

## Development of a sustainable learning environment with Challenge-Based Learning

### Conference subtheme(s):

Durability; Sustainable learning spaces; Recontextualization

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### CBL as a driver for the development of a sustainable LE

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#### Abstract

Higher Education Institutions are called to foster the development of Global Future Skills among their students. This symposium addresses Challenge-Based Learning (CBL) as the teaching and learning approach in the ECIU university to create an educational model as a sustainable learning environment on the European scale. CBL aims to contribute to real societal change and address transversal skills like problem solving, team work, critical and creative thinking, and communication next to technical skills and subject knowledge. The ECIU University is an EU-funded European University that gathers learners, teachers, and researchers to cooperate with communities and businesses. It focuses on "Sustainable cities and communities" (SDG11) in research, teaching and learning.

The findings of the first three years of CBL at ECIU University will be presented, from different perspectives:

1. **In theory, CBL is nothing else than another name for PBL and PjBL. True or false?** This part discusses the findings of a systematic literature analysis of 177 scientific papers. Reported teachers' activities are aligned to the ADDIE model and supplemented by additional focus on the role, attitudes, and behaviour outcome of teachers and students. It will emphasize the different steps of instructional design and provide recommendations for teachers.
2. **Bringing CBL@ECIU to life: Benefits of and criticism on CBL@ECIU from students and teachers.** In three cycles, teachers and students take part in surveys and interviews to identify factors support or hinder the implementation of CBL. This part addresses educational developers, leaders, and teachers. It highlights the attitudes of teachers and students and the role of external partners as key drivers in implementing CBL.

3. **CBL as a relevant and socially responsible learning environment for all actors involved.**

Reported practices on building a sustainable network of partners, with both relevant contributions to students' projects, and innovation institutional processes for stakeholders, will be discussed. Confrontation with the literature on the development of Communities of Practice that integrate teachers and societal partners will also be presented.

All perspectives combined aim to give insights into theories and practices of implementing CBL as a new educational model on the European scale in a sense of Scholarship of Academic development and invites the participants to reflect on the findings as critical friends.

The symposium will be structured by three 15 min presentations, each followed by 10 min discussion, and additional 15 min to discuss everything in sum with a systemic perspective.

## References

- Blevis, E. (2010). Design challenge based learning (DCBL) and sustainable pedagogical practice. *interactions*, 17(3), 64-69.
- Santibáñez, I. R., & Montiel, G. A. L. (2020). Change in Educational Models for Facing Challenges to Lead Students into a New Way of Learning. In *Educational Leadership*. IntechOpen.
- Vilalta-Perdomo, E. L., Michel-Villarreal, R., Lakshmi, G., and Ge, C. (2020). Challenge-Based Learning: A Multidisciplinary Teaching and Learning Approach in the Digital Era–UoL4. 0 Challenge: A CBL Implementation. In *Engineering Education Trends in the Digital Era* (pp. 150-176). IGI Global.
- Membrillo-Hernández, J., Ramírez-Cadena, M. J., Martínez-Acosta, M., Cruz-Gómez, E., Muñoz-Díaz, E., & Elizalde, H. (2019). Challenge based learning: the importance of world-leading companies as training partners. *International Journal on Interactive Design and Manufacturing (IJIDeM)*, 13(3), 1103-1113

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## Benefits and criticism on CBL at ECIU university

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### Abstract

Challenge-Based Learning (CBL) aims to contribute to real societal change and addresses transversal skills like problem solving, team work, critical and creative thinking and communication besides technical skills and subject knowledge (e.g. Vilalta-Perdomo et al., 2020 and Membrillo-Hernández et al., 2019). Our contribution presents empirical findings from three terms of CBL at ECIU university, an EU-funded European University that gathers learners, teachers and researchers to cooperate with communities and businesses. ECIU focuses on "Sustainable cities and communities" (SDG11) in research, teaching and learning. Based on qualitative and quantitative research, we present findings on motivation, goals and competencies of teachers and students, followed by an overview of key factors that may affect the implementation of CBL. These include academic cultures, institutional regulations and structures, teaching and learning conditions, external stakeholders, colleagues/support, teachers' attitudes and competencies as well as students' attitudes and competencies.

Moreover, we identify interrelations and dynamics between some of the aspects that support and/or hinder the implementation. For instance, even though implementing CBL still heavily relies on the teacher's individual intrinsic motivation and their personal time and energy investment, an unfavorable institutional/academic culture may lead to a decline of the teacher's enthusiasm, whereas working with colleagues is depicted as clearly supportive. Another example for interconnected factors would be the impact of external partner involvement on students' attitude, engagement and perceived self-efficacy.

### References

Vilalta-Perdomo, E. L., Michel-Villarreal, R., Lakshmi, G., and Ge, C. (2020). Challenge-Based Learning: A Multidisciplinary Teaching and Learning Approach in the Digital Era–UoL4. 0 Challenge: A CBL Implementation. In Engineering Education Trends in the Digital Era (pp. 150-176). IGI Global.

Membrillo-Hernández, J., Ramírez-Cadena, M. J., Martínez-Acosta, M., Cruz-Gómez, E., Muñoz-Díaz, E., & Elizalde, H. (2019). Challenge based learning: the importance of world-leading companies as training partners. International Journal on Interactive Design and Manufacturing (IJIDeM), 13(3), 1103-1113.

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## CBL as a socially responsible learning environment for all actors

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### Abstract

Challenge-based Learning (CBL) has a major relevance in Higher Education (HE), by confronting students to real-world problems with no pre-established answers (Michael, 2006), where external partners play an essential role (Membrillo-Hernández et al., 2019). As a student-centered active learning approach based on solving scientific/societal challenges in interdisciplinary teams, through three steps (engage, investigate and act), CBL learning experience is multidisciplinary, involves different stakeholder perspectives, and seeks a collaboratively developed solution that is environmentally, socially and economically sustainable (Rådberg et al., 2020). Högfeldt et al. (2019), as well as Membrillo-Hernández et al. (2019) emphasize that the co-work with stakeholders may continue after the academic period being formally over, which may benefit the solutions' sustainability, and possibly the students' employability.

The implementation of CBL in HE institutions demands for pedagogical innovation and the change of teachers' practices. Fostering Communities of Practice (CoP) on Inquiry-based learning (IBL) methodologies such as CBL can bring together teachers and societal partners, providing a more socially responsible learning environment (Hodgkinson-Williams et al., 2008). This study presents University of Aveiro (UA) initiatives to help HE teachers and external partners collaborate on the conception of socially relevant challenges, within the ECIU Erasmus+ project.

At the UA CoP on IBL (about 80 UA teachers), one session (June 2021) was based on how to involve external partners in IBL methodologies. Some external partners were invited to share practices and to describe the process of interaction with the UA on IBL activities.

*The discussion was based on the guiding questions: How did the interaction with the UA develop, from a processual point of view? What benefits did the interaction with the UA reap? What aspects of process improvement or innovation do you suggest?*

This initiative was followed by a session where different types of external partners were invited to work with teachers on the definition of socially relevant challenges. During the first part of the session teachers were able to meet possible relevant partners, to better understand each other's contexts and aims. On the second part, teachers and partners started to design joint CBL challenges, such as "Efficient Human Resources Management in the ICT area" and "Sustainable development - Valorisation of industry residues in the construction of buildings and infrastructure".

The presentation will report the initiatives for building a sustainable network of partners, with both relevant contributions to students' projects and to innovation institutional processes for stakeholders, and discuss its results.

## References

- Blevis, E. (2010). Design challenge based learning (DCBL) and sustainable pedagogical practice. *interactions*, 17(3), 64-69.
- Santibáñez, I. R., & Montiel, G. A. L. (2020). Change in Educational Models for Facing Challenges to Lead Students into a New Way of Learning. In *Educational Leadership*. IntechOpen.
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