Digilec 8 (2021), pp. 115-136

Fecha de recepción: 23/03/2021
Fecha de aceptación: 15/06/2021
DOI: https://doi.org/10.17979/digilec.2021.8.0.7763

e-ISSN: 2386-6691

THE DEVELOPMENT OF SOFT SKILLS AND ENGLISH THROUGH ICLHE: LITERATURE REVIEW AND PEDAGOGICAL PROPOSAL FOR ENGINEERING STUDENTS

EL DESARROLLO DE HABILIDADES BLANDAS Y EL INGLÉS A TRAVÉS DE ICLES: REVISIÓN DE LA LITERATURA Y PROPUESTA PEDAGÓGICA PARA ESTUDIANTES DE INGENIERÍA

Javier DÍEZ-RAMÍREZ
Universidad de Castilla-La Mancha
Orcid: https://orcid.org/0000-0002-5357-5006

Mercedes QUEROL-JULIÁN*
Universidad Internacional de La Rioja
Orcid: http://orcid.org/0000-0003-4017-1982

Abstract
Mastering English is a must for all engineers in the current globalized world where English is the language of science, communication and business. In an engineering syllabus, however, in addition to technical skills and English proficiency, the development of other competences also needs to be considered. To adequately equip engineering students for their careers, we also have to promote the development of soft skills such as communication, problem-solving, teamwork, time-management or leadership, among others. ICLHE (Integrating Content and Language in Higher Education), which is itself evocative of CLIL (Content and Language Integrated Learning) approach extensively used in other educational levels, appears as an alternative to integrate language learning in non-language subject curriculums in higher education and to develop soft skills. This paper makes a literature review to find out the main aspects that engineering instructors should consider to properly implement ICLHE to enhance learners' development of soft-skills through the active methodologies of Project-Based Learning and Flipped Classroom. In the last part of the study, a 10-step guideline is proposed, which will help teachers to integrate these active methodologies in an ICLHE engineering subject.

Key Words: Integrating Content and Language in Higher Education; engineering studies; project-based learning; flipped classroom; soft skills

* Avenida de la Paz, 137. 26006, Logroño (Spain). Email: mercedes.querol@unir.net

Resumen
Tener una buena competencia en inglés es una necesidad para los ingenieros en un mundo globalizado donde el inglés es la lengua de la ciencia, la comunicación y los negocios. Sin embargo, en el plan de estudios de una ingeniería se debe tener en cuenta otras competencias además de las habilidades técnicas y el inglés. Para preparar adecuadamente a los estudiantes de ingeniería para sus carreras profesionales, debemos fomentar también el desarrollo de sus habilidades blandas tales como la comunicación, la resolución de problemas, el trabajo en equipo, la gestión del tiempo o el liderazgo, entre otras. ICLES (Integración de Contenido y Lengua en Educación Superior), el cual es si mismo evoca el enfoque AICLE (Aprendizaje Integrado de Contenido y Lengua) ampliamente utilizado en otros niveles educativos, aparece como una alternativa para integrar el aprendizaje de lenguas en currículos de asignaturas donde no se enseña lengua en la universidad y desarrollar las habilidades blandas. Este artículo hace una revisión de la literatura con el objetivo de encontrar los aspectos más importantes que los docentes de ingeniería deberían considerar para, de forma adecuada, implementar ICLES para mejorar el desarrollo de las habilidades blandas mediante las metodologías activas del aprendizaje basado en proyectos y la clase invertida. En la última parte del trabajo, se propone una guía de 10 pasos que ayudará a los docentes a integrar estas metodologías activas en una asignatura ICLES de ingeniería.

Palabras clave: Integración de Contenido y Lengua en Educación Superior; estudios de ingeniería; aprendizaje basado en proyectos; clase invertida; habilidades blandas

1. INTRODUCTION

English is the current international language of science. Not only most of the research is published in English, but also English dominates international communication and business. Therefore, mastering English is a requirement for most engineers in the world, and its study is particularly significant in countries where English is a foreign language. Moreover, some engineering education programmes lack the experiential component that could equip students for their professional development, giving them opportunities to put into practice their learning. This detachment from real-world projects during their training process could lead to a lack of teamwork and communication skills needed for their professional development (Mills & Treagust, 2003).

Studies in engineering education have highlighted the importance of soft skills in students' lives and how these can complement technical/ hard skills (Schulz, 2008). Evidence has shown that soft skills predict and produce success in life; thus, programmes that enhance them should be important in an effective portfolio of public policies (Heckman & Kautz, 2012). As a matter of fact, "(t)hese soft skills are also known as people skills, life skills, interpersonal skills, employability skills, and emotional intelligence" (Rao, 2014: 43). The need for explicit and embedding teaching of soft skills to engineering students (Pulko & Parikh, 2003) is underpinned by engineering education literature, which shares a consensual vision of the importance of soft skills for every workplace. In this vein, all the stakeholders involved in engineering education, and mainly students, must be aware of the importance of soft skills for their future employment and professional development. Direito, Pereira, and de Oliveira Duarte (2012) call for curriculum development focused on using appropriate pedagogic techniques that enhance learning and develop soft skills. They conclude that "specific training could be designed and delivered to respond to major skills' gaps, using learning styles-based methodologies. For example, enhancing teamwork skills using active and visual learning strategies, and work organization skills using sequential learning strategies" (Direito et al., 2012: 849). However, the question is if it is possible to enhance soft skills in some hours of training. Here is where pedagogic techniques play a crucial role since educators have a major influence on the development of engineering students' soft skills during their university time. Schulz (2008: 146) affirms that "(e)mbedding the training of soft skills into hard skills courses is a very effective and efficient method of achieving both an attractive way of teaching a particular content and an enhancement of soft skills."

One of the features of soft skills is communication, the capacity to interact with others effectively. It is out of discussion that nowadays having good communicative skills in English opens the door for engineers to enter the workforce of the industry of the 21st century. Universities must evolve to respond to new realities such as internationalization, which is driven by two main trends: online education and English-medium instruction (Querol-Julián & Crawford Camiciottoli, 2019). Nowadays, most universities offer a wide variety of programmes implemented to teach (in or through) English. However, the integration of English in higher education is not an easy task, although the English-medium paradigm applied in higher education shows different possibilities (Schmidt-Unterberguer, 2018). Because of this reality, CLIL (Content and Language Integrated Learning) appears to be a solution to integrate content and language learning in the curriculum (Coyle, 2007). The term CLIL has been widely used to refer to this bilingual education practice mainly in lower education levels, but also at university. In higher education, this integrative approach is referred to as ICLHE (Integrating Content and Language in Higher Education) or, more recently, EMEMUS (English-Medium Education in Multilingual University Settings). As regards the latter, ROAD-MAPPING (Dafouz & Smit, 2020) is one innovative and holistic framework to conduct contextualised research and to engage in EMEMUS management.

Yet, the Englishisation of the university has received considerable attention from the most prominent approach used: English-Medium Instruction (EMI) (Macaro, 2018), where English is the vehicular language but there is not an attempt to integrate content and language learning, as it is in the other approaches mentioned above. However, there is still a lack of research in this context on CLIL/ ICLHE/ EMEMUS (Fortanet-Gómez, 2013; Komori-Glatz, 2017; Valcke & Wilkinson, 2017) and the impact of its application on learning content and language. Additionally, some of this literature is not clear about the phenomenon studied, showing an ill-use of the term CLIL. Some authors, as it mentioned in more detailed in the next section, refer to CLIL, when it is not clear where teachers are actually trying to integrate content and language learning or only using English as a vehicular language, i.e., doing EMI. Aguilar's (2017) study put in the foreground the differences between the two approaches. This author analysed engineering lecturers' views on CLIL and EMI, who reported that they only employed EMI and did not contemplate CLIL because they declined "teaching English" (Airey, 2012) or assessing it since they do not perceive language issues as one of their duties. Nonetheless, it seems that an increasing interest in EMI towards language is present nowadays (see for example the special issue on the role of languages in English-Medium Instruction (EMI) at university, edited by Doiz and Lasagabaster (2020)). Hopefully, we are witnessing a final twist of the screw on EMI teachers' awareness of the importance of language, and a step forwards towards the popularisation of ICLHE.

The general aim of this study is to make a literature review of the main aspects that engineering educators should take into account to develop ICLHE to adapt CLIL core features, which are fully developed in other educational levels, to the university setting. These core features are related to, and thus enhance, the development of the soft skills needed in the engineering world. The specific objectives that will help us to attain the general aim of the study are:

- Place ICLHE in the English-medium education paradigm.
- Examine the concept of CLIL and know the benefits and drawbacks of its implementation at the university level.
- Know the benefits and challenges of introducing project-based learning and flipped classroom in engineering programmes, as well as the recommendations for its use.

- Provide a set of guidelines to implement an ICLHE lesson plan in an Engineering subject to develop soft skills while integrating content and language learning.

2. THE ENGLISH-MEDIUM PARADIGM AND ICLHE

The English-medium paradigm is a framework featured by different types of programmes or courses found in English-medium contexts. Schmidt-Unterberger (2018) has classified it into five distinct categories and defined their potential opportunities and implications for language learning: i) Pre-sessional ESP/EAP (English for Specific Purposes/ English for Academic Purposes): They are language courses, which are implemented before a particular content course, to work in its linguistic demands, and that “equip students with the essential discipline-specific language (ESP) and/ or academic communication and study skills (EAP)” (Schmidt-Unterberger, 2018: 531). Their main drawback is their disconnection from the rest of the programme. ii) Embedded ESP/EAP: These courses are part of the regular curriculum, and their objective is to “develop discipline-specific and general academic language skills students need in the English-medium programmes” (Schmidt-Unterberger, 2018: 533). iii) Adjunct ESP: It is also carried out while a content subject is taught. Its objective is to help students understand the language needed in the subject and the genres most used in the content class. This type is utterly challenging because collaboration between content and language teachers is required to create two curriculums of two different subjects that complement each other (Brinton, Snow, & Wesche, 1989). iv) EMI: English-Medium Instruction for a particular course/ programme is the approach most used in higher education. Language learning goals are not taken into account (Järvinen, 2008). Due to this vision of English, EMI can lead to difficulties with concepts comprehension, absence of learning about the subject and low participation due to a lack of English proficiency (Kocaman, 2000). v) ICLHE: As mentioned above, it is the direct counterpart for tertiary education of CLIL, which is an umbrella term that has become increasingly popular in school programmes across Europe (Coyle, 2007). CLIL is defined by Coyle, Hood, and Marsh (2010: 3), as “an educational approach in which various language-supportive methodologies are used which deal with a dual-focused form of instruction where attention is given to both language and content”.

One of the first attempts to understand CLIL in higher education was made by Räsänen (2010), who identified five main ways in which CLIL was integrated into the curriculum: i) Partial CLIL LSP (Language for Specific Purposes) or pre-CLIL (discipline-based language teaching, explicit L2 learning aims). ii) Partial CLIL-language (Language for Academic Purposes focus tailored for future content learning, explicit L2 learning aims). iii) Partial CLIL-content (content mastery, incidental L2 learning, implicit L2 learning aims). iv) Adjunct CLIL (content mastery and L2 learning, tailored adjunct L2 instruction to support content learning). And v) CLIL (full dual integration of language through subject teaching, content mastery and L2 learning, specified aims for both). One can see a parallelism between Räsänen’s classification and Schmidt-Unterberger’s

English-medium paradigm since Partial CLIL LSP seems to refer to embedded ESP, Partial CLIL-language to Pre-sessional EAP, Partial CLIL-content to embedded EAP, and CLIL to ICLHE.

Schmidt-Unterberger (2018) argued that a marriage between EMI courses and ESP/ EAP programmes is a more realistic combination than adopting ICLHE. However, this partnership seems to be used to counterbalance the lack of a language-conscious approach in EMI courses. In line with this, research on the impact of ESP courses on the preparation for EMI courses has inquired into teachers' perception (Jiang and Zhang, 2017), and engineering students' perception (Arnó-Macià, Aguilar-Pérez, & Tatzl, 2020) with positive results. Furthermore, research has revealed that academic success in the EMI context is connected to ESP (Rose et al., 2019). Therefore, it is evident that there is a need to pay more attention to academic language proficiency in EMI. Furthermore, the development of academic English language proficiency is a crucial component of ICLHE (Crossman, 2018) since the main principle of this approach is balancing content and language learning through their integration.

3. CLIL CURRICULUM DEVELOPMENT AT UNIVERSITY LEVEL

As Alimi (2018: 2) pointed out "CLIL needs contextualization and personalization to answer the needs of the institution". To facilitate the transition between theory and classroom practice, Coyle (2008) developed the well-known 4Cs framework that aims to plan an effective integration of content and language in a specific context, also at the university level. The 4Cs are: Content, Communication, Cognition, and Culture.

i) Content is understood from a broad perspective since it is not only for students to gain knowledge and skills, but also to create their own knowledge, skills and understanding following a specific learning path. CLIL adopts a constructivist perspective, being the students the centre of the learning process and taking responsibility. This perspective cements critical and creative thinking, which is the first step towards the development of soft skills in engineering students.

ii) Communication, particularly language, requires a reconceptualization which is defined by six main features: (1) Language is a medium for learning and an objective. Thus, meaningful and contextualised learning can be promoted in the university classroom, avoiding detachment from reality. (2) A journey takes place from the development of Basic Interpersonal Conversational Skills (BICS) to the development of Cognitive Academic Language Proficiency (CALP) (Cummins, 2008), which can provide engineering students with the linguistic tools needed for the countless and unpredictable communicative situations they will find at work. (3) Special attention is paid to fluency rather than to accuracy. This can make feel some lecturers more comfortable with what is expected from them as regards language. (4) Nonetheless, there is a need for comprehensible input (Krashen, 1998), which requires scaffolding strategies to ensure understanding. (5) The language triptych (language of learning, language for learning, and language through learning) (Coyle et al., 2010) should also be considered when planning CLIL lessons at university. The language of learning is the "language learners will need to access new knowledge and understanding when dealing with concepts" (Coyle et al., 2010: 61), i.e., topic-related key vocabulary and phrases. The language for learning "is linked to the language students will need during the lessons to carry out the planned activities effectively" (Coyle et al., 2010: 62); for example, the language to present a project, discuss, write a report, etc. The language through learning refers to unprepared language that emerge through learning.

iii) Cognition is approached from Bloom's revised taxonomy (Anderson & Krathwohl, 2001) to design educational objectives. Thus, tasks must be created following a progression from Lower Order Thinking Skills (LOTS) to Higher Order Thinking Skills (HOTS). The development of critical and creative thinking skills is at the core of the approach. As Hanesová (2014: 33) pointed out students "are intellectually challenged to transform information, to solve problems, to discover meaning using creative thinking"; that is, to develop soft skills.

iv) Culture is related to the self and other awareness, identity and progression towards intercultural understanding. This term has been disambiguated over the years due to technology and its implication in the globalized world. Community and Connection are added to this dimension to identify learning and collaborative networks that are accessible to everyone. Thus, the connection between the conceptual and methodological features of CLIL and soft skills development is conspicuous. As regards culture, engineering students will benefit from their personal and professional development when evoking the feeling of being part of a specialised community.

Although CLIL is known in tertiary education as ICLHE, most of the literature we have found uses CLIL to refer to its development at the university level. Research has revealed some benefits and drawbacks of its implementation, which are summarized in Table 1.

Table 1

Benefits and drawbacks of CLIL implementation at university level.

Benefits	Drawbacks
Larger lexicon, with a higher use of it and vocabulary richness (Jexenflicker & Dalton-Puffer, 2010; Vázquez, 2007; Várkuti, 2010).	Lack of faculty collaboration to integrate content and language teaching (Airey, 2016; Arnó-Macià & Mancho-Barés, 2015; Weinberg & Symon, 2017; Woźniak, 2017).
Increase of motivation for language learning (Schmidt-Unterberger, 2018) and for the topic studied (García-Fernández, Moreno de Diezmas, & Ruiz-Gallardo, 2017).	It is "time-consuming in joint lesson planning, team teaching and collaborative assessment" (Schmidt-Unterberger, 2018, p. 535).
Increase of student's spontaneity in their oral communications (Lasagabaster, 2008)	Losses in students: decreasing participation because of low English proficiency, failure to show the best performance, decrease in

Development of multilingual interests and attitudes (Carrió & Gimeno, 2007)	student's overall learning results or increase in study load (Aguilar & Rodríguez, 2012).
Improvement of receptive skills (Aguilar & Rodríguez, 2012).	Losses for teachers: some content knowledge is sacrificed (Airey, 2004), a slower delivery rate (Hincks, 2010; Thørgersen & Airey, 2011).
Knowledge becomes stronger and more orderly (Godzhaeva, Logunov, Lokteva, & Tochilina, 2018).	
Facilitation of higher order thinking skill, better English competence and moral development (Alimi, 2018).	
Preparation for professional life, providing more job opportunities (Carrió & Gimeno, 2007).	

It is surprising the variety of benefits that ICLHE implementation has, not only related to English skills, but also personal development, such as motivation or spontaneity increase, and the broad spectrum of possibilities opened thanks to English proficiency. However, some drawbacks also need to be considered when implementing ICLHE in the best possible way because some could be overcome. We cannot avoid investing much time in the process; however, we could work on faculty collaboration and lecturers' profiles which should be completed with an academic background in the given field, proficiency level of English and training in ICLHE methodology (Aguilar & Rodríguez, 2012). Thus, these professionals will be able to easily integrate language and content learning and cover the curriculum with fluency and using scaffolding strategies. When these basic conditions converge, it has been observed students' and teachers' positive perceptions (Aguilar & Rodríguez, 2012) and that neither the content nor the academic performance is sacrificed (Toledo et al., 2012).

4. ACTIVE METHODOLOGIES TO DEVELOP CLIL CORE FEATURES AND SOFT SKILLS

According to Mehisto, Marsh, and Frigols (2008), the main core features of CLIL are:

i) Multiple focus approach: a high degree of integration between content and language and among different subjects is required.

ii) Safe and enriching learning environment: authentic materials and learning environments.

iii) Authenticity: connect students' lives, motivations and feelings with learning. Real materials are brought into class using media, technology and other sources.

iv) Active learning: students are the centre of the teaching-learning process. Students talk time should be higher than teacher talk time. Activities must foster cooperation to achieve common goals.

v) Scaffolding: teachers act as facilitators; they must support students' language needs and be ready to work with different learning styles.

vi) Cooperation, which is seen in students' activities and between content and language specialists.

In general, a change is needed in the way we teach at university to integrate these features. Traditional lecture, known as teacher-centred, is still the most common way of teaching in the engineering setting (Rodríguez et al., 2019). This kind of instruction leads to some limitations because it treats all the students in the same manner, without taking into account the different learning styles and needs, students also come to class without previous preparation, and formative feedback is usually not given immediately but delayed (Tormey & Henchy, 2008). Research on learning and teaching styles in engineering education revealed mismatches between students' learning styles and teacher's teaching styles that lead "to poor student performance, professorial frustration, and a loss to society of many potentially excellent engineers" (Felder & Silverman, 1988: 680). These mismatches have been confirmed by more recent studies, claiming the need for further research "to determine how willing faculty members are to teach outside their comfort level to match the students' preferred learning styles" (Katsioloudis & Fantz, 2012:67).

These limitations can be mitigated by shifting classroom activity from teachers to students, for example, with the help of the flipped classroom (Munir et al., 2018). Student-centric approaches are needed to make learning more meaningful and dynamic. Moreover, not only content is important, but the development of some soft skills, such as communication, leadership, creativity, teamwork, decision making, problem-solving, initiative, negotiation or goal setting, is also needed in this competitive and globalize world (Barros & Bittencourt, 2019). These can be fostered by engaging students in project-based learning and by flipping the classroom.

4.1. Project-based Learning

Project-based learning (PjBL) is a pedagogical approach where students acquire knowledge and skills working in real-world projects and research. In these projects, students work in groups to create a common end product. As it was stated by Larson et al. (2018: 500), "Project-based learning is often confused with problem-based learning (PBL)", which is centred on a problem to be solved. In project-based learning and problem-based learning, students work cooperatively to increase individual and group learning (Aranzabal, Epelde, & Artetxe, 2019). The model problem-oriented and project-based learning (POPBL) attempts to integrate both (Li & Faghri, 2016). Furthermore, the importance of teamwork and the close collaboration with the real environment has led this pedagogical approach to be also named Team Project-Based Learning (TPBL) (Raycheva, Angelova, & Vodenova, 2017).

Project-based learning has been used in many engineering programmes in the last years due to its benefits (Ballesteros, Daza, Valdés, Ratkovich, & Reyes, 2019; Moreno-Ruiz et al., 2019; Villalobos-Abarca, Herrera-Acuña, Ramírez, & Cruz, 2018; Zancul, Sousa-Zomer, & Cauchick-Miguel, 2017). Table 2 provides a review of these benefits, as well as some challenges and recommendations to apply the approach.

Table 2

Project-based learning in engineering programmes: benefits, challenges and recommendations

Benefits (Hadim & Esche, 2002)	
Project-based learning: Increases students' participation in the learning process Encourages students to assume responsibility for their learning experience and to shift from passive to more active learning patterns. Enhances communication skills and teamwork. Takes into account different learning styles. Promotes critical and proactive thinking. Allows that knowledge and skills are transferred from academic learning environment to more real contexts.	
Challenges	Recommendations
It is difficult to create a stimulating approach that engages students.	Instructors must be trained to possess strong skill sets for implementing PjBL.
(Nwokeji, Aqlan, Olagunju, Holmes, & Okolie, 2018)	
Students have little experience in PjBL.	Provide some training sessions on teamwork: jigsaw session.
(Aranzabal et al., 2019)	
A well-balanced group. (Aranzabal et al., 2019)	"Use an instructional and reflective session of Belbin roles (Belbin, 2012). Each student writes a report justifying the reasons and facts why he/she chose that role" (Aranzabal et al., 2019: 60).
How to assess students.	Using rubrics, responsible sharing marks, certification of votes or peer assessment.
(San-Valero et al., 2019)	

Based on the benefits found of project-based learning, this methodology could be useful for engineering students to bring more real-life experiences into class and to develop soft skills such as:

> professionalism; reliability; the ability to cope with uncertainty; the ability to work under pressure; the ability to plan and think strategically; the capability to communicate and interact with others, either in teams or through networking; good written and verbal communication skills; information and communication technology skills; creativity and self-confidence; good self-management and time-management skills; a willingness to learn and accept responsibility. (Andrews & Higson, 2008: 413)

However, its implementation may not be easy because not all teachers have the skills needed to create stimulating environments to apply it. Moreover, as Mitchell and Rogers (2019) reported, the teacher context and aspirations have led to a softly different interpretation of project-based learning. In line with this, teacher's roles are essential in project-based learning. Walsh (2005) defined them as follows:

- Climate setting: they create certain learning conditions that foster autonomous learning.
- Planning: they are responsible for organizing and structuring the project and tutorials.
- Clarifying learning needs: they set goals and learning aims.
- Designing a learning plan: they help learners to develop strategies to achieve their goals.
- Engaging in learning activities: they give direction and scaffold to guarantee that learners are following their learning path.
- Assessing learning outcomes: they use formative feedback and summative assessment.

Furthermore, to boost a learning-by-doing scheme, it is necessary to devote more time to deal with theory at home. To do so, we can use strategies like the flipped classroom (San-Valero et al., 2019).

4.2. Flipped Classroom

The flipped classroom is a pedagogical approach that consists in changing the class structure. Activities carried out in class like theoretical explanations are now performed outside the classroom, whereas practical problem resolution is worked inside the classroom (Valero et al., 2019). The effective flipped classroom has been related to Bloom's Taxonomy. Before coming to class, students are individually involved in activities that require lower levels cognitive processes of understanding and remembering; while in class, activities entail developing higher-order thinking skills (Nihlawi et al., 2018).

One way to implement this approach is through the recording of educational videos that aim to complement traditional materials such as slides or texts (Rodríguez et al., 2019). Pre-recorded videos are shared online and are available until the end of the term. Regarding the length of the videos used to promote autonomous learning, Guo, Kim, and Rubin's (2014) comprehensive study on the effects of video production on students' engagement revealed an optimal length of about 6 minutes. The use of flipped classroom and the best advantages of face-to-face learning in class is one of the formats of blended learning (Bonk & Graham, 2006) that we have at our disposal. Table 3 shows the main benefits, drawbacks or challenges and recommendations of the flipped classroom implementation in engineering programmes.

As in other methodologies, flipped classrooms need time to prepare videos and explain students what the fundamentals and structure of the new autonomous learning they have to perform are. As it reported by Salcines-Talledo, Cifrián, González-

Fernández, and Viguri (2020), students' engagement does not happen spontaneously, an adaptation time is necessary. This adaptation period finishes when students are aware of the benefits of this active learning methodology.

Table 3

Flipped Classroom in engineering programmes: benefits, challenges and recommendations

Benefits (Chiquito, Castedo, Santos, López, & Alarcón, 2020; Khan & Thayniath, 2020; Rodríguez-Chueca, Molina-García, García-Aranda, Pérez, & Rodríguez, 2020; Valero et al., 2019)	
More time dedicated to practical application of learned concepts in class. Students show further comprehension of the content, a higher amount of thinking and stronger capacities to deal with down-to-earth problems. A change in student's learning habits that promotes independent learning. More time to address students with special needs. The use of Project-based learning and cooperative learning activities in class are promoted.	
Challenges	Recommendations
High teacher workload to create and design content materials and a large investment of time. (Rodríguez et al., 2019)	Although most of the material is reused, it should be convenient "to have a shared platform on the internet where teachers from over the world share chunks of knowledge that others can reuse and take advantage of" (Rodríguez et al., 2019: 12).
Students observe an increase in the amount of effort needed. (Valero et al., 2019)	"It is due to a poor presentation of the methodology. Students need to know exactly how this process is going to develop from the very beginning". (Valero et al., 2019: 77).
Limited and delayed feedback.	Collect student's performance once they watch the videos using quizzes. Use the outcomes to adapt the content to the next lecture.
(Kakosimos, 2015)	

Flipped classroom has been used in many engineering programmes (Chiquito et al., 2020; Gren, 2020; Khan & Thayniath, 2020; Martínez-Carrascal, Márquez Cebrián, Sancho-Vinuesa, & Valderrama, 2020; Salcines-Talledo et al., 2020). Interestingly, Gren (2020) stated how vital is the help of pedagogical experts during the development of active lectures to success in the implementation of active learning activities. Moreover, Khan and Thayniath (2020) showed how engineering students' English oral skills improved through flipped classroom.

Flipped classroom merges with other active learning methodologies such as project-based learning (Moreno-Ruiz et al., 2019) because it allows students to have more time for hands-on work in class. The integration of these approaches may foster cooperation, authentic and active learning and the rest of the core CLIL features, that is, the soft skills needed to be developed in ILCHE to shape the students' professional competences profile.

5. FROM THEORY TO PRACTICE

This section proposes how these approaches, project-based learning and flipped classroom, could merge in the design of an ICLHE subject to develop English proficiency and soft skills. The aim is to provide some guidelines for university teachers involved in English-medium instruction to move from content focus and teacher-centred methodologies to a more integrative perspective, placing students engagement at the core of their practices (Carini, Kuh, & Klein, 2006). The two main objectives of the approach, apart from facilitating the development of hard skills, are: (i) to improve students' English proficiency level, and (ii) to foster the development of soft skills that are necessary in the engineering world: communication, leadership, creativity, teamwork, decision making, problem-solving, initiative or negotiation. In Table 4, we propose 10 interdependent steps to design a lesson plan for an engineering ICLHE subject.

Table 4

Guidelines to implement ICLHE, Project-Based Learning and Flipped Classroom in an engineering subject

Tips	Examples
Step 1. Choose the topic of the project	
• Align the topic with the students' real needs to be part of the labour market. • Consider all the contents of the subject. • Show a clear connection between its parts and the contents of the subject.	*The chemical industry.* Students can work on reactants, materials, energy sources, chemical reactions, thermodynamics, etc.
Step 2. Define the final goal	
• Design an integrative goal, comprising content and language.	*Create your own chemical industry.*
Step 3. Organise the project in parts	
• Relate each part to one of the topics/ units of the subject or comprise some topics in one part. • Order the parts following a progression.	*Classification of basic operations.* *Variables of the processes.* *The chemical processes.*
Step 4. Integrate content and language learning	
• Follow the 4Cs framework (content, cognition, communication, and culture).	

• Design objectives related to the 4Cs. • Design objectives for each task. Some tasks can share some objectives.	
Design content-related objectives.	
• Consider its dual nature, which embodies cognition (a verb phrase) and content (a noun phrase). • Follow a progressive cognitive development (from LOTS to HOTS), in the objectives of one task and throughout the project.	*Identify the energetic needs of an industrial plant.* *Differentiate between the different types of energies.* *Plan how to reduce contamination using renewable energies.* *Create an environmentally friendly plant.*
Design language-related objectives.	
• If possible, know your students' English level. • Foster the development of the four skills (speaking, writing, listening, reading). • Use the language triptych framework to design these goals (language of/for/through learning).	*Understand the lexicon related to energies* (Language OF). *Use language for debating about energies advantages and disadvantages* (Language FOR). *Look for news in your L1 related to energy and share them in English with your classmates* (Language THROUGH).
Foster the development of the cultural dimension.	
• Integrate the cultural dimension in the design of content-/ language-related objectives.	Science literacy can be spread out on the Internet through some videos made by the students. Interculturality can be enhanced if students have the opportunity to interact with peers from other universities working on similar projects.
Step 5. Design tasks	
• Identify the learning situations needed to achieve the learning objectives of each task. • Design one task for each part of the project. • Decide how long each task or part of the project will last.	*An outdoor activity to visit a chemical industrial plant*.
Step 6. Plan the development of soft skills	
• Foster the development of soft skills during the tasks. • Cooperative learning is central to develop and enhance soft skills.	Communication: teamwork, debates, interviews. Self-motivation: project related to the students' future job. Leadership: teamwork, the visit of a leader from a recognised enterprise who talks about what is necessary to be a leader. Responsibility and Time management: teamwork, tasks deadlines. Negotiation and conflict resolution: teamwork, emotional dimension awareness.
Step 7. Foster cooperative learning	

• Form small groups of heterogeneous abilities. • Ensure positive interdependence and individual accountability. • Use pedagogical translanguaging during teamwork. Allow learners to use their complete linguistic repertoire.	Positive interdependence: assign roles to the students, which can be changed throughout the project. Individual accountability: ask students to make an individual public performance (e.g., report, presentation, etc.) Pedagogical translanguaging: allow the use of sources published in the students' L1 and small talks in other languages, establish what has to be done in English, e.g., group discussion and outputs.
Step 8. Create videos to flip the classroom	
• Include the essential concepts and explanations of the subject necessary to develop the different activities proposed throughout the project. • Create several short 6-minute videos for each part of the project.	A video to introduce the different types of energies or to explain how to calculate the carbon footprint.
Step 9. Design assessment	
• Include a wide range of assessment instruments. • Assess the whole process: individual work during the flipped classroom and cooperative work throughout the project-based learning. • Engage students in the assessment process through self-assessment and peer-assessment. • Assess hard skills and soft skills, that is, communicative skills, group management, problems resolution, analysis and reflection, negotiation and conflict resolution, flexibility, team working, etc.	Individual tests about the videos. Post edit the videos and insert questions making watching videos more interactive (e.g., with Edpuzzle or Zaption) or create short quizzes after watching them (e.g., Mentimeter, Canvas, Quizalize, Google Form), and automatically collect answers. Class observation Oral presentations Written reports Blueprints
Step 10. Plan content and language scaffolding	
• Create multimodal (e.g., visual and/o oral) support to scaffold content learning. • Create multimodal support to scaffold language learning.	A working wall where some photographs show different engineering materials or units with their names. A video with examples of good presentations or common mistakes made by students. A list of expressions used for debating.

After following these ten steps, the project will be ready to be applied. Projects are dynamic and can be modified during the process or after the first results are obtained. Evaluating the design and the accomplishment of the learning goals is essential to identify any adaptation or improvement needed. An example of a unit design is shown in Table 5.

Table 5

Unit example following the guidelines to implement ICLHE, Project-Based Learning and Flipped Classroom in an engineering subject

<table>
<tr><th>UNIT EXAMPLE</th><th colspan="2">ENERGIES AND POLLUTION</th></tr>
<tr><td>Time</td><td colspan="2">3 hours</td></tr>
<tr><td colspan="3">Content goals</td></tr>
<tr><td colspan="3">• Identify energetic needs in an industrial plant.
• Differentiate between the different types of energies.
• Plan how to reduce contamination using renewable energies.
• Create an environmentally friendly industry.</td></tr>
<tr><td colspan="3">Language goals</td></tr>
<tr><td>Language of</td><td>Language for</td><td>Language through</td></tr>
<tr><td>• Understand the lexicon related to environmental applications.
• Watch and listen to the video prepared for this unit.
• Use reason and consequence clauses to talk about energy and contamination.</td><td>• Use language for debating about the different types of energy.
• Answer teacher's questions using evidence.
• Use language for proposing new ideas for the industry.</td><td>• Add terms to the English-native language glossary.
• Search for news in your country about environmental problems and share them in English with your classmates.</td></tr>
<tr><td colspan="3">Scaffolding instruments</td></tr>
<tr><td colspan="3">Video of the unit.
List of the most used vocabulary about Energies and Pollution.</td></tr>
<tr><td colspan="3">Tasks</td></tr>
<tr><td colspan="3">• Search on the internet the different types of energies and how electric energy is produced.
• Design a schema with the information found.
• Debate with your group the advantages and disadvantages of the different energies.
• Calculate the footprint of the different energies.
• Search for news in your country about environmental problems and share them with your group.
• Create a map where the most typical renewable energies used in a higher percentage in each country appear.
• Create a video explaining what type of energy you can implement in your industry: explain the possible implementation and the pollution sources.</td></tr>
<tr><td colspan="3">Assessment</td></tr>
<tr><td colspan="3">• Class observation of students' work.
• Peer-assessment to know if all students have worked in the group.
• Rubric of the video produced in the last task where content and communication skills are considered.</td></tr>
<tr><td colspan="3">Soft skills developed</td></tr>
<tr><td colspan="3">Communication skills in the debate and in the video production
Teamwork skills working in groups.</td></tr>
</table>

6. CONCLUSIONS

The literature review conducted in this study has revealed a lack of research on the application of ICLHE. Although this approach seems to have gained relevance in the bilingual/ multilingual higher education construct, it seems there is still an inaccurate use of the concept of content and language integrated learning in this setting. Some publications refer to CLIL when the approach adopted is EMI (or a combination of EMI with ESP or EAP courses/ programmes), or the characteristics of the approach are not clearly stated, and one cannot be sure about having the integration of content and language learning at the core of the teaching practice.

The study has shown the benefits and challenges of applying project-based learning and flipped classroom in engineering studies. It has been revealed how these and CLIL principles are aligned and can perfectly combine to foster the development of technical/hard skills and English proficiency, and the soft skills that are central in the engineering students' profile.

Based on the results found in the literature review, the paper proposes some guidelines to design an engineering ICLHE subject that embodies project-based learning and flipped classroom, while integrating content and English language learning. Project-based learning has been demonstrated that increases students' participation, enhances communication skills and teamwork, takes into account different learning styles and promotes critical thinking. On the other hand, when flipping the classroom, the time needed to develop the project in class will be available. This strategy has also been shown to increase students' comprehension, time management and responsibility.

REFERENCES

Aguilar, M. (2017). Engineering lecturers' views on CLIL and EMI. *International Journal of Bilingual Education and Bilingualism,* 22, 722-735. https://doi.org/10.1080/13670050.2015.1073664

Aguilar, M., & Rodríguez, R. (2012). Lecturer and student perceptions on CLIL at a Spanish university. *International Journal of Bilingual Education and Bilingualism*, 15, 183–197. https://doi.org/10.1080/13670050.2011.615906

Airey, J. (2004). Can you teach it in English? Aspects of the language choice debate in Swedish higher education. In R. Wilkinson (Ed.), *Integrating content and language. Meeting the challenge of a multilingual education,* 97–108. Maastricht: Maastricht University.

Airey, J. (2012). 'I don't teach language.' The linguistic attitudes of physics lecturers in Sweden. *AILA Review,* 25, 64-79. https://doi.org/10.1075/aila.25.05air

Airey, J. (2016). EAP, EMI or CLIL? In K. Hyland & P. Shaw (Eds.), *The Routledge handbook of English for academic purposes*, 71–83. Abingdon: Routledge. https://doi.org/10.4324/9781315657455

Alimi, M. Y. (2018). The use of content and language integrated learning (CLIL) as conservation education methodology: An experience from State University of

Semarang. *Proceedings of the 9th International Conference on Global Resource Conservation*. https://doi.org/10.1063/1.5061860

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.

Andrews, J., & Higson, H. (2008). Graduate employability, 'soft skills' versus 'hard' business knowledge: A European study. *Higher education in Europe,* 33(4), 411-422. https://doi.org/10.1080/03797720802522627

Aranzabal, A., Epelde, E., & Artetxe, M. (2019). Monitoring questionnaires to ensure positive interdependence and individual accountability in a chemical process synthesis following collaborative PBL approach. *Education for Chemical Engineers*, 26, 58–66. https://doi.org/10.1016/j.ece.2018.06.006

Arnó-Macià, E., & Mancho-Barés, G. (2015). The role of content and language in content and language integrated learning (CLIL) at university: Challenges and implications for ESP. *English for Specific Purposes*, 37, 63–73. https://doi.org/10.1016/j.esp.2014.06.007

Arnó-Macià, E., Aguilar-Pérez, M., & Tatzl, D. (2020). Engineering students' perceptions of the role of ESP courses in internationalized universities. *English for Specific Purposes,* 58, 58-74. https://doi.org/10.1016/j.esp.2019.12.001

Ballesteros, M. A., Daza, M. A., Valdés, J. P., Ratkovich, N., & Reyes, L. H. (2019). Applying PBL methodologies to the chemical engineering courses: Unit operations and modeling and simulation, using a joint course project. *Education for Chemical Engineers*, 27, 35–42. https://doi.org/10.1016/j.ece.2019.01.005

Barros, F. L. F., & Bittencourt, R. A. (2019). Evaluating the influence of PBL on the development of soft skills in a computer engineering undergraduate program. *Proceedings of the 2018 Frontiers in Education Conference,* 1-9. https://doi.org/10.1109/FIE.2018.8658832

Belbin, R. M. (2012). *Team roles at work* (2nd ed.). London: Routledge. https://doi.org/10.4324/9780080963242

Bonk, C. J., & Graham, C. R. (2006). *The handbook of blended learning: Global perspectives, local designs.* San Francisco, CA: Pfeiffer Publishing.

Brinton, D., Snow, M. A., & Wesche, M. B. (1989). *Content-based second language instruction*. Newbury House.

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education, 47*(1), 1-32. https://doi.org/10.1007/s11162-005-8150-9

Carrió Pastor, M., & Gimeno Sanz, A. (2007). Content and language integrated learning in a technical higher education environment. In D. Marsh, & D. Wolff (Eds.), *Diverse contexts - converging goals. CLIL in Europe*, 103-111. Frankfurt: Peter Lang.

Chiquito, M., Castedo, R., Santos, A. P., López, L. M., & Alarcón, C. (2020). Flipped classroom in engineering: The influence of gender. *Computer Applications in Engineering Education*, 28(1), 80–89. https://doi.org/10.1002/cae.22176

Coyle, D. (2007). Content and language integrated learning: Towards a connected research agenda for CLIL pedagogies. *International Journal of Bilingual Education and Bilingualism*, 10, 543–562. https://doi.org/10.2167/beb459.0

Coyle, D. (2008). CLIL- a pedagogical approach. In N. Van Deusen-Scholl & N. Hornberger (Eds.), *Encyclipedia of language and educatio*n 4, 97-111.Berlin: Springer. https://www.springer.com/series/15111

Coyle, D., Hood, P., & Marsh, D. (2010). *Content and language integrated learning.*

Cambridge: Cambridge University Press.
Crossman, K. (2018). Immersed in academic English: vocabulary and academic outcomes of a CLIL university preparation course. *International Journal of Bilingual Education and Bilingualism*, 21, 564–577. https://doi.org/10.1080/13670050.2018.1494698
Cummins, J. (2008). BICS and CALP: Empirical and theoretical status of the distinction. *Encyclopedia of language and education*, 2(2), 71-83. https://doi.org/10.1007/978-0-387-30424-3_36
Dafouz, E., & Smit, U. (2020). *ROAD-MAPPING English medium education in the internationalised university*. Cham: Palgrave Macmillan. https://doi.org/10.1007/978-3-030-23463-8
Direito, I., Pereira, A., & de Oliveira Duarte, A. M. (2012). Engineering undergraduates' perceptions of soft skills: Relations with self-efficacy and learning styles. *Procedia-Social and Behavioral Sciences,* 55, 843-851. https://doi.org/10.1016/j.sbspro.2012.09.571
Doiz, A., & Lasagabaster, D. (2020). Dealing with language issues in English-medium instruction at university: A comprehensive approach. *International Journal of Bilingual Education and Bilingualism,* 23(3), 257-262. https://doi.org/10.1080/13670050.2020.1727409
Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering education,* 78(7), 674-681.
Fortanet-Gómez, I. (2013). *CLIL in higher education: Towards a multilingual language policy*. Bristol: Multilingual Matters. http://www.multilingual-matters.com/display.asp?K=9781847699350
García-Fernández, B., Moreno de Diezmas, E. N. & Ruiz-Gallardo, J. R. (2017). Mejorar la motivación en ciencias con enseñanza CLIL. Un estudio de caso. *X Prodeedings of the Congreso internacional sobre investigación en didáctica de las ciencias*, Spain, 2625–2630.
Godzhaeva, N., Logunov, T., Lokteva, M., & Tochilina, Y. (2018). Challenges and prospects of CLIL for training mining engineers. *E3S Web of Conferences*, *41*. https://doi.org/10.1051/e3sconf/20184104052
Gren, L. (2020). A Flipped classroom approach to teaching empirical software engineering. *IEEE Transactions on Education*. https://doi.org/10.1109/TE.2019.2960264
Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement: An empirical study of MOOC videos. *Proceedings of the first ACM conference on Learning@ scale conference*, USA, 41–50. https://dl.acm.org/doi/pdf/10.1145/2556325.2566239
Hadim, H. A., & Esche, S. K. (2002). Enhancing the engineering curriculum through project-based learning. *Proceedings of the 32nd Annual Frontiers in Education*, USA, F3F-1–F3F. https://doi.org/10.1109/FIE.2002.1158200
Hanesová, D. (2014). Development of critical and creative thinking skills in CLIL. *Journal of language and cultural education,* 2(2), 33-51.
Heckman, J. J., & Kautz, T. (2012). Hard evidence on soft skills. *Labour economics,* 19(4), 451-464. https://doi.org/10.1016/j.labeco.2012.05.014
Hincks, R. (2010). Speaking rate and information content in English lingua franca oral presentations. *English for Specific Purposes*, 20, 4–18. https://doi.org/10.1016/j.esp.2009.05.004
Järvinen, H. (2008). Learning contextualized language: Implications for tertiary foreign-language-medium education. In E. Rauto & L. Saarikoski (Eds.), *Foreign-*

language-medium instruction in tertiary Education: A tool for enhancing language learning, 77–85. Vaasa: Vaasan Ammattikorkeakoulu, University of Applied Sciences Publications.

Jexenflicker, S., & Dalton-Puffer, C. (2010). The CLIL differential: comparing the writing of CLIL and non-CLIL students in higher colleges of technology. In C. Dalton-Puffer, T. Nikula, & U. Smit (Eds.), *Language use and language learning in CLIL classrooms*, 169–190. Amsterdam: John Benjamins.

Jiang, A. L., & Zhang, L. J. (2017). ESP/EAP through English-medium instruction: Teachers' perceptions and practices. In H. Reinders, D. Nunan & B. Zou (Eds.), *Innovation in language learning and teaching: The case of China*, 173-195. London: Palgrave Macmillan.

Kakosimos, K. E. (2015). Example of a micro-adaptative instruction methodology for the improvement of flipped-classrooms and adaptative-learning based on advanced blended-learning tools. *Education for Chemical Engineers*, 12, 1–11. https://doi.org/10.1016/j.ece.2015.06.001

Katsioloudis, P., & Fantz, T. D. (2012). A comparative analysis of preferred learning and teaching styles for engineering, industrial, and technology education students and faculty. *Journal of Technology Education,* 23(2), 61-69. https://doi.org/10.21061/jte.v23i2.a.4

Khan, S. M., & Thayniath, S. (2020). Facilitating aural-oral skills of engineering students through the flipped classroom. *Test Engineering and Management*, 82(1–2), 154–167.

Kocaman, A. (2000). Yabanci dilde egitim. *Comhuriyet Gazetesi Bilim Teknik Eki*, *708*, 14–15.

Komori-Glatz, M. (2017). *English as a business lingua franca in multicultural student teamwork: An EMEMUS study* (Doctoral dissertation). https://doi.org/10.25365/thesis.50397

Krashen, S. (1998). Comprehensible output?. *System,* 26(2), 175-182. https://doi.org/10.1016/S0346-251X(98)00002-5

Larson, J. S., Tirkolaei, H. K., Farnsworth, K., Glazewski, K., Folkestad, L. S., & Savenye, W. (2018). Using problem-based learning to enable application of foundation engineering knowledge in a real-world problem. *Proceedings of the 7th International Conference on Teaching, Assessment and Learning for Engineering*, Australia, 500–506. https://doi.org/10.1109/TALE.2018.8615329

Lasagabaster, D. (2008). Foreign language competence in content and language integrated courses. *The Open Applied Linguistics Journal*, 1, 30–41. http://dx.doi.org/10.2174/1874913500801010030

Li, M., & Faghri, A. (2016). Applying problem-oriented and project-based learning in a transportation engineering course. *Journal of Professional Issues in Engineering Education and Practice*, 142(3). https://doi.org/10.1061/(ASCE)EI.1943-5541.0000274

Macaro, E. (2018). *English medium instruction*. Oxford: Oxford University Press.

Martínez-Carrascal, J. A., Márquez Cebrián, D., Sancho-Vinuesa, T., & Valderrama, E. (2020). Impact of early activity on flipped classroom performance prediction: A case study for a first-year Engineering course. *Computer Applications in Engineering Education*, 28(3), 590-605. https://doi.org/10.1002/cae.22229

Mehisto, P., Marsh, D., & Frigols, M. J. (2008). *Uncovering CLIL*. Oxford: Macmillan.

Mills, J. E., & Treagust, D. F. (2003). Engineering education - is problem-based or project-based learning the answer? *Journal of Engineering Education*, *3*, 2–16.

Mitchell, J. E., & Rogers, L. (2019). Staff perceptions of implementing project-based learning in engineering education. *European Journal of Engineering Education,* 45(3), 349-362. https://doi.org/10.1080/03043797.2019.1641471

Moreno-Ruiz, L., Castellanos-Nieves, D., Braileanu, B. P., González-González, E. J., Sánchez-De La Rosa, J. L., Groenwald, C. L. O., & González-González, C. S. (2019). Combining flipped classroom, project-based learning, and formative assessment strategies in engineering studies. *International Journal of Engineering Education*, 35(6 A), 1673–1683.

Munir, M. T., Baroutian, S., Young, B. R., & Carter, S. (2018). Flipped classroom with cooperative learning as a cornerstone. *Education for Chemical Engineers*, 23, 25–33. https://doi.org/10.1016/j.ece.2018.05.001

Nihlawi, R., El-Baz, H., & Gunn, C. (2018). Engineering students' perceptions of flipped learning: Benefits, challenges and recommendations. *Proceedings of Advances in Science and Engineering Technology International Conferences,* United Arab Emirates, 1–6. https://doi.org/10.1109/ICASET.2018.8376920

Nwokeji, J. C., Aqlan, F., Olagunju, A., Holmes, T., & Okolie, N. C. (2018). WIP: Implementing project based learning: some challenges from a requirements engineering perspective. *Proceedings of Frontiers in Education Conference,* USA, 1-5. https://doi.org/10.1109/FIE.2018.8659307

Pulko, S. H., & Parikh, S. (2003). Teaching 'soft' skills to engineers. *International Journal of Electrical Engineering Education,* 40(4), 243-254. https://doi.org/10.7227/IJEEE.40.4.2

Querol-Julián, M. & Crawford Camiciottoli, B. (2019). The impact of online technologies and English medium instruction on university lectures in international learning contexts: a systematic review. *ESP Today,* 7(1), 2-23. https://doi.org/10.18485/esptoday.2019.7.1.1

Rao, M. S. (2014). Enhancing employability in engineering and management students through soft skills. *Industrial and Commercial Training*, 46(1), 42-48. https://doi.org/10.1108/ICT-04-2013-0023

Räsänen, A. (2010). LANQUA. Content and language integrated learning (CLIL). https://www.lanqua.eu/theme/content-language-integrated-learning-clil/

Raycheva, R. P., Angelova, D. I., & Vodenova, P. M. (2017). Project-based learning in engineering design in Bulgaria: expectations, experiments and results. *European Journal of Engineering Education*, 42(6), 944–961. https://doi.org/10.1080/03043797.2016.1235140

Rodríguez, M., Díaz, I., Gonzalez, E. J., & González-Miquel, M. (2019). Reprint of: motivational active learning: An integrated approach to teaching and learning process control. *Education for Chemical Engineers*, 26, 8–13. https://doi.org/10.1016/j.ece.2019.01.002

Rodríguez-Chueca, J., Molina-García, A., García-Aranda, C., Pérez, J., & Rodríguez, E. (2020). Understanding sustainability and the circular economy through flipped classroom and challenge-based learning: an innovative experience in engineering education in Spain. *Environmental Education Research*, 26(2), 238–252. https://doi.org/10.1080/13504622.2019.1705965

Rose, H., Curle, S., Aizawa, I. & Thompson, G. (2019). What drives success in english medium taught courses? The interplay between language proficiency, Academic Skills, and Motivation. *Studies in Higher Education*, 1-13 https://doi.org/10.1080/03075079.2019.1590690

Salcines-Talledo, I., Cifrián, E., González-Fernández, N., & Viguri, J. R. (2020). Case study about the student perceptions of the flipped classroom model in engineering subjects. Design and implementation of a questionnaire. *Revista Complutense de*

Educacion, 31(1), 25–34. https://doi.org/10.5209/rced.61739

San-Valero, P., Robles, A., Ruano, M. V., Martí, N., Cháfer, A., & Badia, J. D. (2019). Workshops of innovation in chemical engineering to train communication skills in science and technology. *Education for Chemical Engineers*, 26, 114–121. https://doi.org/10.1016/j.ece.2018.07.001

Schmidt-Unterberger, B. (2018). The English-medium paradigm: a conceptualisation of English-medium teaching in higher education. *International Journal of Bilingual Education and Bilingualism*, 21, 527–539. https://doi.org/10.1080/13670050.2018.1491949

Schulz, B. (2008). The Importance of Soft Skills: Education beyond academic knowledge. *Journal of Language and Communication*, June, 146-154

Thøgersen, J., & Airey, J. (2011). Lecturing undergraduate science in Danish and in English. *English for Specific Purposes*, 30, 209–221.

Toledo, I., Rubio, F. D., & Hermosín, M. (2012). Creencias, rendimiento académico y actitudes de alumnos universitarios principiantes en un programa plurilingüe. *Porta Linguarum*, 18, 213–229.

Tormey, R., & Henchy, D. (2008). Re-imagining the traditional lecture: an action research approach to teaching student teachers to "do" philosophy. *Teaching in Higher Education*, 13, 303–314. https://doi.org/10.1080/13562510802045337

Valcke, J., & Wilkinson, R. (Eds.). (2017). *Integrating content and language in higher education: Perspectives on professional practice*. Frankfurt: Peter Lang.

Valero, M. M., Martinez, M., Pozo, F., & Planas, E. (2019). A successful experience with the flipped classroom in the Transport Phenomena course. *Education for Chemical Engineers*, 26, 67–79. https://doi.org/10.1016/j.ece.2018.08.003

Várkuti, A. (2010). Linguistic benefits of the CLIL approach. *International CLIL Research Journal*, 1, 67–79.

Vázquez, G. (2007). Models of CLIL: an evaluation of its status drawing on the German experience. A critical report on the limits of reality and perspectives. *RESLA*, 1, 95–111.

Villalobos-Abarca, M. A., Herrera-Acuña, R. A., Ramírez, I. G., & Cruz, X. C. (2018). Aprendizaje basado en proyectos reales aplicado a la formación del ingeniero de software. *Formación Universitaria,* 11(3), 97-112.

Walsh, A. (2005). *The tutor in problem based learning: a novel's guide.* Hamilton: McMaster University, Health Sciences.

Weinberg, L., & Symon, M. (2017). Crossing borders: The challenges and benefits of a collaborative approach to course development involving content and language specialists in different countries. In J. Valcke & R. Wilkinson (Eds.), *Integrating content and language in higher education: Perspectives on professional practice*, 135–150. Frankfurt: Peter Lang. https://doi.org/10.3726/978-3-653-07263-1

Zancul, E. de S., Sousa-Zomer, T. T., & Cauchick-Miguel, P. A. (2017). Project-based learning approach: Improvements of an undergraduate course in new product development. *Producao*, 27 (Special issue). https://doi.org/10.1590/0103-6513.225216