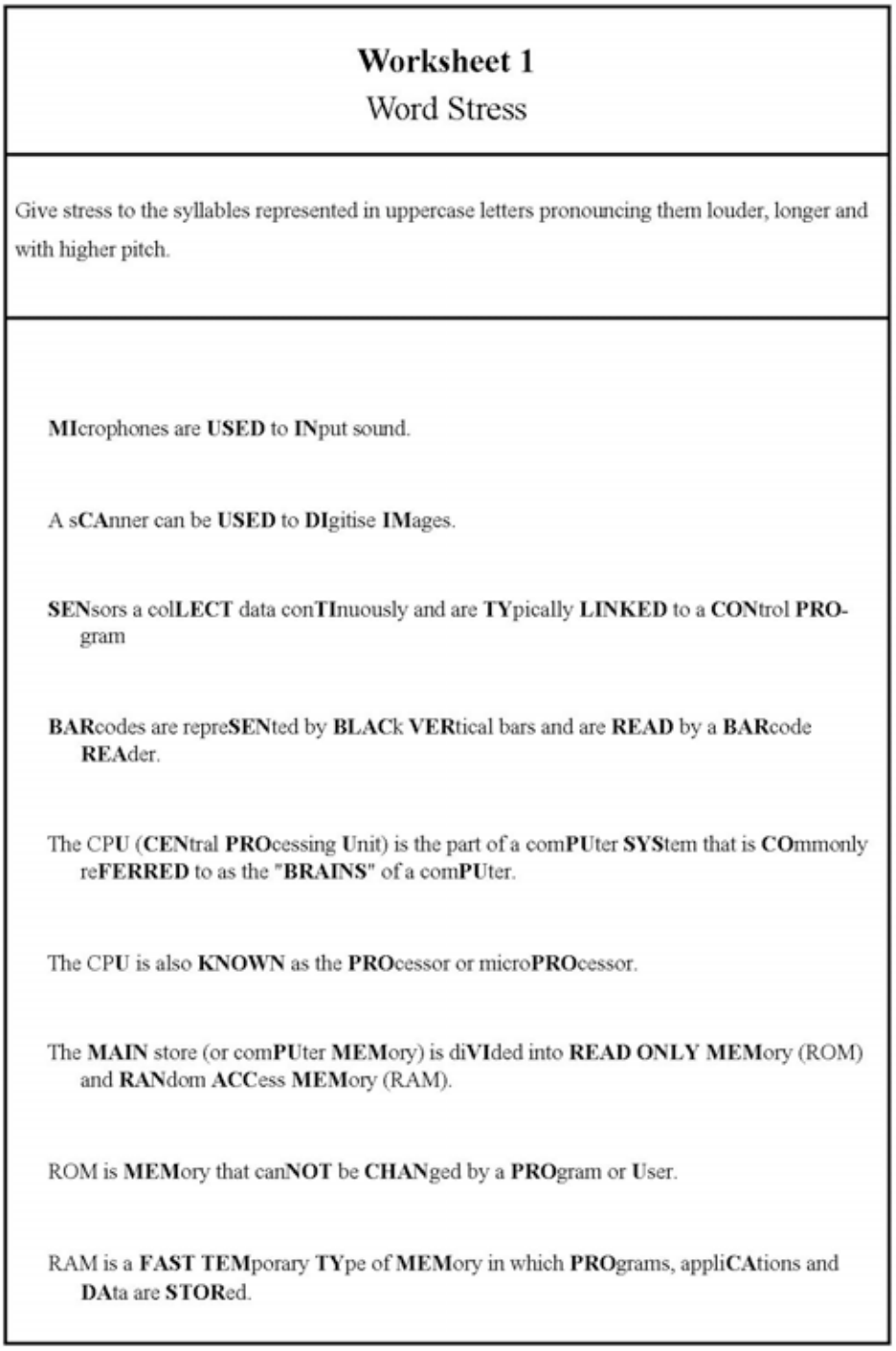
Pronunciation tips can be included in CLIL lessons, through the specific words that appear on the topic. As soon as learners show enough proficiency to formulate words and sentences, a new level based on prosodic features can be introduced. It is highly recommended that teachers should promote real life conversations in class. The teacher can create micro-lessons on pronunciation with the appearance of new vocabulary, giving information about how to properly articulate the sounds, and encouraging the students to repeat them, that those sounds can become easily automated.

Students need to learn which is the peak syllable when they find a new word, i.e., recognise the stress pattern of the word. Failure to notice a stress pattern not only affects intelligibility but can also hinder the ability to recognize the words in listening activities.

Given those considerations about English pronunciation, we will now outline a few examples of activities designed to work in CLIL lessons related to Science or Technology.

4.1 Practising stress patterns.

As we have previously discussed, both word and sentence stress are fundamental aspects of English pronunciation. Depending on the learners' needs, the teacher will have to work more on word stress or on sentence stress, although both are closely linked. Worksheet 1 shows exercises that can be used for practising this.



Worksheet 1

Word Stress

Give stress to the syllables represented in uppercase letters pronouncing them louder, longer and with higher pitch.

MIcrophones are **USED** to **IN**put sound.

A s**CA**nner can be **USED** to **DI**gitise **IM**ages.

SENsors a col**LECT** data con**TI**nuously and are **TY**pically **LINKED** to a **CON**trol **PRO**gram

BARcodes are repre**SEN**ted by **BLAC**k **VER**tical bars and are **READ** by a **BAR**code **REA**der.

The CP**U** (**CEN**tral **PRO**cessing **U**nit) is the part of a com**PU**ter **SYS**tem that is **CO**mmonly re**FERRED** to as the "**BRAINS**" of a com**PU**ter.

The CP**U** is also **KNOWN** as the **PRO**cessor or micro**PRO**cessor.

The **MAIN** store (or com**PU**ter **MEM**ory) is di**VI**ded into **READ ONLY MEM**ory (ROM) and **RAN**dom **ACC**ess **MEM**ory (RAM).

ROM is **MEM**ory that can**NOT** be **CHAN**ged by a **PRO**gram or **U**ser.

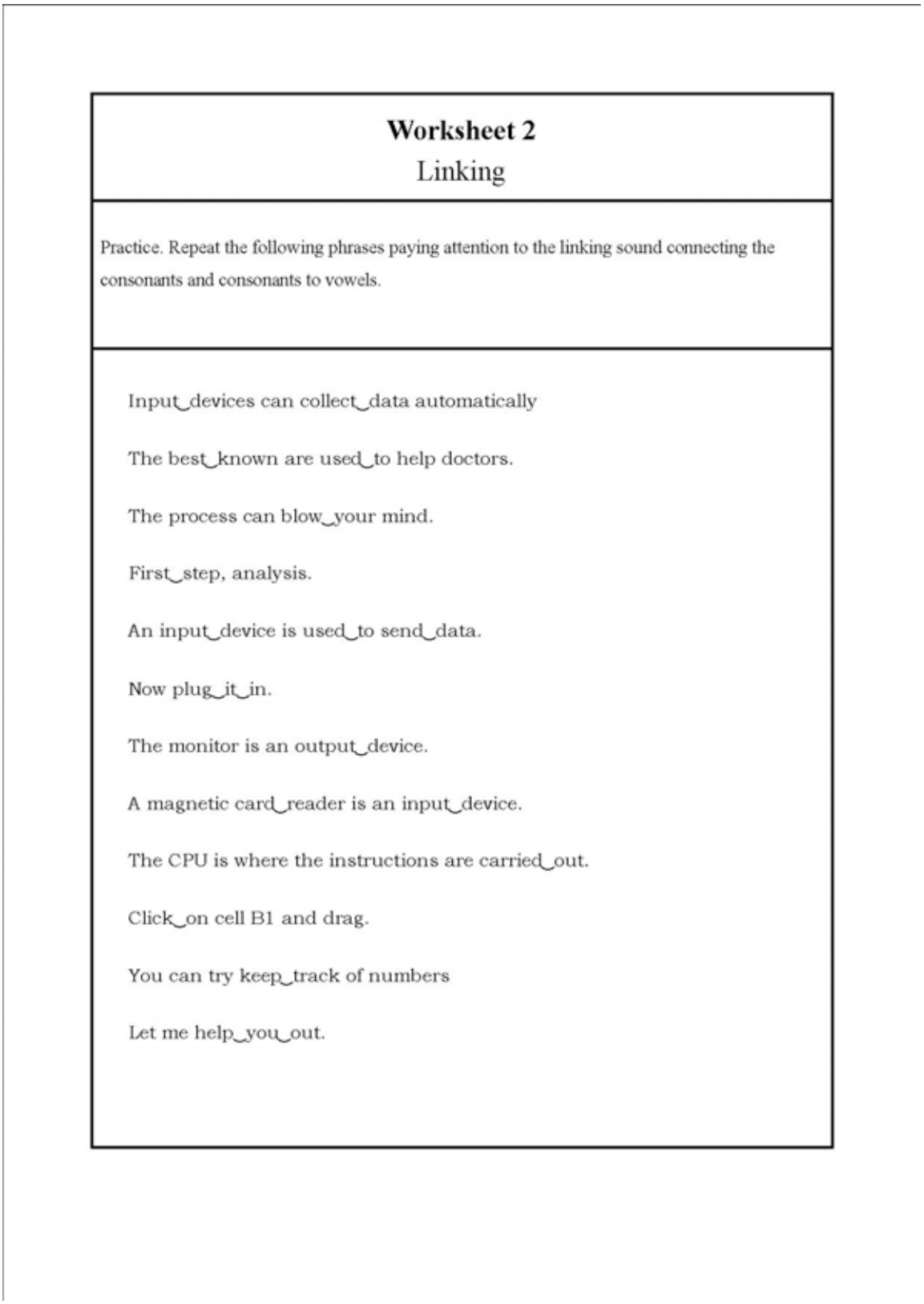
RAM is a **FAST TEM**porary **TY**pe of **MEM**ory in which **PRO**grams, appli**CA**tions and **DA**ta are **STOR**ed.

Worksheet 1. Exercises for practising stress patterns

4.2 Practising linking

Teaching connected speech represents a special challenge, especially if learners do not have many opportunities to interact with native speakers, and their ordinary teachers overarticulate in class with

the aim to facilitate comprehension. In worksheet 2 an exercise is presented to illustrate how connected speech can be practised in a CLIL lesson.



Worksheet 2

Linking

Practice. Repeat the following phrases paying attention to the linking sound connecting the consonants and consonants to vowels.

Input‿devices can collect‿data automatically

The best‿known are used‿to help doctors.

The process can blow‿your mind.

First‿step, analysis.

An input‿device is used‿to send‿data.

Now plug‿it‿in.

The monitor is an output‿device.

A magnetic card‿reader is an input‿device.

The CPU is where the instructions are carried‿out.

Click‿on cell B1 and drag.

You can try keep‿track of numbers

Let me help‿you‿out.

Worksheet 2. Exercises for practising linking

5 Conclusion

It is generally agreed that acquiring good pronunciation is a desirable goal for teachers and learners involved in CLIL projects. Although both would like to attain native-like pronunciation, it seems to be an unrealistic goal in most cases. A more realistic target would be to reach comfortable intelligibility.

In this paper we consider some suggestions and ideas that would be useful for teachers and learners to improve their English pronunciation, and gain confidence enough to speak clearly in normal communicative situations.

However, in the long term, we believe that it is important that teachers involved in CLIL programs should receive more training on phonetics and pronunciation teaching in order to be able to help their students master the individual sounds, rhythm and intonation of English, and consequently become comfortably intelligible speakers.

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TEACHER TRAINING FOR CLIL IN EUROPE

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Abstract: CLIL is without any doubt a top teaching and learning method with outstanding benefits for the learner and rewarding results for the teacher. Nevertheless, practitioners cannot be left alone in the challenge of teaching CLIL properly, and Teacher Training turns out to be at the core of effective and successful CLIL teaching and learning. Besides, just as CLIL adapts to all communities, so teacher training can be different depending on the geographical area where it takes place.

"The question of teacher training is massive and complex. It must be understood that this type of training does not happen overnight. It is a long process (…). It is important that the training is planned in a controlled and positive manner if CLIL is to be implemented successfully" (Hillyard, 2011).

Teacher training for CLIL in Europe

CLIL changes depending on the country where it takes place; so does teacher training. Different measures are taken in different countries in Europe. This brief summary is intended to give an overview of some of the initiatives undertaken by other European countries.

France

In France, content subject teachers who want to become involved in CLIL must necessarily be certified to do so (Bertaux, 2007). This means preparing the teachers to meet the challenge of teaching CLIL successfully. Initial training modules have been set up in several IUFMs (Institut Universitaire de Formation de Maîtres-Teacher Training Institutes) around the country since the implementation of the CLIL certificate (Bertaux, 2007). Once the training process has concluded, the certification process starts. This process includes two main stages: a written exam and an oral exam. If the candidate passes both the written and the oral exam he/she receives the CLIL Teacher Qualification, and he/she will be able to teach a content subject through CLIL.

United Kingdom

The UK enrolled in the ECLILT project (e-based Content and Language Integrated Learning Training) in 2007. As Hunt states, the ECLILT project "was set up as a consortium of eight partner countries with the aim of enhancing the quality and European dimension of teacher training in CLIL through the organization and delivery of pilot courses to stimulate the introduction of CLIL provision on a broader scale in secondary schools". ECLILT is one of the most innovative initiatives of this kind to date. The aims of ECLILT have a teaching and learning dimension, and a cultural dimension (Hunt, 2011).

Italy

CLIL has been recently introduced into the Italian educational system. The MIUR (Italy's equivalent to the Ministry of Education) specified the parameters of the teacher preparation courses

for learning CLIL methodology in September 2010 (Pulcini, 2014; Leone, 2015). These were restrictive courses, since only teachers with an advanced (C1) level of English could apply; and "only those teachers who passed the course would be given a certificate attesting to their ability to teach a non-linguistic discipline in a foreign language" (Leone, 2015).

Germany

According to some authors, the German teacher training system "provides excellent and enriching conditions for the training of CLIL teachers" (Brüning and Purrmann, n.d.). This teacher training consists of two different phases as well as providing further qualification for teachers. There is a wide range of possibilities:

- At university level, several universities offer CLIL specialization and certification within a module.
- Other recent initiatives in the German teacher-training system are the creation of study modules sponsored by European projects (Vázquez, 2007).

Finland

In the words of Salhberg (2010), "with its high levels of educational achievement and attainment, Finland is regarded as one of the world's most literate societies. One key element has impacted Finland's success above all others: Excellent teachers." In Finland all forms of teacher training are university-based: "there are 13 teacher training schools in Finland which are attached to universities and administered by their respective faculties of education. However, CLIL instruction has become rather commonplace in the schools" (Marsh et al., 2010).

CLIL teacher training in Finland is minimal in initial training, and is mainly focused on subject teachers. In-service Teacher Training (INSET) mainly occurs within a university setting. "A heterogeneous range of programmes have been offered since 1990 which range from small-scale seminars to extensive programmes run over a period of one year" (Marsh et al., 2010). The Universities of Jyväskylä and Vaasa are two of the most important centres of teacher training and research.

Spain

In Spain, research in teacher training has been carried out at the University of Alcalá in order to clarify the needs and expectations of teachers (Fernández et al., 2005: Halbach et al., 2005; Pena et al., 2006). But there are several other official initiatives in the area of CLIL (Lasagabaster and Ruiz de Zarobe, 2010). Some of these are:

- A joint bilingual project (1996/1997) between the MEC (Ministry of Education) and the British Council. In terms of teacher training, the Bilingual Project in Madrid provides a 240-hour-intensive course along with native teachers, and a one-month summer course in the United Kingdom.
- The PALE program, which aims to aid CLIL-engaged teachers in improving their competence in the foreign language.
- Several *Bilingual Projects* are also being carried out in different communities.

The key to better results is teacher training. However, according to some critics, in many areas of Spain, "pre-service training is practically non-existent and the type of in-service training detected is not enough" (Fernández Fontecha, 2009). If Spain wants to improve its citizens' commands in foreign languages, more public funds need to be devoted to the training of teachers.

Conclusion

CLIL is now well established in some European countries. Teacher training has always existed in these countries so it seems that there is an awareness of the real necessity teacher training embodies. In other countries, CLIL is still a young discipline. A common point in all the countries is the absence of uniformity in teacher training: no state policies or laws dictate the procedure to follow. Italy appears to be the only exception. Countries that have recently adopted the method should seek to learn from the experience of the countries which have a good track record in this area (Mehisto, 2007). These are the ones with better results; and the ones where teacher training is stronger.

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TEACHING SCIENCE WITH TECHNOLOGIES: SCIENCE CLIL ACTIVITIES IN CLASS IN ORDER TO PREVENT TEENAGE DRUG ABUSE

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Abstract: Educators can prevent drug abuse in Science high school students by adopting CLIL methodology and teachers' resources to reflect with students on brain changes and drug addiction. Adolescent students generally have strange and inaccurate perceptions on the consumption of drugs. This article is intended to highlight the role of the educator in school in preventing the onset of drug abuse using CLIL methodology and Science in the high school classroom, involving students working peer to peer in class.

Introduction

Technology in education is in constant, progressive and rapid change. To face new challenges, teachers need to have a repository in order to design new scenarios and environments for teaching and learning, adapting teaching to students' own needs and limitations. All these new approaches focus on learners, helping them to become better in their own learning. The following types of basic scaffolding and material could be useful:

- ICT applications: animations, videos, power point presentations help to introduce topics. ICT enhances interactivity, puts learners in a virtual "hands on" learning situation, increases learners' motivation by developing cross curricular knowledge and communication. (Padlet www.padlet.com; tag cloud generator as http://www.wordle.net/ and http://www.tagxedo.com/ http://www.quizlet.com)
- Scientific content texts: Often, students enter CLIL education without a sufficient previous basis and vocabulary in the L2. Familiarity with specific language can help students to understand terms with authentic materials. Students' specific scientific vocabulary will greatly improve through a combination of ICT methods.
- Graphic organizers: Diagrams, schemes, tables and writing organizers help students to put ideas in the right order to make the oral communication easier.
- Task orientation: Students should carry out authentic tasks using the problem solving methodology.
- Motivation: The teacher's attitude inspires students and improves their learning. Teachers need to explore motivation and allow learners to drive their own learning process.

These five tools enable teachers to provide flexible instructional support, adaptable in special ways to teach science contents and appropriate for learners of different ages.

TEACHING OBJECTIVES				LEARNING OUTCOMES AND ICT	
1. Content				2. Cognition	
1	• What is a drug? • How many drugs do you know? • Where do drugs come from? • How drugs work? • Drugs effect in our nervous system • LSD, Cocaine, Marijuana, Alcohol use and abuse and their effects on brain Brain changes due to drugs effects and addictions. Time 5 hours Nervous system Chemical and electrical synapses	1a • These starting points, with video images and PPT, capture the students interest and provide an opportunity for them to express what they know about drugs • How e.g. marijuana use affects brain regions and structures that control the five senses, heart rate, emotions, memory, and judgment • Students will define a drug and became conscious about more common drugs in our society • understand different origins of drugs • classify drugs, their consequences and effects • Learners will understand how drugs can destroy brain from the very first use • Students will choose to study a type of drug from Mouse Party or Mandillo ppt • They will underline the keyword in the text and will search the meaning of each word by word	1b 'Pre-teaching vocabulary' and 'Word bank" Tasks Students collect keywords Create a tag Cloud with them Cloze test Lucy in the sky with Diamonds and Lyrics for listening comprehension and " fill the gap"	**ENGAGE** **PPT** **EXPLORE**	ICT vehicle for contents Mouse Party animation Look inside the brains of mice on drugs http://learn.genetics.utah.edu/content/addiction/mouse/ Create a tag Cloud with Keywords PPT Brain Changes and addiction Author Dr Silvia Mandillo EMBL Monterotondo Learners carry out hands-on activities that allow them to explore their concept of the topic They will succeed in describing the topic in their own words They will remove their misconceptions on the topic changing ideas/preconceptions about the topic Create a video You tube clip http://www.e-chords.com/chords/the-

		reference. • They will create a crossword using keywords			beatles/lucy-in-the-sky-with-diamonds watching popular TV series such as “Breaking bad”
	3. Communication				**4. Culture**	
2	**CAUSE AND EFFECT** Something causes something else to happen Time 2 hours	The cause tells why something happened. The effect tells what happened Learners will interact in group Using the writing organizer Sandwich chart, students will learn how to make a flow chart of the topic			EXPLAIN	After exploring and explaining, learners will reach their own conclusions because of the activities. So the explanation follows the experience, so that the learners will reach their conclusions on their own
3	**STUDENTS WILL MAKE A LIST OF 20 WORDS ABOUT BIOLOGICAL PATHWAYS**	The student will understand how marijuana interferes with information transfer and short-term memory.	Students will identify the areas of the brain and structures responsible for these functions and will be reminded that marijuana alters neurotransmission in these areas	ACTIVITY Stump your partner Discussions. In small groups or as a class use the discussion questions to	ELABORATE	DISCUSSION QUESTIONS • What did you read that you didn’t know before? • Does this information change your views? If so, how? • What did you learn during the CLIL lessons? What do you understand better now?

					discuss about the topic **Working in pairs:** What do you know about drugs? Could drugs be helpful for people or harmful? What do you know about brain changes and drug addiction?		• What are some of the risks involved in doing drugs? What will happen in the family, at school, in the social context, and what about the financial point of view? • Discuss what happens when an illegal drug becomes legal. Who benefits from the use of legal drugs? Who suffers? Why? • How does mass media play a role in drug use and addiction? Consider all types of media, including television and movies, social media, and advertisements. • Reflect on the CLIL lessons: did you enjoy working in a group using ICT?
4	**EVALUATION** Assessment Time 1 hour	How to produce a rubric Self -perception and self-evaluation				**EVALUATION**	Discussion in class on the topic Compare and Contrast Carry out a discussion with www.voxopop.com Poster production

Conclusions

This paper has focused on some teaching resources providing support for learning in CLIL classrooms. Using contents and specific scientific language can develop thinking skills and encourage communication. ICT plays a strategic role in science teaching for learners of all ages, enhancing the ludic dimension. At the same time it could be an effective tool to reduce the distance between students and the solutions to the health problem they may be facing. In the future, it could be very interesting to create a digital repository of Science CLIL lessons made in class by teachers and students coordinated by a Science University's department in order to share, reuse, valorize and capitalize best practices in the international community of CLIL teachers. This could help Science teachers feel more confident in their CLIL action in classroom, and also be useful for the University because by interacting with schools, it could be possible to organize a better pre-service science teacher training. The CLIL approach surely encourages cooperation with colleagues from different disciplines and from different school levels, as well as the University, to renew and appraise their methodological and teaching pathway. CLIL in fact acts as an agent for quality change.

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Resources

http://selda.unicatt.it/milano-azioni-e-repository-azione-3
http://selda.unicatt.it/milano-azione-4-progetti-delle-istituzioni-scolastiche
http://selda.unicatt.it/milano-azioni-e-repository-azione-5#content

TEACHING SOCIAL SCIENCES THROUGH ENGLISH: GEOGRAPHY PROJECTS THAT WORK

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Abstract: Content and language integrated in one go: social sciences and English language can be taught in the same teaching session. Bilingual programmes have made lessons and the teaching style in the social sciences change. This involves innovations in the teaching methodology - and the best is yet to come. CLIL teachers no longer give traditional lectures, since students have other goals to attain. The search for and development of resources appropriate to CLIL learners is a demanding task. In this paper, different activities already tested in bilingual classrooms are displayed: oral presentations, geography projects, student-run roundtables and self-assessment through portfolios. This integrated methodology takes us a step further in CLIL teaching and learning.

1. How do students acquire geography concepts in CLIL lessons?

Learners who study a great part of the secondary school curriculum through English need a different input which goes far beyond the traditional lesson. Visual displays, vocabulary *drilling*, the development of projects, oral presentations, geographical literacy awareness activities, and so on, are some of the tools that need to be used to support bilingual instruction. The atmosphere in the classrooms has changed: visual displays back up content teaching, help students and enhance the acquisition of concepts. For example, in 1ESO geography lessons (age 12-13), volcanoes are part of the contents. Apart from the input from books, students now have the chance to watch National Geographic videos on volcano eruptions and they can make their own volcano following some simple instructions. Thus, the subject content becomes more meaningful, which makes it easier to pursue two goals at the same time: geography learning and foreign language acquisition.

2. Geography Projects

1ESO is a suitable moment in school to do geography projects that involve different skills. Students are required to do a team project in preparation for the presentation of one continent of their choice. They create the physical maps and find basic information about geographical features, landscapes, environments and tourism. They prepare either a video or a Powerpoint presentation, together with a set of questions for their classmates. Hence, students presenting will play the role of teachers and they will notice whether their classmates paid attention during the presentation. The final goal is for all the students in the group to become experts on just one continent, but to work on all of them (Figures 1 and 2). It is appropriate in this context to leave the linguistic mistakes

students make in their questions to one side, since they will be corrected by their peers after the presentation when mutual feedback is given.

Figure 1. Students working on geography project

1. What **bodys** of water are around Europe (seas, oceans)?
2. Do you remember what the Caspian Sea is?
3. Do you see mountain ranges? Which ones? Are they very high?
4. What is the highest summit in Europe? Where is it?
5. What are the names of the three Mediterranean peninsulas?
6. Where does river Volga **disembocate**?
7. Complete the names of the European rivers:

   _ b _ _

   _ o

   _ h _ _ _ s

   R _ i _ _

   _ _ _ u _ _

   D _ _ _ _ _ _r

Figure 2. Presentation of Europe and activities for classmates (original student writing)

Projects save time from the geography sessions because students develop their own learning by following the guidelines, and they transfer it to the improvement of their linguistic skills (Figure 3). Following this, learners have the opportunity to reflect on the whole process in their portfolio. The CLIP (Content and Language Integrated Portfolio) makes enhanced formative assessment possible for evaluating the teaching and learning process (Del Pozo 2009: 37).

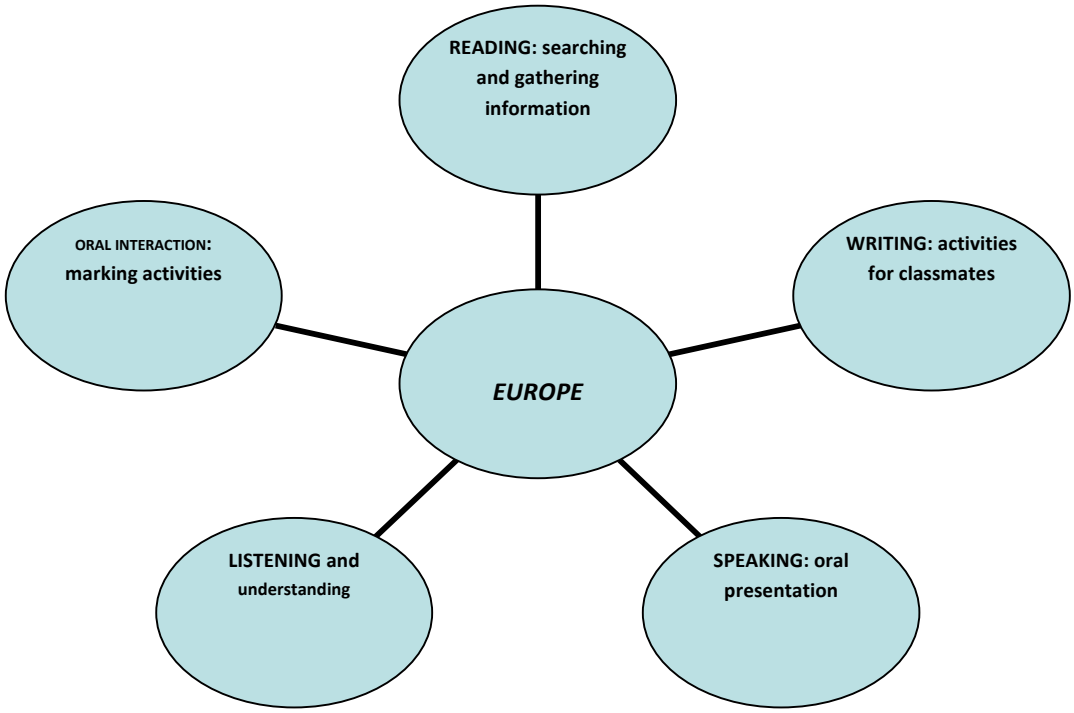

Figure 3. Year 1 ESO Presentation: portfolio assessment

3ESO is an appropriate year to do fieldwork projects. Students of this age seem to be more comfortable participating in a group project and they have the chance to distribute the work adequately. There are interesting projects to develop the topics from the unit 'Settlements':

- Facilities for disabled people in your town
- Design of a skateboarding park (Figure 4)
- Environmental problems of parks in your town
- Design of a tram line
- Solve traffic problems (e.g. build a roundabout)

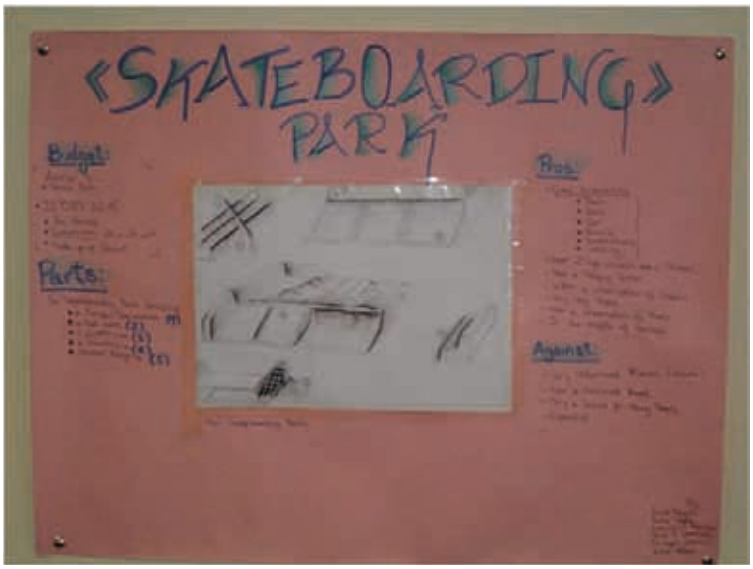

Figure 4. Design for a skateboarding park (student poster)

It is essential to provide students with both an example of the kind of projects we expect from them as well as the guidelines we want them to follow:

1. Prepare a project on how you'll do the project and why: your requirements
2. Distribute the work among the members of the team
3. Take photographs or videos
4. Interview people
5. Prepare a Powerpoint presentation for your class
6. Make a poster about the topic
7. Prepare a budget to carry out the project
8. Present your project to the town hall (if applicable)

Preparing the projects students develop, not only the contents of the geography they studied in class, but also linguistic and non-linguistic skills (see Figure 5, below):

- Selecting and putting information in order (cognitive, reading and writing skills)
- Kinesthetic, artistic skills
- ICT
- Oral communication
- Decision taking: evaluation of costs and consequences

Figure 5. Year 3 ESO students present their design of a skateboarding park to the class

3. Economic geography roundtable

Making the most of the exchange students is important for the school community. Foreign visitors give a different perspective on school life. It is the teachers' choice whether to use this resource in the form of a simple lecture by the foreign visitor, or to elicit students' own ideas as part of a communication system in the CLIL classroom (Llinares, Morton & Whittaker, 2012: 54). In our school, year 1 Bachillerato (age 16-17) students are asked to participate in a roundtable at the school library on the topic: "Impact of the Economic Crisis on Youth*"* (Figure 6).

Figure 6. Roundtable discussion: Impact of the Economic Crisis on Youth. English exchange student Katie and a Spanish university student make up the panel. A year 1 *Bachillerato* student moderates the debate

For that purpose Katie, the English exchange student in school, is invited to give her view on the topic in her hometown: Sheffield, Northern England. The second guest is a former bilingual student from the school, currently studying her first year of Economics at university. To moderate the roundtable, we appointed one Year 1 *Bachillerato* student highly committed to social issues. Students in the audience get involved in the topic easily and they are soon engaged in an interactive dialogue with the members of the panel. Not only do social and economic aspects come up, but also political issues happening at the moment in Spain and England. Students develop both communication and cognition skills during the session:

- Interrupting formulae
- Turn taking
- Decision taking
- Summarizing
- Gaining autonomy
- Preparing own intervention

4. What's next in CLIL? Assessment through Portfolio: CLIP

Some geography teachers might be reluctant to move into bilingual education because of the fear that there could be either content simplification or a vocabulary reduction in students' learning about geographical contents. However, as Tedick and Wesely point out 'translanguaging and transliteracy taking place in multilingual classrooms

powerfully validate students and promote academic achievement' (Tedick & Wesely, 2015: 32). In order to shape this achievement, portfolio assessment in geography may help to move from the traditional summative assessment to formative assessment (Sibley, 2003: 77) without losing content. At this point, the teacher becomes a facilitator in the bilingual classroom and 'designs tasks that shape the context of the situation in which the activity is carried out' (Llinares, 2015: 69).

The final step of the planning is the reflection on teaching and learning processes in the CLIP (Figure 7):

GROUP……TERM……..DATE……..

What can you do in English? Colour the squares using a green crayon.
✕✕ I can't do this
✕ I need to work more on this
✓ I can do this well
✓✓ I can do this very well

SKILLS		**YOU**				**YOUR TEACHER**			
		✓✓	✓	✕	✕✕	✓✓	✓	✕	✕✕
Writing	▪ I can use capital letters, full stops, question marks, exclamation marks, brackets and dashes correctly								
	▪ I can write the definition of a geographic/term.								
	▪ I can investigate how places and environments are interdependent								
Searching	▪ I can carry out geographical enquiries, both inside and outside the classroom.								
	▪ I can present the conclusion of a reading on geography								
Spoken Production	▪ I can discuss and respond to initial ideas and information, carry out tasks and refine ideas.								
	▪ I can analyse evidence and draw conclusions.								
Reading	▪ I can identify the main points of a task, text…								
	▪ I can listen for specific information on geography in a recording								
Listening	▪ I can listen for a specific purpose, note the main points of a talk and consider their relevance								
	▪ I can participate in a debate on a geographic/economic issue.								
Spoken Interaction	▪ I can hold a conversation with a native speaker about a social sciences topic.								

Figure 7. Content and Language Integrated Portfolio (CLIP)

Conclusion

Projects in the teaching of geography through English are meaningful tools to develop students' awareness on social sciences. Students are expected to think critically when they do the projects since they had to connect abstract facts and think 'geographically'. They enhance the relationship between implicit, explicit and subliminal message in visual and textual images together with the presentation of geographical topics to their peers.

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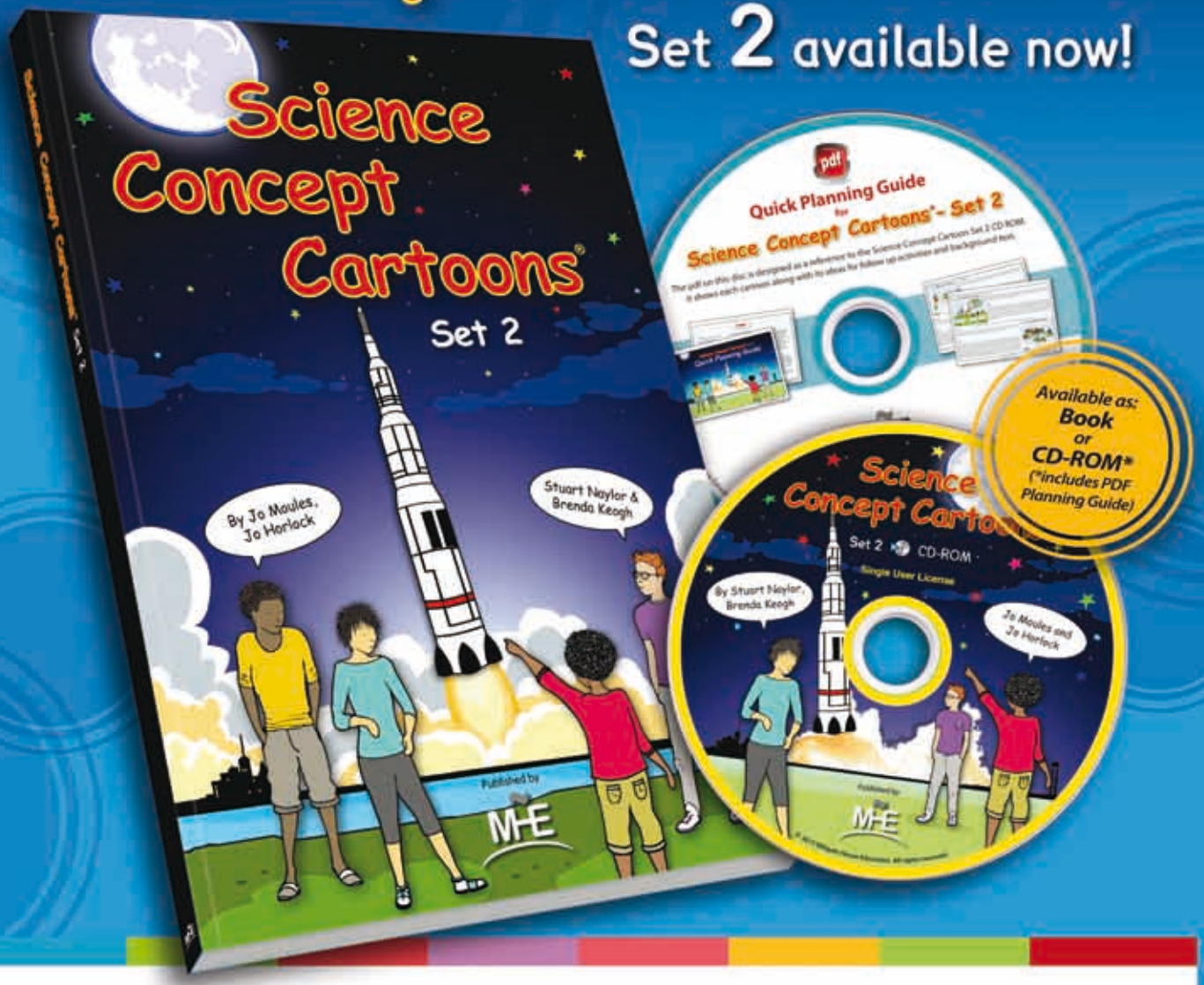

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FOCUS ON LEXIS: ICLHE STUDENTS' PERCEPTIONS OF LECTURERS' PRACTICES

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Abstract: This paper briefly reviews findings from recent studies which looked at how teachers focus on lexicon in ICL classes. The paper presents a small-scale study that examined how lecturers focus on subject-specific and general vocabulary and contrasted it to students' perceptions of lecturers' practices. The paper highlights CLIL teachers' and students' opinions regarding the use of L1 in CLIL settings.

Introduction

The growing need for internationalization across higher education institutions (Smit and Dafouz, 2012) has created language demands of university students that are being met by increasing students' exposure to foreign/additional languages (often English) through non-language content-based subjects (e.g. chemistry, physics, etc.). This approach to content and language integrated learning in higher education (henceforth, ICLHE) varies from "learning *in* English" to "learning *through* English", depending on the university setting. While the former describes English-Medium Instruction (EMI) in contexts where students' proficiency levels allow for fluid content teaching and learning in English, the latter describes settings where students' proficiency levels require consistent language scaffolding that is characteristic of CLIL. The degree of focus on language as an object of study is one of the main aspects that seem to set CLIL apart from EMI.

Recent findings have shown that despite the movement towards CLIL in higher education, its implementation does not necessarily follow precise guidelines or include the same level of language support across degree programs. For example, Arnó-Macià and Mancho-Baréss (2015) showed that though their internal documents mentioned their contexts were CLIL oriented, *language support* was not present.

The present paper aims to project the nature of content and language integration in the private university of San Jorge, Zaragoza, for which purpose two questions were posed:

1- How do lecturers focus on lexicon?
1a. Do lecturers use English, Spanish or a mixture of both when focusing on lexicon?
2- Do students' perceptions of lecturers' practices align with lecturers' reports?

Teacher training and planned attention to language

CLIL implementation in San Jorge University (USJ), in Aragon, began from its foundation year in 2005 (cf, Nashaat Sobhy, Berzosa and Crean, 2013). To increase consistency among lecturers and ascertain that they not only have the language means to teach through English but also the pedagogical means, an internal accreditation process was put into practice at the end of 2015. The accreditation is composed of a series of training workshops and classroom observations (see Giner and Nashaat Sobhy, this volume). During this training, lecturers learn to prepare their materials and lessons in a way that should enhance students' comprehension and production of the new content.

Attention to subject-specific language forms is part of these workshops, which the trainers find particularly important for students to eventually contribute to class conversations, aided by teacher practices like modeling, paraphrasing, and repairing student language production. In content classes, these practices are likely to hinge on subject-specific terms (SSTs) -technical and semi-technical terms- that are the meeting point between content and language in ICLHE lectures (Costa, 2012). For this reason, we believe it is important to assess how lecturers focus on lexicon.

Defining the boundaries of Lexical Focus-on-Form (LFonF)

By tradition, FonF refers to focus on morphosyntax. Both Long's (1999) focus-on-form (FonF) in meaning-oriented classroom communication and Lyster's (2007) counter-balanced content and form-based instruction recommend such a focus and show how explicit focus on language in instructional input leads to better improved comprehension and noticing by the students. However, the use of FonF has also been extended to include lexicon whenever the participants pause to focus on language as an object, in contrast to its being a tool for communication (Ellis et al, 2001: 426). FonF can also be lexical whenever there is "intentional vocabulary teaching and learning" in any given learning activity (Laufer and Girsai (2008). These two definitions point to *unplanned* moments when teachers decide to shift their attention to lexicon (Ellis et al, 2001: 426; Long, 1999) and other planned instances in which vocabulary teaching is at the core of learning (Laufer and Girsai, 2008; Lyster, 2007). Whether planned or unplanned, LFonF is a necessary scaffolding practice that facilitates students' content learning.

Unlike *unplanned FonF*, which consists of spontaneous and possibly reactive explanations when students require further clarifications (examples, reformulations and translations), *planned FonF* consists of proactive practices that the lecturer spends time planning for. These could take the form of handouts with language frames or exercises for students to work on. Such materials are prepared to draw students' attention to key SSTs. This, in turn, allows students to participate more actively in classroom discourse.

The next section describes our methodological approach to answer the question.

Methodology

Teacher-led interaction accounts for two-thirds of the talk in CLIL classrooms (Dalton-Puffer 2007), which gives teachers time to provide different types of lexical support and gives students an opportunity to form perceptions of how their course lecturers manage new lexicon. Hence, an online survey, which gathers planned and unplanned LFonF scenarios, were given to seven lecturers -who had received a minimum of 16 hours of CLIL training and one-on-one sessions - and to their students at the end of a 16-week course. Definitions and examples of subject-specific terminology and general non-specific language were inserted in the survey prior to the sections with questions about each category. A total of five questions were asked about whether the lecturer focused on lexicon through: a) self-study activities; b) specific classroom activities; c) glossaries and translations; d) examples (including images), reformulations, definitions and explanations in simpler English; and finally e) corrections and feedback on students' written assignments. Statements a to c denote preemptive planning, whereas d and e are mostly reactive.

Results and discussion

As shown in the chart (Figure 1), the majority of the lecturers' (57.10%) coincide in reporting their use of specific exercises from time to time at the beginning of the class to focus on SSTs. Fewer lecturers (42.90%) then coincide in their frequent use of examples, definitions and reformulations as well as glossaries and translations. Three in seven lecturers (28.60%) also say they include some kind of LFonF for STT through autonomous self-study tasks.

As for general non-STTs, the results show a shift in lecturers' answers; here, the majority (57.10%) coincides in resorting primarily to examples, definitions and reformulations as well as glossaries and translations. Fewer lecturers (42.90%) then coincide in using specific and self-study exercises from time to time.

Interestingly, the majority coincide in not addressing LFonF in students' written work, either for STT or for Non-STT.

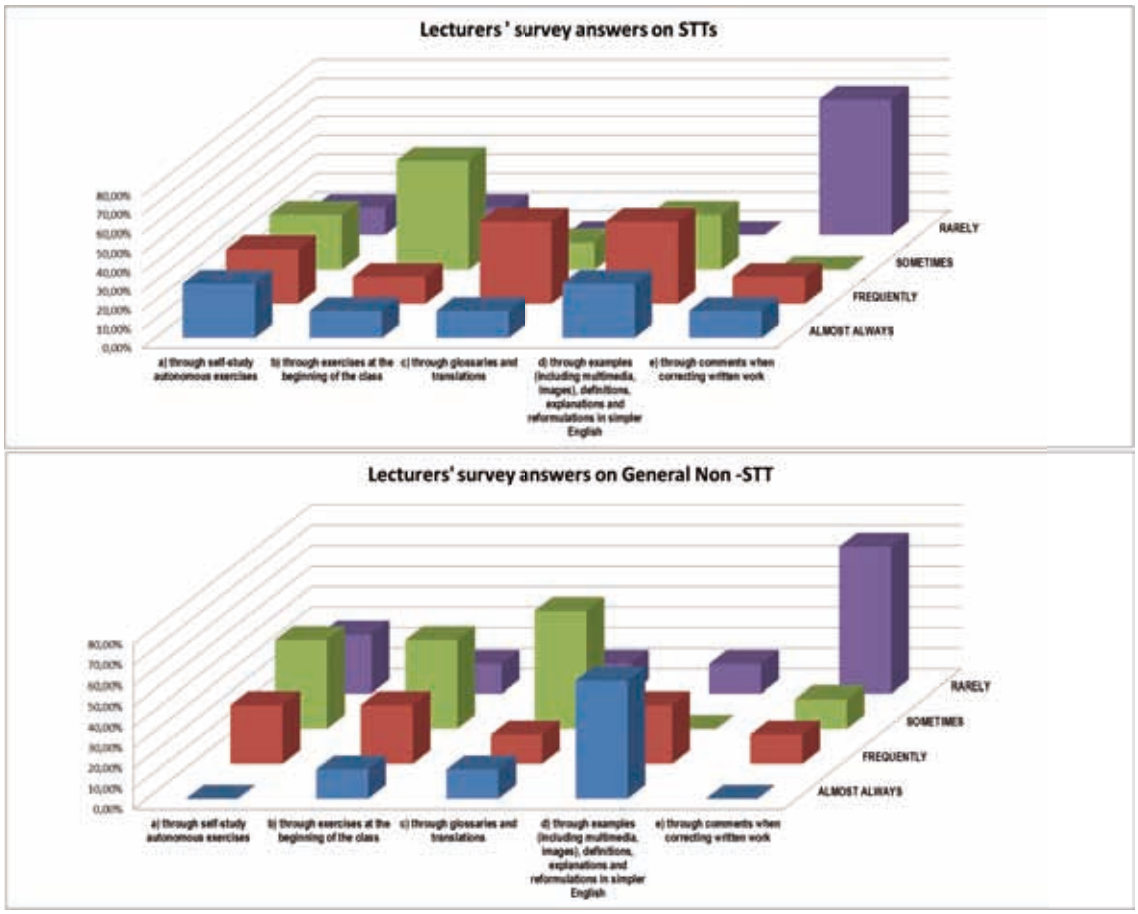

Figure 1. Definitions and examples of subject-specific terminology and general non-specific language

With regard to the use of focusing on SST, 57.1% of the lecturers report using English and Spanish equally, and the remaining 42.9% report mainly using English. When focusing on general Non-STTs, 28.6% of the lecturers mainly use Spanish when students are not familiar with a word or an expression.

Turning to the more precise case of two of the Chemistry and Theory of Education lecturers, and focusing on SSTs only, we see that students' perceptions are *not* well aligned with their

lecturers' answers; however, they seem to be more aligned with the Education-course lecturer than with the Chemistry lecturer (Figure 2 & 3).

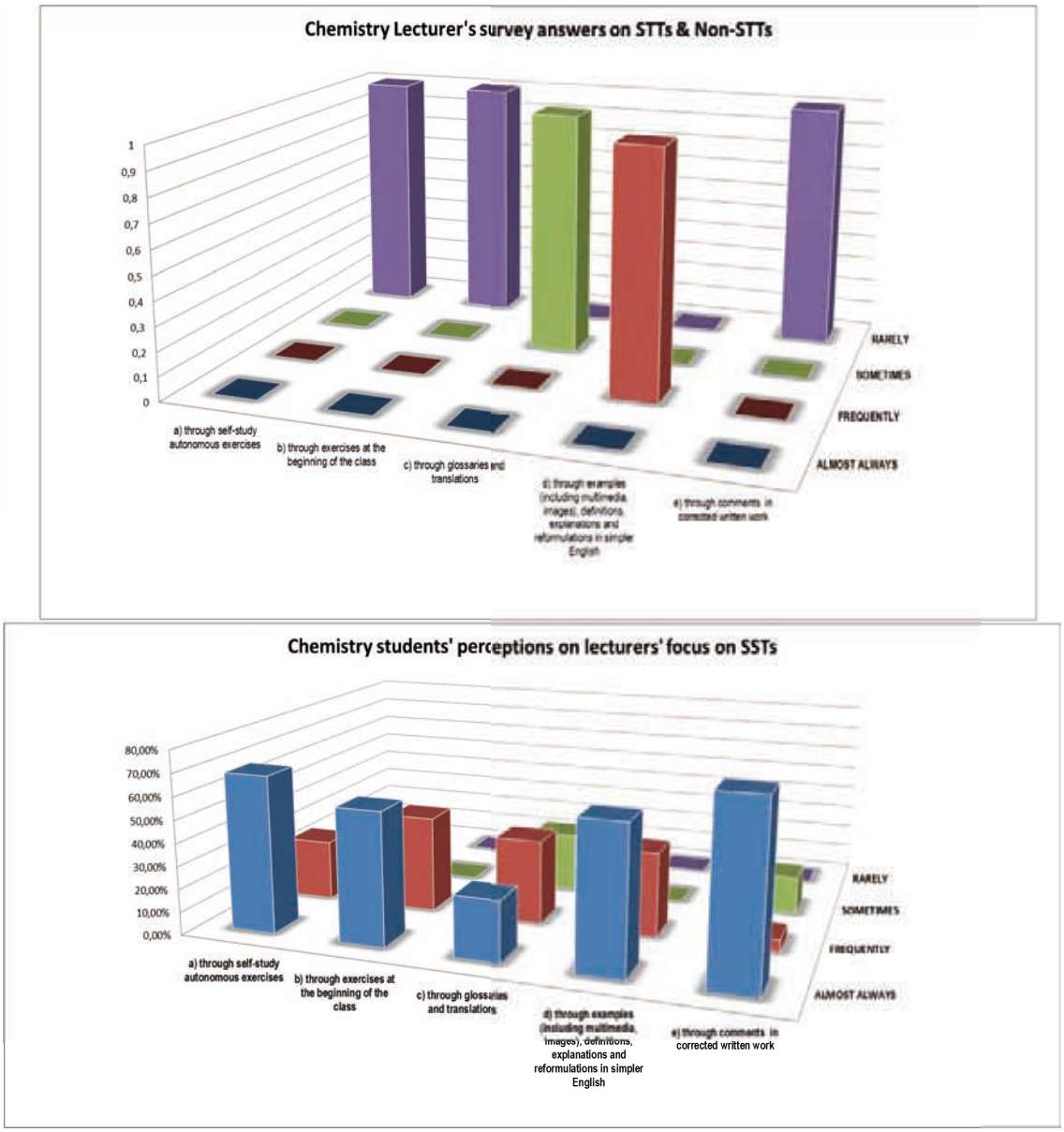

Figure 2. A comparison of Chemistry students' perceptions to their lecturer's answers on the survey regarding focus on SST

The Chemistry lecturer reported having resorted to two strategies: 1) to the frequent use of examples, definitions, and 2) reformulations as well as glossaries and translations from time to time. The Chemistry students, however, perceived that the lecturer had focused on SST almost always through the full range of all the proposed activities in the survey (Choices a to e). The lecturer's answers and the students' perceptions are completely unrelated.

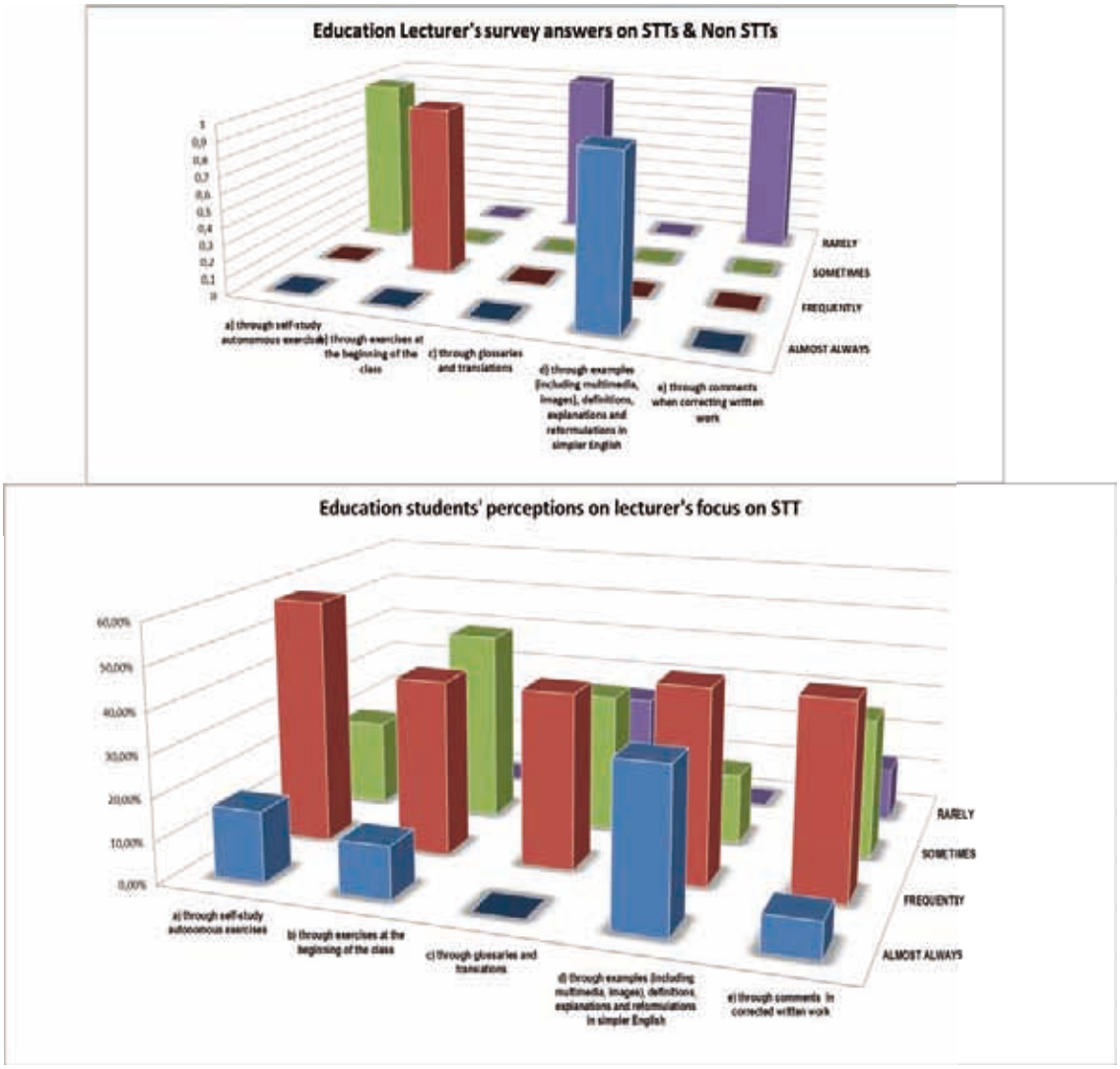

Figure 3. A comparison of Chemistry students' perceptions to their lecturer's answers on the survey regarding focus on SST

The Education lecturer, on the other hand, reported resorting to 3 strategies: 1) almost always to the use of examples, definitions and reformulations, followed by 2) a frequent use of specific LFonF activities at the beginning of some lessons then by 3) including STT exercises in self-study autonomous tasks. The lecturers' reported practices coincide with the perceptions of the majority of the students; nonetheless, there are major discrepancies in students' perceptions of *the frequency* with which the lecturer used the LFonF strategies.

Concerning students' perceptions of lecturers' rates of English and Spanish use, these were completely aligned. Both lecturers reported having used English only throughout the course, which is reflected in the students' perceptions.

Conclusion

To sum up, this small-scale study has shown that lecturers vary in the strategies they apply, yet all report making room for planned LFonF during self-study tasks and activities at the beginning of content lectures, through examples, definitions, explanations and reformulations in a less academic register.

The study has also shown that students' perceptions did not align with the lecturers' answers. The students' perceived that their lecturers had either used more strategies or had used

them at higher frequencies. In other words, students' perceptions give the impression that the lecturers did more than what the lecturers reported, not less.

Spanish emerged as a tool for LFonF through the use of glossaries and translations, and some lecturers' reports regarding resorting to Spanish more than English when dealing with general Non-STT. Students and lecturers also shared opinions regarding the use of L1 in the CLIL classroom, which cannot be elaborated on here given the limited space.

All this leads us to conclude that the sustained interaction between content and language lecturers during the accreditation training and in the one-on-one sessions is leading lecturers to share common practices. These practices point to substantial attention to language, which makes us believe that the integrated content and language model at USJ is drawing closer to CLIL than to EMI.

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PROBLEMATIZING ON LANGUAGE LEARNING ISSUES IN EMI: OPINIONS OF SCIENCE AND TECHNOLOGY EMI LECTURERS

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Abstract. Following the Interpretative Policy Analysis approach (Moore & Wiley, 2015), this preliminary study seeks to examine the language policies (LP) that Lleida University has recently implemented to promote EMI. In particular, we analyse how the meanings underlying language policy affect policy enactors (EMI lecturers) and we analyse their opinions in order to identify points of conflict.

As in most European universities, English-Medium Instruction (EMI) is increasingly present in bachelor's and master's programmes in Spain (Wächter & Maiworm, 2014). EMI implementation is not absent of tensions, though. In fact, Wilkinson (2005) claims that EMI teaching and instructional methods seem to be hegded with language problems, which are evidenced in the classroom discourse of lecturers (Arnó & Mancho, 2015) and their students (Hellekjaer 2010); however, EMI programs are rated highly by students, lecturers, and programme directors alike (Wilkinson, 2005; Wächter & Mainworm 2014). Therefore, the implemention of EMI at university deserves more attention so as to unveil possible points of conflict that are to be resolved.

For this purpose, this paper aims to qualitatively investigate EMI lecturers'opinions about foreign language learning. Specifically, the goal of this paper is to tease out the themes related to foreign language learning in EMI contexts that emerge in language policy documents at the University of Lleida (UdL, Catalonia, Spain) vis-à-vis the beliefs held by its interpretive community, that is, the community of EMI lecturers at the UdL.

There are two types of qualitative data sources: (i) UdL language policy documents and (ii) opinions expressed by four EMI science and technology lecturers. On the one hand, the UdL has issued two language policy documents: first, its *Pla Operatiu per al Multilingüisme* (POM) (2013-2018) (University of Lleida, 2013) offers the UdL's community an operational framework to deal with the university language services (i.e. administrative units for language traning and multilingual consultacy—translations, revision) (Pons, 2015) and with the rights and duties for lecturers and students alike concerning linguistic issues, such as lecturers' selection of the language of instruction or students' L2 accreditation process. The POM provides a very general statement as to how to implement EMI in the degrees (p.16). Second, though not a language policy document strictly speaking, the *Pla Operatiu per a la Internacionalització* (POI) (2012-16) sets as an objective, among others, the need to increase the offer of EMI courses so as to boost local students' command of English for Specific Purposes (University of Lleida, 2012: 9). On the other hand, the other type of data have been field notes taken of the speech of four EMI lecturers during a recent conference on multilingualism in higher education at the UdL (February 2016). Essentially, lecturers had been asked to give their opinions on their EMI experience.

Data are analyzed according to the interpretive policy analysis approach (IPA) (Moore & Wiley, 2015). Although not always happening sequentially, there are four steps in IPA: (i) single out the policy artifacts bearing meaning for a given policy issue; (ii) identify communities of interpretation connected to the policy issue under analysis; (iii) identify the themes (i.e. meanings, interpretations or understandings) found in the artifacts; and (iv) tear the points of conflict apart.

Three broad themes on foreign language learning have been identified in the LP documentation. First, the policy issue of foreign language learning at university hinges on the consideration that students' plurilingualism is a useful commodity (Heller 2010) for mobility and employability purposes. In fact, the POM expects students to have a high command of Catalan and Spanish and knowledge of foreign languages when they finish their undergraduate and post-graduate cycles. Yet, such objective is not an institutional objective but the individual agents' responsibility, to the extent that members of the community are held responsible for their own foreign language learning process. Therefore, the university does not seem to engage directly in actively promoting foreign language learning—understood as the allocation of specific budgetary resources—as the documentation simply states that the university will provide unspecified resources for language learning and practice, without specifying what these resources are. Second, LP documents advise on the need to progresively implement EMI subjects in the bachelor degrees, in line with previous reports (Berga et al., 2008), which recommend an increasing presence of EMI in undergraduate degrees to improve local students' foreign language competence. However, there is no explicit mention in the LP documents of foreign language learning as a benefit of EMI, apart from the brief acknowledgment that EMI will allow local students to progress in ESP skills. Likewise, no mention is made of institutional incentives that compensate for lecturers' extra workload derived from teaching through English, in line with previous research (Arno-Macià et al., 2015). Last, the promotion of EMI teacher training programmes is also in the forefront of the LP. The POM points to academic staff from the English department of the UdL and staff from the university's language service as support providers for lecturers willing to teach in English (2013: 15). The need to promote this kind of training programmes among lecturers that impart their lessons in a foreign language has also been pointed out in previous research (cf. Wilkinson, 2005).

The beliefs of four EMI lecturers were analyzed subsequently, whose membership of the community of interpretation is clear as they were invited to the conference as experienced EMI content lecturers at UdL. Their discourses were compared to the three themes in LP (i.e. plurilingualism and university support, progressive implementation of EMI and teacher training programmes) to determine the extent to which they aligned with the foreign language learning issue as emerged in LP analysis.

EMI lecturers' opinions on foreign language practice were analysed and three recurrent themes were identified: (i) the development of students' professional communication skills and lecturers' denial of responsibility for teaching English. These lecturers think that their students practise and develop their professional communication skills and fluency in their lessons, in particular in oral presentations and also in tasks where students learn to communicate in English, like teamwork, interaction and peerwork. In their view, an important benefit of EMI for students is increased confidence in communicating in English. However, lecturers refuse to teach English and assertively state they do not teach, evaluate or correct English because it is not their job, a common attitude among EMI lecturers (Airey 2012); in other words, EMI lecturers overtly refuse to be language referents in class (Arnó-Macià et al., 2015); (ii) progressive implementation of EMI. Lecturers mention that in most cases EMI courses are scarce, optional and rarely compulsory, and that the lecturer switches to L1 when there are no Erasmus students in class. Besides they may even reduce content, i.e. focus on the essentials and leave out detail, due to students' uneven command of English; finally, (iii) lecturers' emphasis that EMI lecturing requires more motivation, more effort and more work, and that the university does not reward them for the extra workload. It is worth adding that three lecturers had voluntarily followed an EMI training course that the university offers, although it was not compulsory for them to lecture in English.

As can be seen, the policy documents (particularly the POM) aim at providing the university community with language resources. Given that the document does not specify the type of resources to be provided particularly to students, the question arises about the possibility that such resources could also be human resources, namely EMI lecturers. This is an issue that deserves futher exploration as lecturers stated explicitly that they do not actively engage in English teaching,

although EMI students reportedly improve their foreign language competence and also their ESP skills. One possible way for this latent conflict to come to light is to offer ESP subjects and/or tandem-teaching between content and language experts. Secondly, the POM suggests a progressive implemention of EMI, which excludes full programmes totally imparted through English. However, lecturers' salient complaints not only point to the teaching quality of EMI class sessions but also to the fact that for language learning benefits to emerge, a full programme may be necessary since following a limited amount of EMI in a bachelor's degree will not suffice (cf. Wilkinson 2005). Finally, even though the university provides them with teacher training courses, as stated in the LP, the lack of incentives that somehow compensate for lecturers' extra work may cause an undesirable burning-out effect. The lecturers may then decide to step down from EMI, which in turn would reduce the offer of EMI courses.

Interpretive policy analysis therefore helps us unveil conflicts between meanings as intended by LP makers and meanings acknowledged by the community of interpretation of LP. These insights could be used to hone EMI at university, for example by helping LP makers revisit LP, actual EMI classroom methodologies, new types of foreign language instruction at university, and acknowledged teaching duties of EMI lecturers so that EMI can effectively contribute to students' foreign language development.

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EXTENDING LANGUAGE-RELATED EPISODES: TEAM-TEACHING FOR TECHNOLOGY IN ENGINEERING CONTEXTS

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Abstract. Starting out from the notions of *counterbalanced instruction* (Lyster 2007), *language-related episode* (Basturkmen & Shackleford 2015), and the *adjunct teaching model* in the EMI classroom (Brinton, Snow & Wesche 1989), in this presentation I explore the CLIL potential of technological surveillance in engineering environments. I report on a joint teaching initiative conducted by an applied linguist (myself) and an agronomy engineer at the Universidad Politécnica de Madrid for over two years, showing the goals, syllabi and final outcomes of the experience and opening fresh pedagogical and scholarly avenues.

1. Educational gap

The motivation behind this team-teaching initiative, which has now been implemented for two years at the Technical University of Madrid, is manifold. It not only promotes joint English-medium instruction (EMI) among content and language lecturers while teaching a given technology and its evolution, but also fosters the exercise and acquisition of transversal skills among engineering students, namely genre literacy, critical and lateral thinking, and teamwork. These abilities are implicit in the practice of *technological surveillance,* increasingly demanded by corporations and institutions alike and one of the ultimate goals of this pedagogical project, so far taught as a cycle of seminars within masters and doctoral programmes.

By means of a hands-on approach, based on a systematic and critical textual analysis focused on the generic and contextual features of research articles and patents (henceforth RAs and Ps), learners realise that the construction of knowledge depends on both content and form, and that according to the content focus, the text type chosen and the writing conventions adopted, they may decide which information should be tacit or explicit, and thus shape different perceptions of the same scientific phenomenon or technological object. The overall purpose of this initiative is to pave the way for a 'mind adjustment' (Fig. 1) at two levels: social and technical. On a social plane, students are supposed to detect the usefulness and therefore the investment potential of an invention, develop a sense of an audience through register shift and the attunement of their communications to the background and interests of their readers, and along the way enjoy the whole process of 'learning how to sound more professional' and dealing with language in general. The technical level consists in becoming able to understand the inventor's mind and doing actual 'technological watch', for which most often they need to verbalise visual information and encode verbal texts graphically. With the interrelation of these two planes or levels and the dual RA/P genre literacy we also intend to dilute the traditional divide between technology (patentable inventions and discoveries) and science (research), two sides of the same coin (i.e. problem-solving, the raison d'être of engineering) that are epistemologically convergent but discursively divergent

due to their distinctive aims of marketisation and dissemination. This dichotomy has been largely kindled by online media, which have tended to store RAs and Ps separately.

The contrastive analysis of RA and P texts conducted by students concerns differences in authorship, publication date, titles, abstracts, word keyness, kind and location of visuals, rhetorical organisation, promotional and vague language, and changes in the inventor's profile and the contexts of genre use (i.e. corporations as university research sponsors and professors as patent applicants, as well as the main national variations for patent applications and texts). In addition, it provides a 'know-how' of the patenting and research communication strategies that contribute to arouse a sense of belonging to the engineering community of practice (Wenger 1998). This communal feeling is honed by topical choices: harvesting machines for agronomic engineers and drones applied to agriculture for a mixed audience of aeronautical and agronomic professionals.

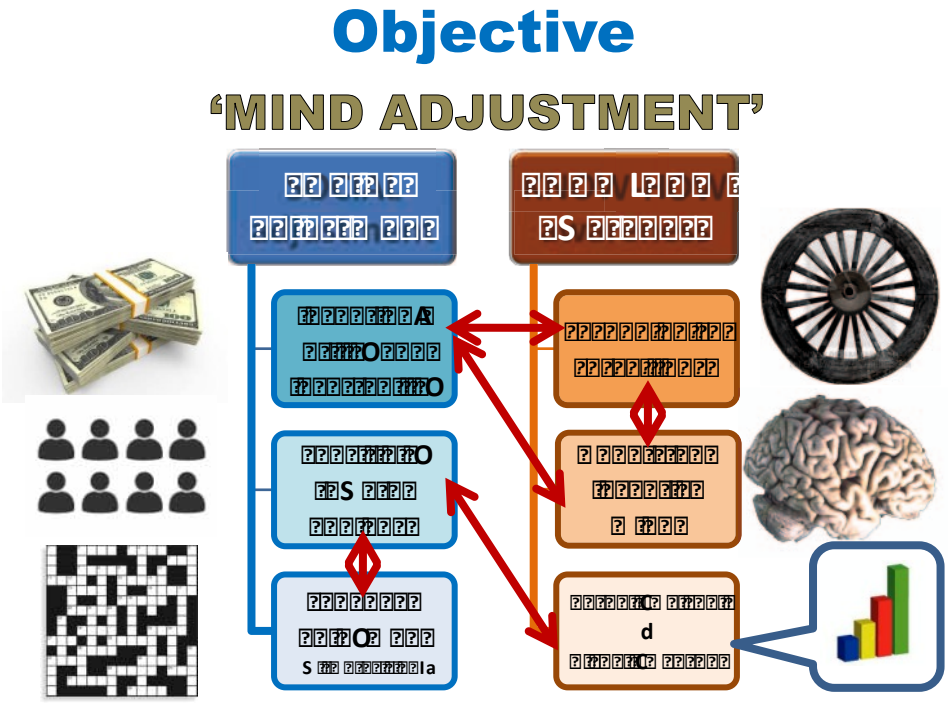

Figure 1. Macro-objective of the EMI team-teaching experience

2. Theoretical framework and seminar features

Research into Content and Language Integrated Learning (CLIL) methodologies has been crucial to the present EMI perspective, which, as mentioned, pivots around the collaborative teaching between language and content instructors. The RA and P genres lend themselves to an 'adjunct model' of team teaching (Brinton et al.1989, Greere & Räsänen 2008) in which the language and content components have the same weight, following Lyster's (2007) advocacy of a *counterbalanced instruction*. In this case such counterbalance turns indispensable because the rhetorical moves and phraseologies of academic writing and the triple register of Ps (i.e. technical, legal and business English) may be as unknown as the technologies themselves, even to native speakers of English. Another underlying theoretical ground is Basturkmen & Shackleford's (2015) *language-related episode*s. That is, the convenience for content teachers to make language salient in order to help neophytes 'read and sound professional' and strengthen their bonds with their community.

Daily class dynamics (Fig. 2) consists of three slots: 1) a brief slide-show input on all the technical and linguistic information necessary to accomplish the tasks of the corresponding worksheet of the day, 2) peer workshop time for completing the said worksheet, and 3) a closing whole-class discussion to share outcomes and generate opinion. Extra 'food for thought' and pending tasks, if any, are assigned as homework and commented on in the next session.

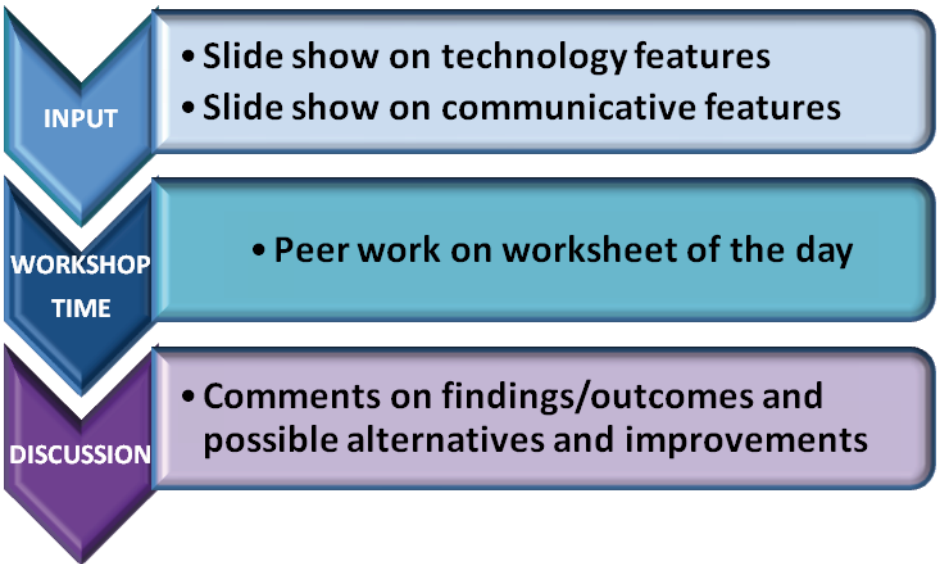

Figure 2. Outline of class dynamics

Over the ten-hour course (2h/day), the topical aspects covered include the following (Figure 3):

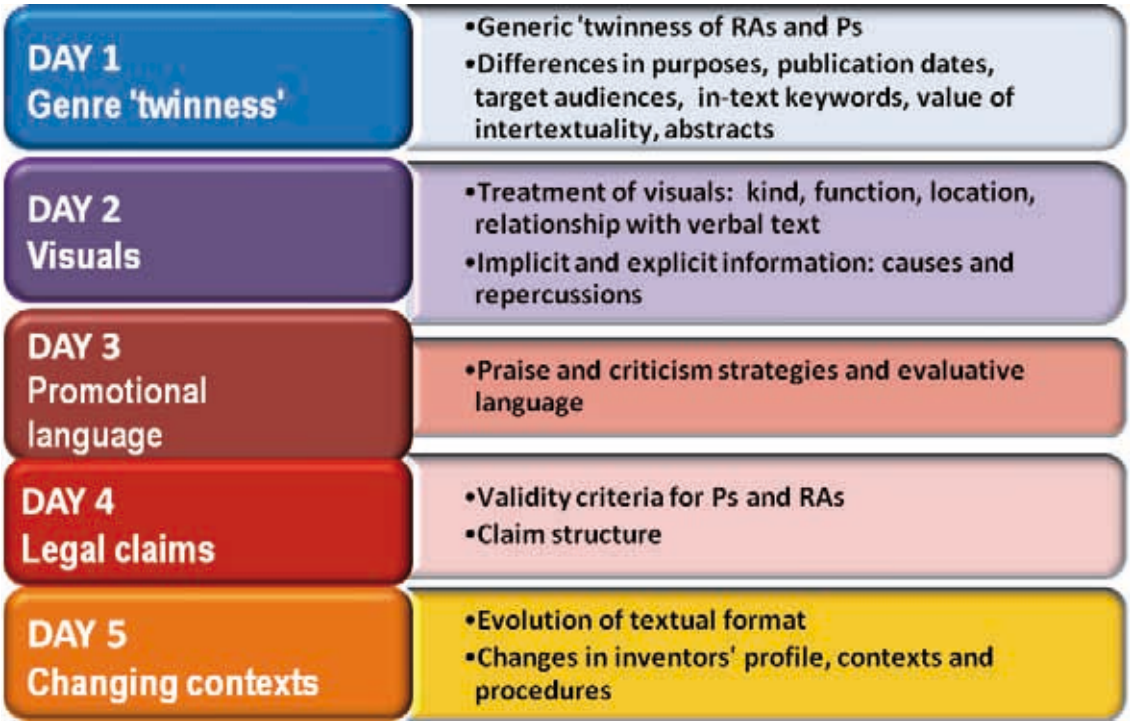

Figure 3. Outline of topical aspects covered

It is worthy of note that worksheets are always designed out of a dual sample RA/P on the same object or phenomenon and written by the same authors, so as to better appreciate the mirroring nature of the two genres. Some of their analytical questions and activities are:

➔ DAY 1

- *What do you think is a 'patent asignee'?*
- *Why is the RA received before the P is filed but always published later?*
- *How do RA and P titles differ and why?*
- *Why are Ps essentially descriptive and RAs narrative?*
- *What are the key words in the body of text of each document?*
- *What do your e-search findings indicate?*

➔ DAY 2

- *Where do you find visuals in each document?*
- *Do they complement the verbal text?*
- *If so, do they anticipate, illustrate, or summarise?*
- *Can you design a visual abstract for each document?*
- *Do the two graphical abstracts highlight the same items or aspects? Why (not)?*

➔ DAY 3

- *How do authors claim the validity of their findings in each genre? What type of language or devices do they use?*
- *How do they criticise previous literature and in what proportion and places in the text? Why do you think they do it in that way?*

➔ DAY 4

- *Can you label the parts of this claim?*
- *Can you match each claim with its corresponding description in the body of text of this patent?*
- *How many independent claims can you find in this patent document?*
- *Can you draw a hierarchy tree of the claims in this patent?*
- *Can you write appropriate claims to vindicate the intellectual property of the fictitious object in the photograph?*

➔ DAY 5

- *What do you think can be patentable?*
- *Do you know of any professor or student who has patented an invention or a discovery? How can universities patent research?*
- *How have the inventor's profile and role changed over the years?*
- *Compare these patent documents from different epochs. How has the format of patents evolved? What parts have been eliminated or modified and why?*

Interestingly, future engineering professionals welcome linguistic methods enthusiastically (e.g. qualitative, such as interviews with members of staff, or quantitative, such as corpus analysis) when it comes to dissecting the texts and finding out about their contexts. Figure 4 shows a worksheet sample with a list of items to be electronically searched with the aid of a freeware concordance program, *AntConc 3.2.1w* (Anthony 2007). With it, students may quantify linguistic and stylistic differences regarding the ways for addressing expert and lay communities within the readership, evaluate the impact of vague and emphatic language and reader-considerateness through metadiscourse, and think of arguments to justify their asymmetries.

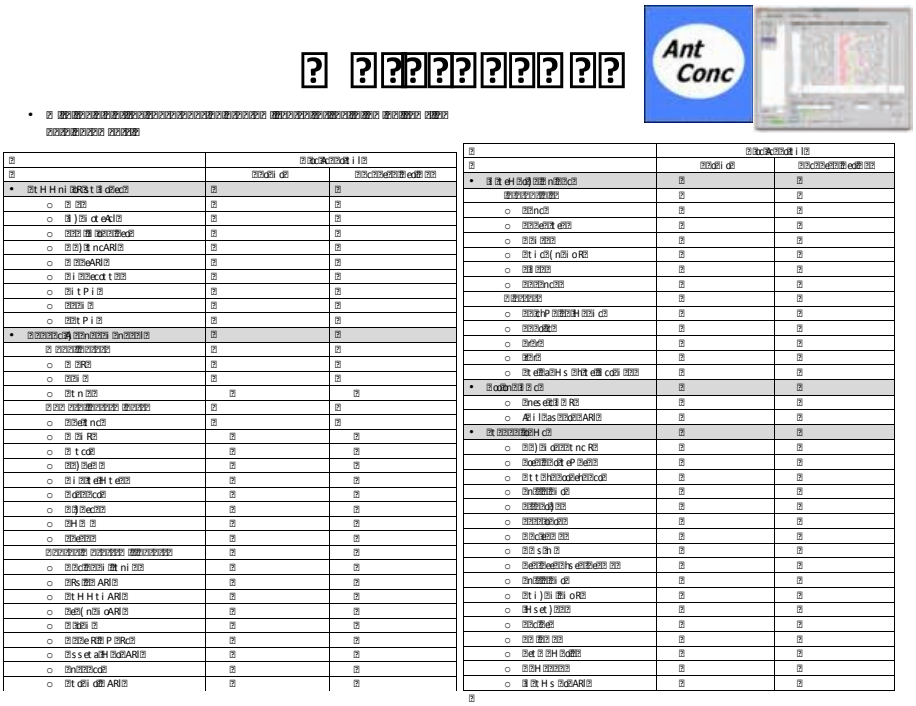

Figure 4. Worksheet sample for the electronic search of textual corpora

3. New methodological avenues

Finally, for future editions of this course the teaching team is contemplating the inclusion of a similar training in derived and associated genres (e.g. brochures, grant proposals, etc.) and in their multimodal dissemination (e.g. video essays and graphical abstracts in the case of RAs). Likewise,

further directions may be the incorporation of reception studies among members of the educational community and testimonies from experienced in-house patent applicants and research writers. To conclude, the satisfaction questionnaires completed by the participants at the end of the seminar reveal their high appreciation of the currency and utility of the contents and their acknowledgement of having gained sensitivity towards their audiences, together with a greater prowess in understanding and handling registers and writing strategies, in particular thanks to the linguistic methods and tools facilitated.

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THE PERFECT DOSE OF SCIENTIFIC ENGLISH IN PHARMACY: CLIL AND ESP INTERCONNECTIONS

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Abstract. This paper considers the coordination, collaboration and interdisciplinary contributions between lecturers who integrate English in the first year of a pharmacy degree programme in Spain. These interconnections relate to English in CLIL in science subjects such as Applied Physics, Introduction to Laboratory Work, Organic Chemistry and Inorganic Chemistry and the corresponding ESP subject. We analyse the types, distribution and interdependence of the activities and learning objectives developed across our subjects.

The growing number of university courses in English across higher education institutions around the world is clearly understandable, given the unquestionable dominance of this language in academic and scientific environments. English is introduced in non-linguistic subjects to enhance language learning and foster domain-relevant communicative skills next to academic and professional content learning, and increase students' motivation, mobility and employability (Dearden, 2014; Doiz, Lasagabaster, & Sierra, 2013; Smit & Dafouz, 2012; Wächter & Maiworm, 2014). Although CLIL (Content and Language Integrated Learning) has a two-fold focus on both content and language, it does not mean that the two aims are always pursued to the same degree (Coyle, Hood, & Marsh, 2010). On the continuum of CLIL-related approaches in higher education proposed by Greere and Räsänen (2008), the presence of a foreign language ranges from incidental and limited exposure to it with no language learning aims, to a fully dual approach involving team teaching and learning outcomes for both language and content. The ongoing growth in the amount of content knowledge delivered in English makes the boundaries between content and language teaching increasingly blurred or even impossible to separate. Teachers of university content subjects may not consider themselves teachers of language (Airey, 2012), but they also introduce rhetorical and discourse elements of their disciplines, even if their subjects apparently do not have any linguistic aims.

This paper focuses on the practical realization of CLIL and presents a collaborative effort and interconnections between ESP (English for Specific Purposes) and CLIL subjects in the Pharmacy degree programme at San Jorge University in Spain. First, content lecturers started to integrate English in their subjects in 2009 and in parallel, a number of accompanying measures were developed to address their language and teaching methodology needs. The CLIL programme was implemented as an institution-wide project, though importantly, it was initiated, developed and supervised by the Institute of Modern Languages. English lecturers from this transversal language centre teach ESP subjects and provide individual support to content lecturers. The number of credits in English in Pharmacy has been growing progressively and currently 13 content lecturers integrate it in 23 subjects. As the authors teach in the first year of the programme, the present paper aims at showing the amount and distribution of English in first-year subjects as well as the coordination and collaboration between content and language lecturers. In the first year, apart from the ESP subject, credits in English are integrated in the following content subjects: Introduction to Laboratory Work, Applied Physics, Inorganic Chemistry and Organic Chemistry (Table 1). Although it is not possible to analyse the current situation and all of our activities in detail within the limits of this paper, we hope that our brief descriptions and examples will provide guidelines and ideas for other university contexts and Pharmacy degrees in particular.

1st year	Introduction to Laboratory Work	Applied Physics	Inorganic Chemistry	Organic Chemistry	English
credits in English/ total number of credits	1/6	1/6	1/9	2/9	6/6
September					
October	HOT SEAT: laboratory equipment ONLINE QUESTIONNAIRE: chemical waste disposal in the lab	Blood flow in mammals	Short exercises distributed along the course		
November	SOP (Standard Operating Procedure)	Cell membrane and nerve impulse			
December	POSTER: safety rules and operations				
January					
February					1.Introduction to pharmacy 2. Lab safety 3.Chemistry 4.Experiments 5.Herbal medicine 6.Drugs and medicines 7.Illness and disease 8. Pharmaceutical care
March				Practical sessions in the laboratory	
April				Activities about Lab Experiments: written exercises and online questionnaire	
May					

Table 1. Integration of English into first-year content courses

The integration of English starts in the first semester in the subject called Introduction to Laboratory Work which includes three main parts: safety rules and chemical waste disposal in the lab, operations in laboratories and quality control. The activities in English concentrate on increasing students' knowledge of scientific vocabulary related to laboratory work (laboratory instruments or processes) and the ability to define difficult terms related to it. In the activity called HOT-SEAT, each student writes a definition of an assigned term (*volumetric flask, watch glass, pipette*, etc.). Then in class, students take turns to read the definitions aloud and select three key words so that the class can guess the terms and complete an online quiz. Students use these terms later to write a standard laboratory procedure in the SOP activity (very important for quality control) and design and present an informative poster explaining safety rules and operations (e.g. *Waste disposal and environmentally friendly behaviour*, *How to use laboratory equipment*, *Extraction with a separatory funnel*, see Figure 1). In order to reinforce this part of the subject, students also complete an online quiz about chemical waste disposal.

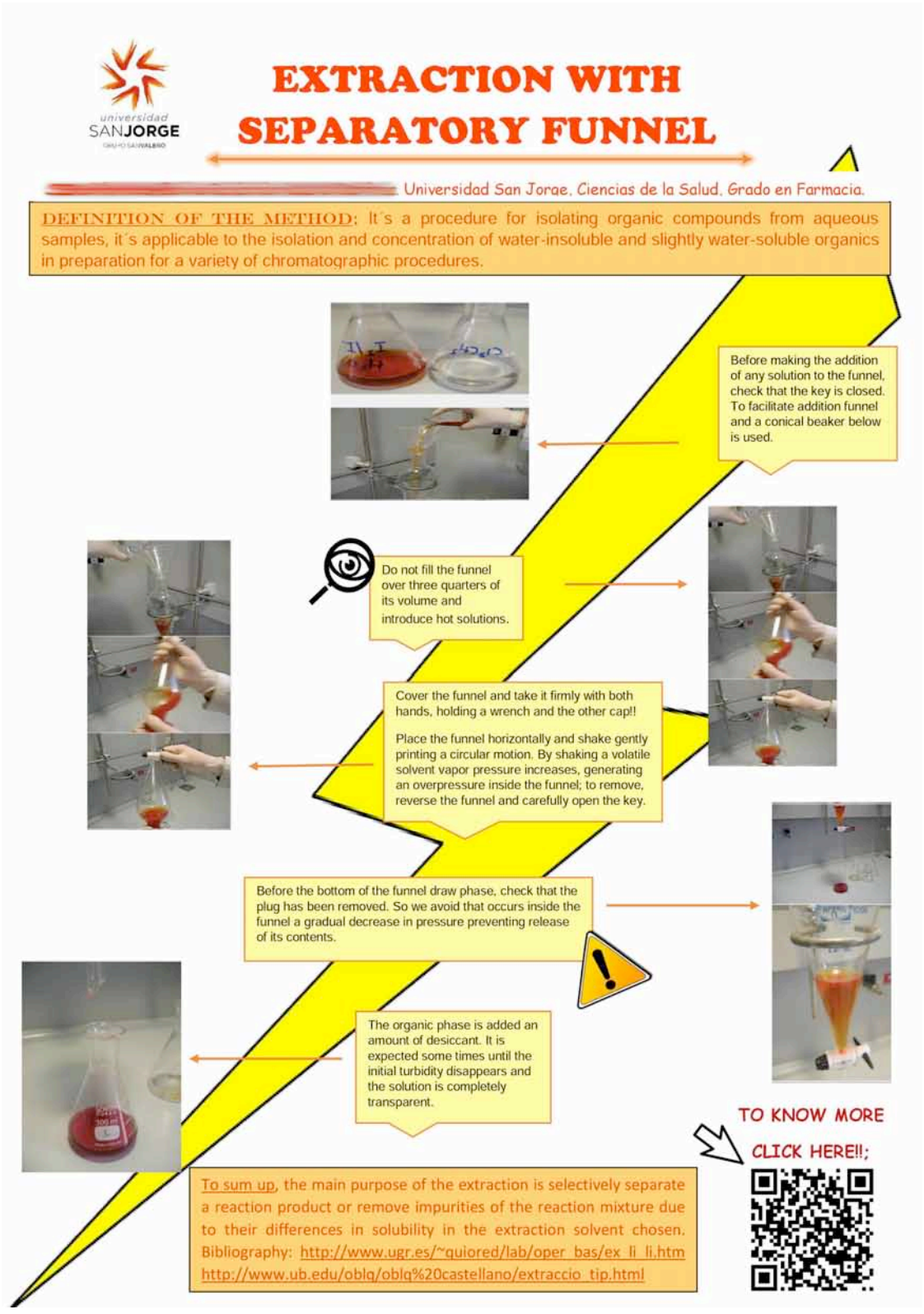

Figure 1. Example of student poster

Applied Physics integrates English in two activities: a study of blood flow in mammals and a research project on cell membrane and nerve impulse. The methodology used in the subject reflects the position of English in today's scientific communication as the activities are developed through congress simulations and scientific seminars (Bergues, Chinarro & Bruton, 2010; Bergues & Domingo, 2015). The aim of the first activity is to analyse physical models and whereas in the

Introduction to Laboratory Work students produce an informative poster, in Applied Physics the integration of English involves writing skills for scientific posters. Students should coherently organize and structure their research and poster including key information for further discussion. In the second activity, students apply the principles of physics to the study of the nerve impulse. Here, in turn, both oral and written production in English is required as students speak about their research, answer questions, write a poster and a short scientific paper as well as appraise other students' work.

In Inorganic Chemistry, several short activities in English are distributed along the semester. Students read the introduction of each practical class in English and answer questions, for example, *When do we use buffer solutions?*, *Why do we use back titration?*, *Define the concept of total acidity in vinegar*, or *What protein is responsible for the separation of milk into curds and for glue preparation?* In theoretical classes, students work with texts related to the new concepts and processes and complete short fill in the gaps and listening exercises. Students are also expected to recognize technical vocabulary and show their understanding by simplifying the language.

English did not start to be taught as an obligatory subject until 2013, so the above-mentioned CLIL activities could not be ignored when designing this ESP course, and this time, in turn, the guidance from Pharmacy lecturers was required and highly appreciated to decide on the contents. Our materials and activities aim to respond to students' and lecturers' unique needs whereas our contents and thematic threads concentrate on authentic language activities that are or will be developed in CLIL classes. The syllabus is divided into two parts, chemistry and pharmacy, organised in eight thematic blocks (Table 1). The first half of the course covers chemistry and laboratory work as this part is taught in parallel to practical classes in Organic Chemistry where students use a lab book in English to write down their results and conclusions of experiments performed in the laboratory. Theoretical sessions of Organic Chemistry cover the main concepts such as *specific rotation*, *distillation calculations*, *liquid-liquid extraction and solubility*, *polarity,* or *column and thin layer chromatography*. At the same time, in the course named English, students explain the similarities and differences between laboratory instruments, give instructions and describe experiments indicated by chemistry lectures. The second part of the subject focuses on pharmaceutical practice and some new concepts related to medicines and pharmaceutical care are introduced, for instance, *dosage forms, routes of administration, side effects*, etc. Students conduct an interview with a patient explaining the use of medicines. Particular tasks and activities build upon each other and prepare students for more complex linguistic contents in both language and content subjects in the following years.

The results of integrating English in Pharmacy degree programme are highly satisfactory for the students, who demonstrate great interest, and for the lecturers, who acknowledge the effectiveness of the content learning in the English-taught courses on the basis of exam scores. The positive reception of this degree programme, in an area in which communication in English is so widespread and 'natural', provides further evidence of the success and development of CLIL. The distribution of English across the subjects and the syllabus of the ESP course result from careful planning, sequencing, coordination and collaboration. This work is under constant development in search of the 'perfect dose' of English in Pharmacy.

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THE LONG TRADITION OF GENRE ANALYSIS IN ESP: DOES IT HAVE ANYTHING TO SAY IN CLIL?

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Abstract: Genre analysis has served to reorganize the research and methodology of ESP and EAP. This long tradition can be now applied to CLIL. The paper proposes to use a genre approach for the linguistic education of English Medium Instruction lecturers of scientific and technological areas. The proposal centers in the lecture as the academic genre per excellence. Following the phases model (Young, 1994) some very precise pedagogical implications are suggested.

Genre analysis is a widely used approach in ESP which has provided pedagogical insights useful for course and materials design. Thus, it has been declared that the concept of genre has served to reorganize the research and pedagogical methodology of ESP and EAP (Alcaraz Varó, 2000). This long tradition can be now applied to CLIL and contribute to reorganize its research and pedagogical methodology (the acronym CLIL will be maintained throughout the text regardless of educational level, but when specifically referring to higher education, EMI will be used). This paper attempts to shed light on how this could be achieved. The first section outlines the potential of genre analysis to reorganize research and teaching methodologies in CLIL EMI. An example of how CLIL contexts can be approached from a genre perspective is presented in the second section.

The potential of a genre approach in CLIL

Taking genre as the basic unit for linguistic planning is a proposal for innovative language education which is already being implemented in some European contexts under the name 'language integrated curriculum" (LIC). The study of the first results in Andalucía, the southern region of Spain, led to the conclusion that:

> CLIL implies a new language model and it both coincides with and has contributed to a move away from the *ars gramatica* and towards a genre-based approach to language study—all language study" (Lorenzo *et al.*, 2009, p. 18).

In addition to these arguments, a second group of vindications refer to the potential of genres as a tool for a true integration of language and content. The rationale behind this position is that "the genre-based approach addresses the concerns of both subject and language learning and supports both the content and language goals of CLIL" (Moate, 2010, p.40).

Several studies (Llinares & Whittaker, 2009; 2010; 2011) report on and evaluate how the genre-based approach to CLIL is being implemented in Spanish secondary school Social Sciences, mainly History. Carefully graded tasks and suitable scaffolding are presented to students from the first years. When the function and the stages of texts are understood, students and teachers unite subject knowledge and the use of language. The effectiveness of this approach lies in the visibility of the cognitive functions intrinsic to the different subjects (Llinares & Whittaker, 2011).

In this same genre-based approach, the project "CLIL and literacy" (The Graz Group, 2013-2015) aims to provide support for academic literacies in secondary education. Its purpose is to assist with the subject literacy skills needed for effective CLIL. The starting point from this is the reality that subject literacy skills are often neglected in CLIL practices, which deprives learners of

adequate development of CALP. The main project outcomes are expected to be a theoretical framework and resources bank to support content teachers.

Advocates of the integrative and unifying potential of genres can equally be found in recommendations in the theoretical and research literature. Genres are seen as potential tools "to bridge the gap between BICS and CALP" (Dafouz, 2011, p. 204). In addition, genres could constitute the "much sought-after analytical tool that captures content-and-language integration" (Dalton-Puffer, 2011, p. 193).

The evidence of the potential and advantages of such an approach demands a step forward: it is essential to apply this to genre in CLIL contexts. The following section provides an example.

A genre approach in CLIL: the lecture

The academic genre per excellence is the lecture. The increase of English Medium Instruction (EMI) in scientific and technological disciplines requires the linguistic training of lecturers. This section of the paper proposes a genre approach to the lecture with the purpose of identifying teachable elements.

The phase model (Young, 1994) is a systematic proposal to the structural patterns of the lecture from a genre analysis perspective. Young defines *phases* as "Strands of discourse that recur discontinuously throughout a particular language event, and, taken together, structure the event. These strands recur and are interspersed with others resulting in an interweaving of threads as the discourse progresses" (1994: 165).

This definition and model are the result of analyzing 72 lectures from different disciplines. The model delineates a common macrostructure, along with the most relevant features of each one of the parts. Phases can be grouped in two categories:

1) metadiscursive, which refer to discourse;

2) non-metadiscursive, related to content.

On the one hand, this classification establishes a main distinction between moves in the lecture referring to discourse and moves not referring to it. On the other, it shows a macrostructure and some significant features which could be exploited in order to teach this genre.

This model was adjusted by Dafouz and Nuñez (2010) so as to take in lectures in EMI contexts. They provided a taxonomy of discourse markers used by EMI lecturers to signal the metadiscoursal phases. Further research on EMI lecturers´ discourses (Martín del Pozo, 2014) adds new categories to the markers identified by Dafouz and Nuñez (2010). Table 1 shows the categories (the new ones are highlighted in bold), the function of the discourse markers and some examples from the data.

	Category		Function	Examples
Discourse structuring phase	Openers		Indicate the beginning of class/section	*In this lesson we will talk about*
	Sequencers		Mark a position within a series	*first of all, then*
	Topicalizer	**Verbal**	Indicate the introduction of a new topic	*Another possible model is*
		non verbal	introduction of a new topic without verbal sign	*Change slide in silence*
		referring to visuals	introduction of a new topic by referring to visual support	*Here we have*
	Prospective markers		Refer to future topics/ sections (present class or other)	*we are going to see later*
	Retrospective markers		Refer to past topics or sections (present class or other)	*as you have heard*
Interaction phase	**questions**	**Referential**	Teacher knows the answer	*What is the result of ?*
		Display	Teacher does not know the answer	*What do you prefer?*
		Rhetorical	Teacher ask and answers	*What does this mean?*
		Indirect	For the students to react	*Could you raise your hand if you agree?*
	Commentaries		Addressing the students directly (you) Inclusive expressions (we)	*as you can see Let us consider*
	Apologizing		Apologizing for deficiencies	*Sorry…*
	Contextual comments		Refer to aspects related to context	*Temperature in any point of this room.*
Conclusion Phase	Closing markers		Formal closing of class/section	*I finish the theoretical lecture*
	Recapitulation markers		*Sumarize main ideas of a class/section*	*We have reflected that*
	Prospective markers		*Refer to topics of future classes*	*in the next lesson we will*
	Retrospective markers		*Refer to topics previously covered*	*Here I talked about*

Table 1. Metadiscoursal lecture phases, discourse markers and examples (Martín del Pozo, 2014)

The reasons for new categories are:

1) The categories *verbal topicalizers*, *non-verbal topicalizers* and *topicalizers referring to visuals* emerged from observations of lecturers. This division was necessary because lecturers introduce new topics in different ways. However, not all of them are equally efficient. For example, too many non-verbal topicalizers may hinder comprehension.

2) The different categories of questions aim to activate reflection about how questions can contribute to learning and to interaction.

This taxonomy of lecture phases and the markers used to signal them could be employed to provide EMI lecturers with linguistic tools to teach in English. The EAP and ESP tradition count with language teaching materials which could now be used in the training of EMI lecturers. For example, the language needed for referring to visuals in lectures (an item which appears under the category of topicalizers) could be taught using materials, which were originally targeted at students in EMI contexts. These can now be used to assist those who have to lecture in English. An example from http://www.uefap.com/speaking/spkfram.htm is shown in Figure 1.

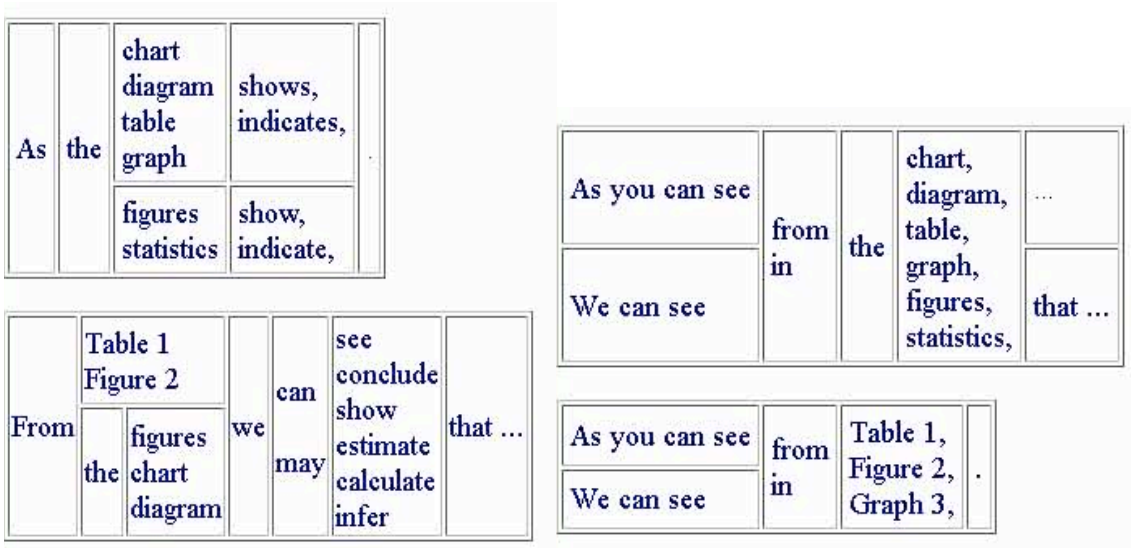

Figure 1. EAP materials to teach the language of referring to visuals

Conclusion

The paper has addressed the question of what the **long tradition of genre analysis in ESP** could **say in CLIL contexts.** One of the lessons learnt from the ESP experience that can be adapted to the new scenario is the potential of genres to serve as language teaching tools. The paper has provided an example of how this can be done with the academic genre of the lecture. Approaching the lecture as a genre has served to identify structural patterns and discursive elements which could serve to train CLIL teachers. Therefore, ESP and CLIL should each put their findings and knowledge at the service of the other.

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HOW MOTIVATED ARE SUBJECT TEACHERS IN HIGHER EDUCATION? THE CASE OF A CLIL PROGRAMME IN SPAIN

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Abstract: This paper examines the motivational dynamics of subject teachers in scientific areas at a Spanish university seeking to discover the influence of CLIL training on their motivation. Based on Dörnyei's motivational self-system (2009), it will explore the developments of their self-image as CLIL teachers as well as their expectations or future selves before and after undertaking a CLIL course for beginners.

Introduction

The Universidad San Jorge is a young university; it was created in 2005 with only a few degrees in the Faculty of Communication. However, in the last decade, Science degrees have extended the range of degree programmes on offer. The implementation process of the CLIL programme started relatively recently with the incorporation of a number of credits to be taught in English in some of the subjects for each degree programme. The number of credits is increasing over the academic years as subject teachers receive CLIL training and develop English-language proficiency.

The present paper seeks to examine the motivational dynamics of the science teachers involved in the programme: the extrinsic or intrinsic factors as well as their self-image as CLIL teachers and the possible evolution of these elements along the initial stages of implementation. According to Dynamic Systems Theory (de Bot, 2008; Dörnyei, 2009; Larsen-Freeman, 2006; and Waninge, Dörnyei and de Bot, 2014; among others), motivation is influenced by processes, experiences and knowledge acquisition. The idea of a dynamic notion of motivation has led to the present survey, which is intended to identify possible changes in the motivation of the teachers participating in the programme, resulting from the effects of CLIL training.

Context

Subject teachers at Universidad San Jorge are offered a free CLIL training programme as well as English courses that seek to encourage the incorporation of English in their subjects.

The process of CLIL implementation in the degrees is made through two different stages. The first one is called *habilitación* and the second one *acreditación*. For both stages, subject teachers must demonstrate English skills and have completed the training courses offered at the university (see Nashaat Sobhy and Giner, this volume). The first stage will reward teachers with additional credits on their teaching assignation (meaning extra time) whereas the second stage offers monetary retribution.

Study design

The sample of subject teachers taken for this study has been selected from the teachers enrolled in the initial CLIL training course compulsory to achieve the *habilitación* stage. Teachers were asked to participate in this study voluntarily by responding to one questionnaire before starting the course

and another one after its completion. The course spanned one month and teachers were given one additional month to put into practice the information acquired in the CLIL course.

The initial CLIL training course at San Jorge focuses on the definition of CLIL from a practical perspective and provides subject teachers with tools and resources to take an interactive approach in the classroom. The teachers in charge of this course often report on the need to establish a clear idea of what a CLIL approach entails, as opposed to teaching their subject in a context where their students are English speakers.

Results and discussion

The questionnaire is divided into different sections addressing the following aspects: i) previous CLIL training and other background information, ii) motivation to participate in the CLIL programme, iii) information about subject teachers' self-image before, during and after a CLIL lesson, iv) basic notions in CLIL and v) the representation of teachers' future self guides. To briefly illustrate the evolution of the teachers' motivation, this paper will only give a few significant examples where the motivation of subject teachers shows a dramatic increase after the completion of initial training.

The type of motivation that has drawn these teachers to incorporate CLIL in their lessons appears to be intrinsic rather than extrinsic. Half of the teachers surveyed strongly disagree with the idea that the additional credits provide their main motivation (while the other 50% partially agree). On the contrary, 75% of the teachers affirm that their motives were related to personal growth and 66.7% also say that this was a chance to improve their English skills. However, 75% of them point to professional reasons or say that they joined in because their deans or vice-deans asked them to get involved in the programme.

After training, the motivational dynamics of subject teachers moves even more towards the intrinsic end of the continuum. For example, the percentage of teachers who answered that credits or more time were their motivation to integrate CLIL in their lessons changed to 66.7% (plus an additional 16.7% who were almost in absolute agreement with this statement). The same numbers apply to the monetary retribution as the reason for integrating CLIL in their teaching practices. Indeed, 83.4% of teachers show intrinsic motivation when answering that their personal growth and the will to improve their own English skills are the factors that led them to participate in the CLIL programme. 100% of them also answered that they wished to enter the programme for reasons related to professional development, but only 33.3% gave their deans or vice-deans as the main reason.

In relation to knowledge on the CLIL approach, before any training was done (see figure 1), 41.7% of surveyed teachers stated that they did not combine subject content with language skills in their lessons, while a significant 41.7% did so to some extent. Only 8.3% of the teachers said they did included a combination of both in their lessons. However, after completion of the course, 83.3% of teachers now combined the teaching of their subject content with English language skills and the same percentage of teachers declared that they catered for their students' different needs in terms of mixed English language abilities (see figure 2).

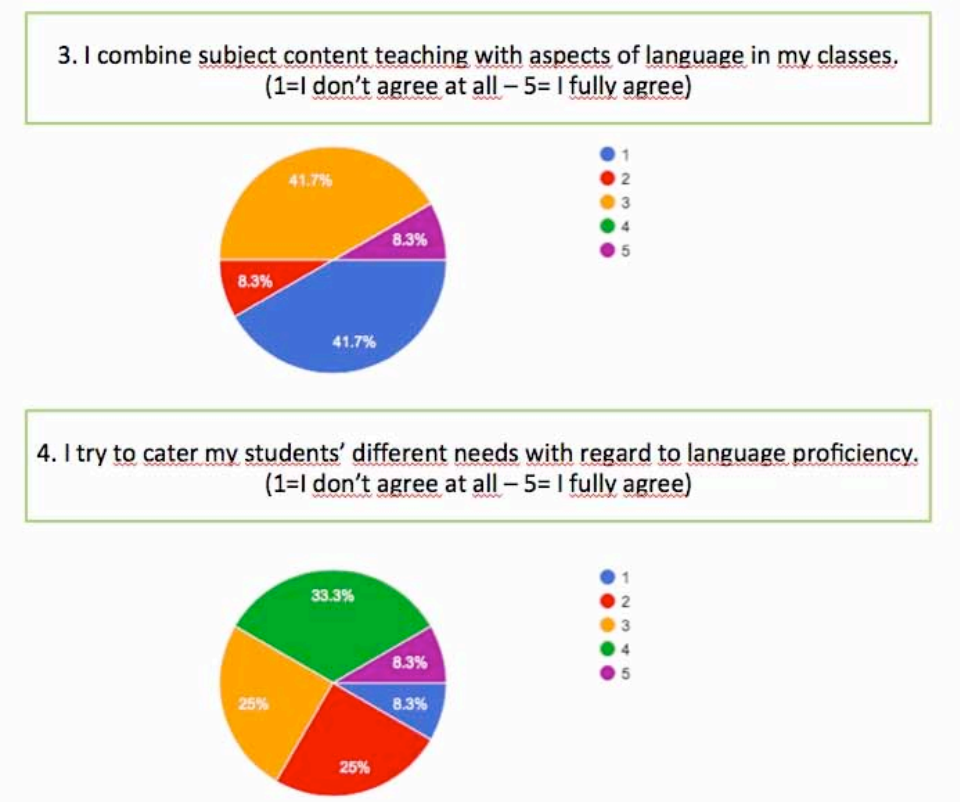

Figure 1. Teachers' responses before receiving CLIL training

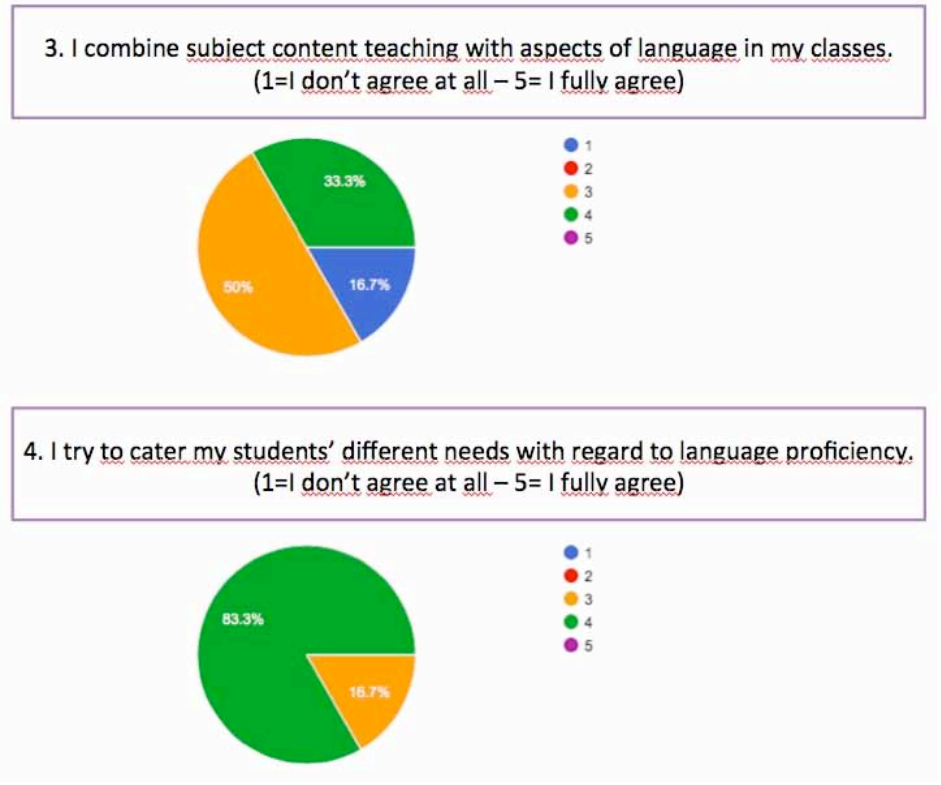

Figure 2. Teachers' responses after CLIL training

Regarding students' different needs in the classroom, less than half the teachers (41.7%) paid any attention to any proficiency level differences in English that their students may present in class before training was conducted. However, almost 67% of them are fully aware that some of the students they have in class are left behind due to problems with the language. In line with this idea, 33.3% of them say they teach their lessons as if they were in a context with English speaking students only. After finishing the course, 33.3% of teachers say now they paid attention to the oral production of their students and helped them improve their pronunciation and intonation.

The questionnaires also included a section dedicated to how subject teachers imagined themselves in the future. The notion of possible selves (Carver et al., 1994) as future self-guides (Csizér and Dörnyei, 2005) is essential to understand how motivation works. These figures are constructed in the mind of the individual and help him or her imagine how they might evolve in the future. In consequence, possible selves can function as a guide or inspiration to help the individual (or, in this case, subject teachers) take action and become that possible desired self in the future.

As such, the future self-guides for subject teachers in this survey look very optimistic both before and after completing the course. Most of the surveyed teachers report imagining themselves comfortably enjoying their CLIL lesson before training, in both questionnaires (83.3%). The percentage of teachers that could imagine themselves as one of the best in their areas, however, increased to a significant 66.7% in contrast to a 25% before training was carried out (figure 3). Another significant change is that 83.4% felt capable of combining content and language in their lessons, which shows an increase from the 66.7% who showed confidence in this item in the first questionnaire.

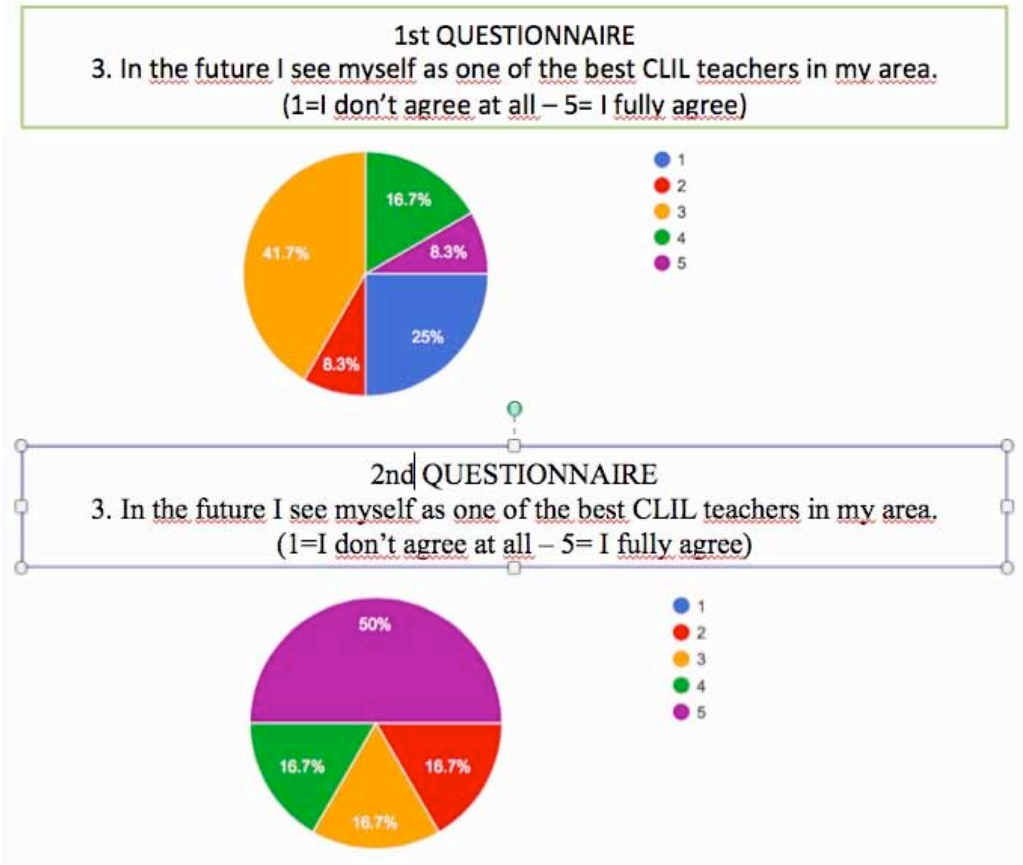

Figure 3. How teachers envisage their future CLIL performance

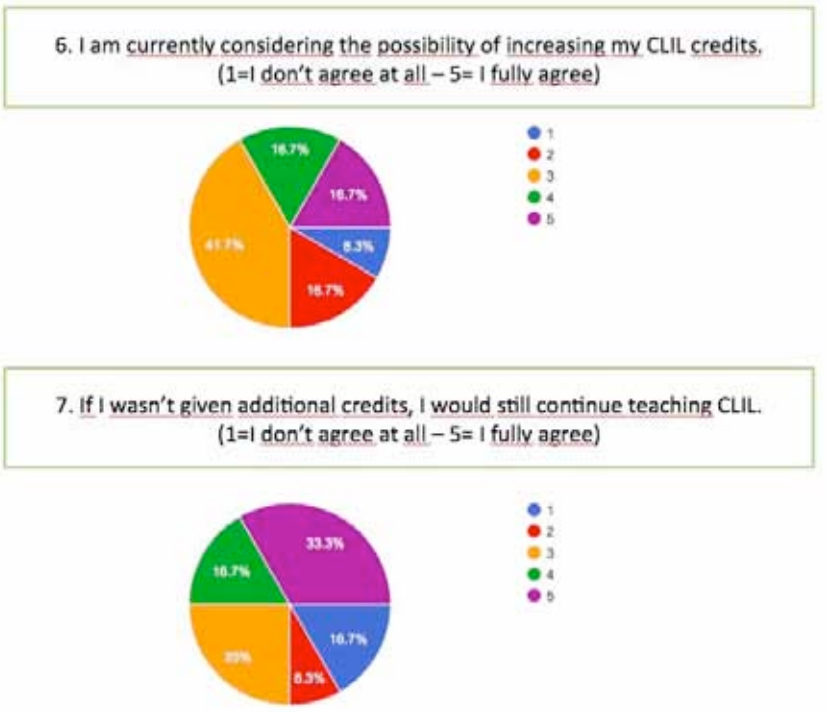

Figure 4. Initial attitudes towards future CLIL teaching

The initial questionnaire also showed that 33.4% would like to add more English credits in their subjects in the future, and 50% of them responded positively when asked about continuing with CLIL even if no additional credits were assigned to them (figure 4).

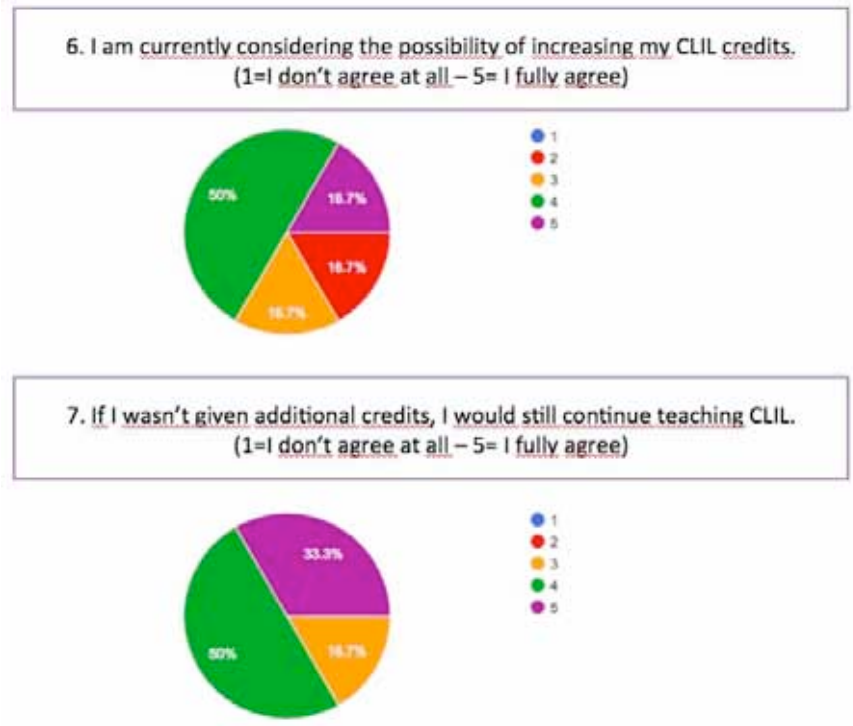

Figure 5. Attitudes towards future CLIL teaching after training

After training, 66.7% of teachers stated they would increase the number of English credits in their teaching load, and 83.3% of them would agree to continue in the CLIL programme should additional credits be eliminated (see figure 5). Finally, one of the most positive findings in this survey is that 100% of the teachers reported that they were keen on continuing CLIL training even if it was not a requirement to achieve the stage of *acreditación* (figure 6).

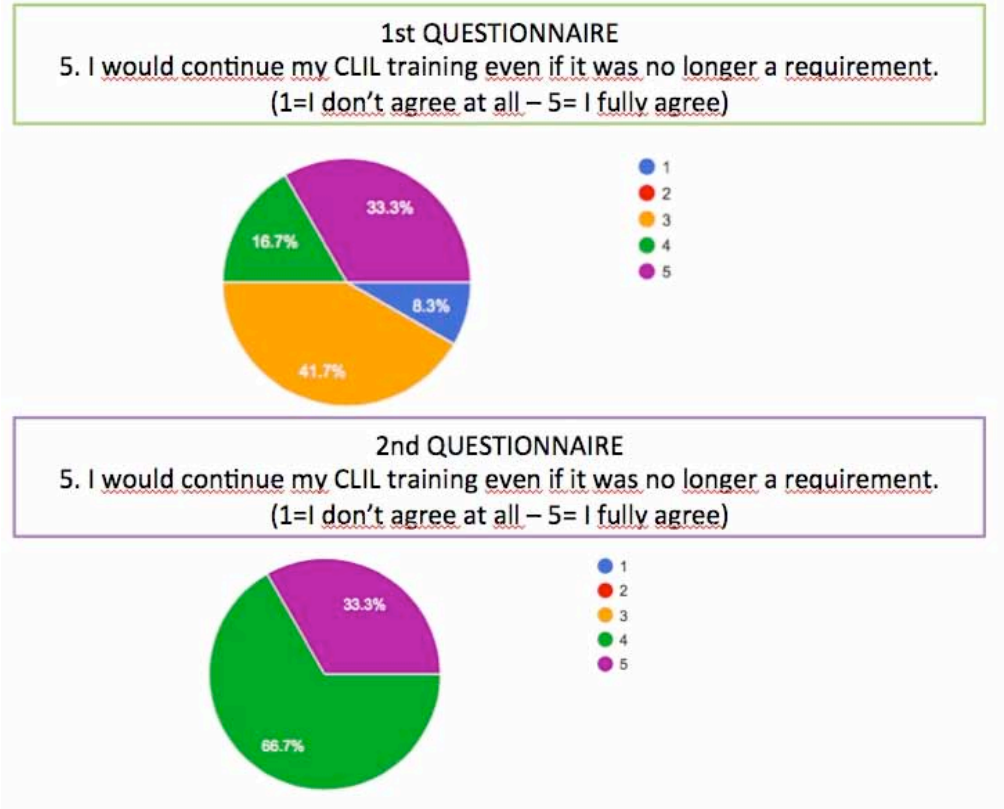

Figure 6. Attitudes towards continuing CLIL training

Conclusion

The effects of training, according to the present survey, are clearly positive, equipping subject teachers with the knowledge, experience and tools necessary for them to gain confidence in all the different stages of CLIL teaching: lesson planning, preparation of materials, classroom management and evaluation. In fact, initial CLIL training has also proven to influence the representation of their future self guides, encouraging teachers to pursue the objective of becoming outstanding CLIL teachers in their fields. Certainly, these results are overwhelmingly positive, and motivational not only for the subject teachers but also for their supervisors and other professional figures participating in the implementation of the programme at Universidad San Jorge.

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JAPANESE NON-ENGLISH MAJOR UNIVERSITY STUDENT ATTITUDES TO THE STUDY OF ECONOMICS IN ENGLISH

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Abstract: The 'dismal science' (economics) can be daunting for non-English major university students in Japan. In this presentation, I report on an ongoing, small-scale project with students who would be classified as level A1 learners of English. The aim is to stimulate student interest in and greater understanding of basic microeconomic principles through the medium of English, using a blended mix of technological resources from the internet and collaborative learning.

Economics is sometimes called the 'dismal science', and for first year non-English major university students in Japan, studying subjects such as economics or business through the medium of English can indeed be dismal, or at the very least daunting. This is particularly the case for students who would probably be classified as level A1, or lower, on the CEFR (Negishi & Tono, 2014). Additionally, Japan, like many other countries, has seen a recent trend towards introversion, with fewer young people interested in studying or working overseas (Dujarric & Takenaka, 2014; IIE, 2015; Sanno Institute of Management, 2013; Tanikawa, 2011).

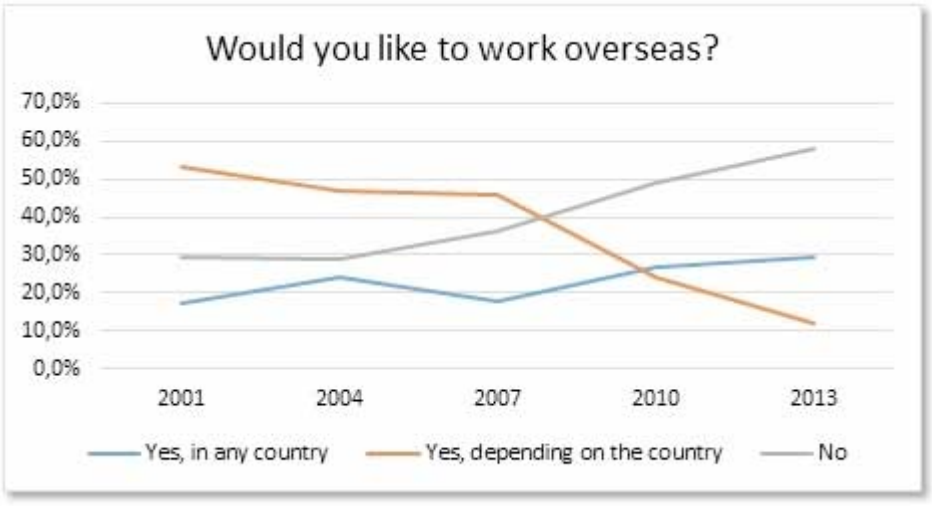

Figure 1. New company employees' attitudes to working abroad. (Source: Sanno Institute of Management, 2013)

In practice, I deal with students who have had a minimum of six years, sometimes more, of formal English language before entering university. Most would probably not be easily placed on the CEFR scale, not realistically being able to reach the requirements of A1. A very few might classified as high as A2, but in a culture which places such a high value on consensus and group harmony, many of these students will demonstrate a much lower level of comprehension and expertise in the classroom, and often in practical demonstrations such as presentations, though they may excel on pencil and paper tests or in more private interactions with the teacher. For most, English is something they have performed badly at in school. They lack confidence and are extremely reluctant to be seen by their peers as being poor in the subject. Consequently, as is the case in many Japanese English language classrooms, my students might be considered 'quiet' or 'passive'.

I am convinced that this is the end result of Japan's entrance-examination-focussed education system, in which those who perform best on tests enter the best high schools and universities and are subsequently rewarded with the best career opportunities (e.g. Nakane, 1984; Reischauer, 1977; Sugimoto, 2010; Takahashi, 2004). Teachers feel a great deal of pressure to 'stick to' the curriculum, as a failure to cover all material may leave students unable to cope with what they will encounter in tests. Those who find themselves unable to keep up are often left to find other ways of trying to understand English, leading to high rates of extra-curricular study. Despite this, or perhaps because of it, pupils and students very often lack motivation to learn English (Berwick & Ross, 1989; Brown, 2004; Kikuchi, 2013; Kimura, Nakata & Okumura, 2001; Ushioda, 2013)

I must stress that this is not the experience of all students or all teachers. Teachers in Japan are dedicated and hard-working. They care deeply about their pupils, and generally pupils respect, admire, even love their teachers. Yet, the reality is that learning English as a subject is challenging for many, and learning content through English even more so.

Over the last year, I have been attempting to discover a way of stimulating student interest in, and understanding of, economics through a blended mix of technological resources on the internet, traditional classroom pedagogy and collaborative learning.

There have been two main challenges. The first has been a general lack of knowledge of the subject. Pupils in Japan encounter little specific economic content in school, and despite the fact that these particular students are all in the Faculty of Economics, few are capable of giving a coherent answer to the question: What is economics? The second has been the acquisition of vocabulary, particularly economics-specific content vocabulary.

These two challenges are complementary, to some extent. Helping students, even with rudimentary English language skills, to develop a means of expressing themselves on economic concepts requires some knowledge of relevant terminology.

One technique has been to marry on online learning tool, Quizlet, with classroom activities. For example, students can access Economic terms on Quizlet (https://quizlet.com/101252905/economics-1-flash-cards/) to engage in learning activities online, either via personal computer or their smartphones. This can be done in class, as homework, or to preview or review class activities.

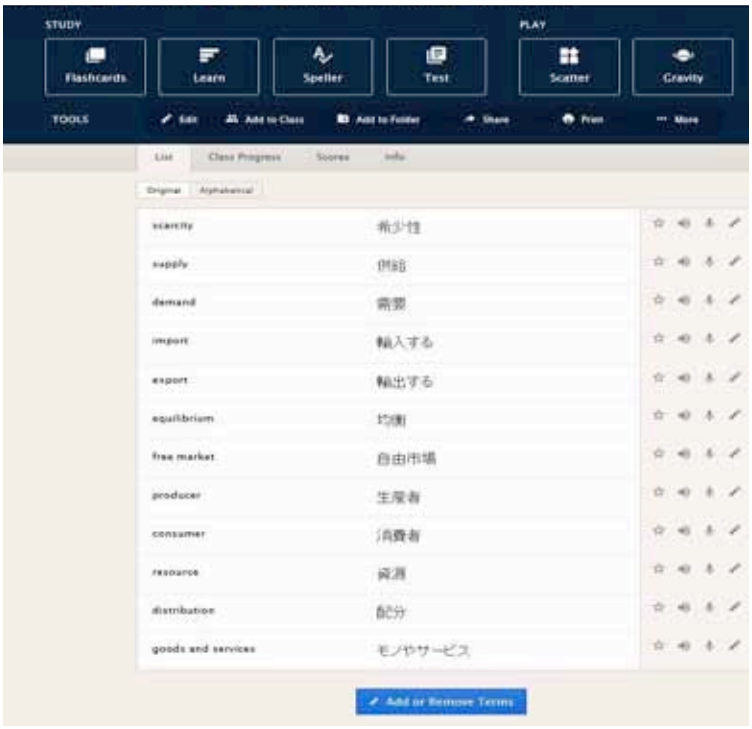

Figure 2. Screen shot of a Quizlet vocabulary page

This is then followed in the classroom with various pencil-and-paper activities. One of the most enjoyable for my students is known as 'quiz-quiz-trade'. Students are provided with a paper similar to that shown in Figure 3. The left hand side shows the front side of the paper, the right hand side shows the back.

Scarcity	Scarcity means there isn't enough of something.
Supply	Supply means how much of something there is for sale.

Figure 3. Example of 'quiz-quiz-trade' flash cards

Each student is provided with one word and two students engage with one another to ask three simple questions about the paper they have:

1. How do you say '希少性' in English? OR How do you say 'scarcity' in Japanese?
2. How do you spell 'scarcity'?
3. What does 'scarcity' mean?

Students are encouraged to help one another to 'cheat' by giving their partner a short look at the paper if they have trouble answering any of the questions. Once both students have completed the 'quiz', they 'trade' papers and find new partners to go through the process again.

The final aim of this endeavour will be to help students develop the ability to explain, in English, some of their own behaviours in life as examples of economic activity, which will in turn be beneficial to them when they encounter the same concepts, though in greater depth, in Japanese in other classes. By its nature this is a small-scale and ongoing educational process, and some efforts prove more successful than others. However, I found positive student attitudes toward this approach of using online resources together with more traditional classroom activities to encourage a greater understanding of basic microeconomic principles through the medium of English. The ideas explained here are just examples of the many efforts made by teachers at Hannan University to incorporate business and economics-related activities and events in order to promote collaborative, active learning for university students through English.

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