Case Study Seven—Co-Creating the Shop "La Botiga": A First Implementation of Challenge-Based Learning at the Universitat Autònoma de Barcelona (Spain)

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Introduction

In recent years, universities have played a fundamental role not only as the leading institutions for creating and promoting knowledge, but also as the key players in the process of identifying and addressing the real-life societal challenges. In this context, the relationship between the university and its immediate social environment has faced several meaningful changes and is currently moving towards a deeper interaction and collaboration between involved actors, contributing decisively to the economic, social, and environmental development of society.

The Universitat Autònoma de Barcelona (UAB) is an institution that is strongly rooted in the territory, and has established a strong connection with it, to actively contribute to its development. Consequently, the institutional strategy of the UAB is framed in this firm commitment of promoting collaboration to address the main challenges of society, and to promote initiatives to share and co-create knowledge with citizens, public administration, and companies.

In this context, the UAB has been exploring and developing new ways of learning and doing research, with the goal of linking education and research to local and regional challenges: an example of these methodologies is challenge-based learning (CBL).

The exploration and the development of this innovative methodology has been done at UAB's institutional level, but it has also benefited from European Projects like the ECIU University, as one of the main goals of this project is the implementation of an ecosystem where students, teachers, and research staff collaborate with a wide range of social and

economic actors, to solve real-life challenges.[1] The university has defined a framework with several components to develop its challenge-based learning strategy. These components are societal linking, stakeholder engagement, and the use of design thinking as ideation methodology. The approach followed at UAB is to merge CBL and design thinking to boost innovation and creativity in the challenge resolution process.

The following section introduces the framework and the guides and tools created, and later we describe a specific challenge process developed at UAB using the developed methodology and the available tools.

The Theoretical Framework: Challenge Development Methodology at the UAB

In order to develop challenges and provide solutions to challenge providers, we have used a methodology to guide challenge participants from challenge definition to challenge solution transfer to society and impact evaluation. This methodology is based on three pillars, as seen in Fig. 6.5, societal connection, stakeholder participation, and design thinking for CBL. A transversal axis is reflection during all development process.

For the first pillar, UAB has developed a connection strategy with the surrounding territory to connect to societal needs through societal actors like citizen associations, local cooperatives, city councils, SMEs, and industry associations. Instead of addressing a particular need from a company, this methodology allows us to gather real societal needs and representative stakeholders for challenges to address UN SDGs.[2] In the case presented in this study, UAB started contacts with *El Prat del Llobregat* city council and ABD NGO to identify the challenge to be solved. At the university, a physical challenge office has been set up to manage these relations.

[1] In this sense, both the UAB teaching and technical staff involved in the ECIU University project are contributing to the institutional implementation of CBL in the institution, providing not only their theoretical knowledge, but also their practical experience in creating and implementing a challenge-based offer.

[2] Ideally, a challenge can address any of the 17 UN SDGs. The UAB is currently focusing on SDG11 "Make cities and human settlements inclusive, safe, resilient and sustainable," in line with what is being worked in the ECIU University.

For the second pillar, we encourage stakeholders' participation during challenge development using a citizen science and open science strategy. Again, this strategy opens university to the society and citizens to improve engagement and quality of the designed solution. In our case, we had participants from the NGO, city council, researchers, students, and citizens from *El Prat de Llobregat*. From these two first pillars, the team formed by the challenge coordinator and the teamchers get a proper challenge and suitable stakeholders identified.

Finally, the third pillar is a step-to-step process based on design thinking and CBL to develop the challenge and provide a solution by challenge participants team. We start from CBL as learning methodology based in three phases*: Engage*, *Investigate*, and *Act*. Then, we merge with design thinking and challenge definition in several phases (Fig. 6.8). It is important to state that the matching between CBL and Design Thinking phases has some overlapping: for example, definition of big questions is included in CBL *Engage*, and challenge definition in part of CBL *Investigate*. Similarly, ideation and prototyping are part of the CBL *Investigate* phase (at first steps) and part of the *Act* phase (at more advanced challenge development).

For each phase, we have identified a set of tools (Fig. 6.7) to use at each phase by the challenge team. We have created a teamchers' guide where all these procedures and tools are described, so they can be used in the challenge resolution.

Design Thinking for CBL phases are shown in Fig. 6.6.

1. Challenge definition
2. Empathising
3. Definition
4. Ideation
5. Prototyping
6. Testing
7. Transfer

The first phase, challenge definition, is used to land problem definition and is based on a canvas (Fig. 6.8) that follows a series of steps to fill in carried on by the whole challenge team:

1. Current situation
2. Future vision
3. Unresolved problems
4. Challenge
5. Participants
6. SDO's
7. Next steps
8. Solutions requirements
9. Expected impact
10. Agents involved
11. Short title
12. Long title

The first phase, together with second and third ones, Empathising and Definition, matches CBL *Engage* step where you start with a big idea, then elaborate essential questions, and finally define your challenge to work into. At the *Investigate* phase, guiding questions for learner's journey are developed, guiding activities and resources are designed and, after the analysis process, a synthesis that outlines the foundations for the solution is produced, possibly including prototype or demonstrator development. This is developed at the "ideation" and "prototyping" phases in the methodology. In the *Act* phase, challenge team members develop solutions, implement, put to work, monitor, and evaluate it, and this is done in testing and transfer phases.

As mentioned, at the UAB we identified and provided a set of tools to carry on each phase (Fig. 6.7). Team members, guided by Teamcher, select the most appropriate tool for each phase based on challenge type, already used tools in previous phases, and team expertise.

In the first phase, "challenge definition," we have developed the already mentioned canvas. For the rest of phases, these are some of the suggested tools to use (Figs. 6.5, 6.6, 6.7, and 6.8):

1. Empathising: stakeholder map, dives, five why's, shadowing and user camera study, analogy for empathy, interviews and focus groups and surveys.
2. Definition: saturate and group, problem sizing, Pestel analysis, Ishikawa diagram, empathy map definition, persona map, journey map, insights selector.

3. Ideation: brain and sketch storming, benchmarking, future scan, scamper, how might we, power of ceros, 10 × 10 ideas, find your mojo.
4. Prototyping: Paper prototype, app prototype, infographic display, video prototype, manual modelling prototype, 2D and 3D print prototype, brand prototype.
5. Testing: Interviews test and focus groups, assumption learning card, feedback grid, experiment card.
6. Transfer: Interviews test and focus groups, assumption learning card, feedback grid, experiment card.

Developing CBL: Pedagogical Aspects of the Challenge "La Botiga"

The case presented in this article was developed within the framework of ECIU University, and the compromise to work towards the Sustainable Development Goals. The experience of developing CBL that we are going to present is extra-curricular, multidisciplinary, and linked to the Sustainable Goal 11: Make cities inclusive, safe, resilient, and sustainable.[3]

The first part of implementing the project was about **starting from a big idea and defining a challenge**. In order to do it, the UAB and two stakeholders, the Prat de Llobregat City Council and the ABD group (a welfare and Development Association), start working together with the UAB challenge coordinator in autumn 2020.[4] After these first contacts, an expert team of the UAB with the Challenge Coordinator organised a workshop in January 2021 with the stakeholder and other experts in the area, and worked together to define the general Challenge, that was finally defined as "Transform the free food distribution programme guaranteeing alimentary security for vulnerable groups." The goal was to discover new ways of transforming usual redistribution of food (food banks) to dignify food access and promote social cohesion, by leading local projects to reduce food waste.

[3] https://sdgs.un.org/goals/goal11.

[4] The final phase of the challenge (the public presentation of results) took place on the 23rd of November of 2021, one year after the first exploration with stakeholders was done. However, the "real work" on the challenge with the students was developed for 6 months (2nd semester of academic year 2020/21).

Fig. 6.5 Challenge development methodology pillars

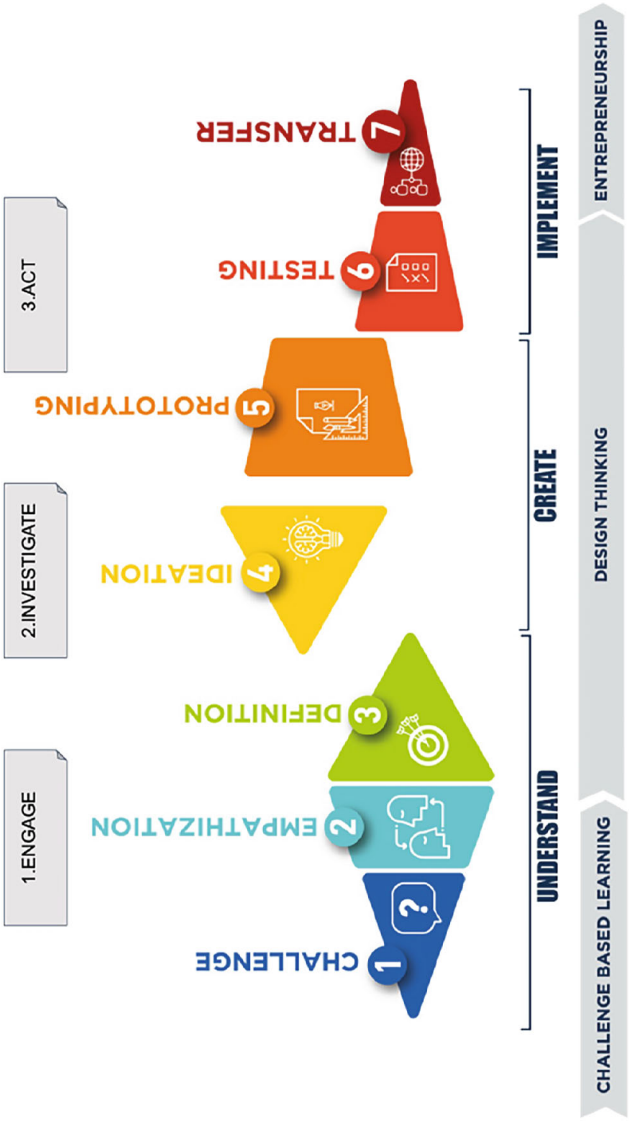

Fig. 6.6 Challenge development methodology

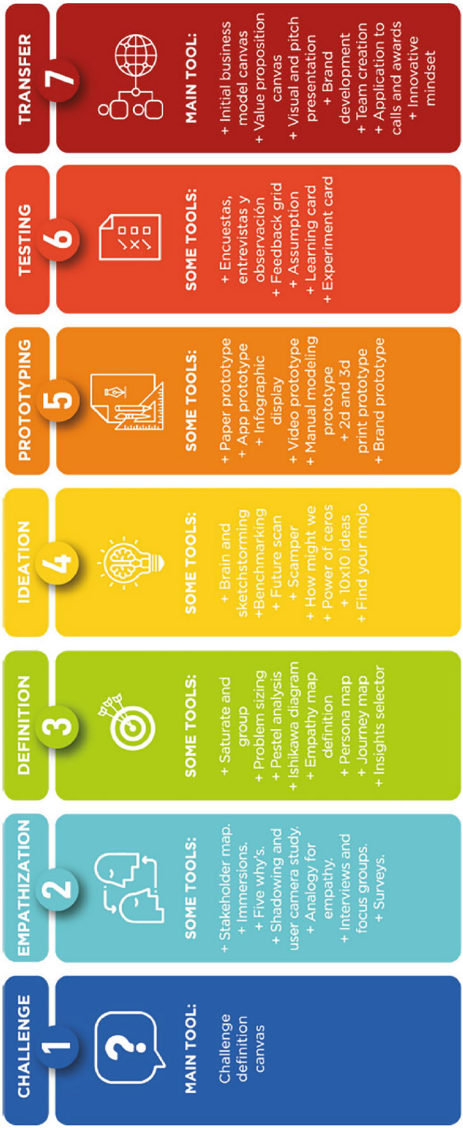

Fig. 6.7 Challenge development tools per phase

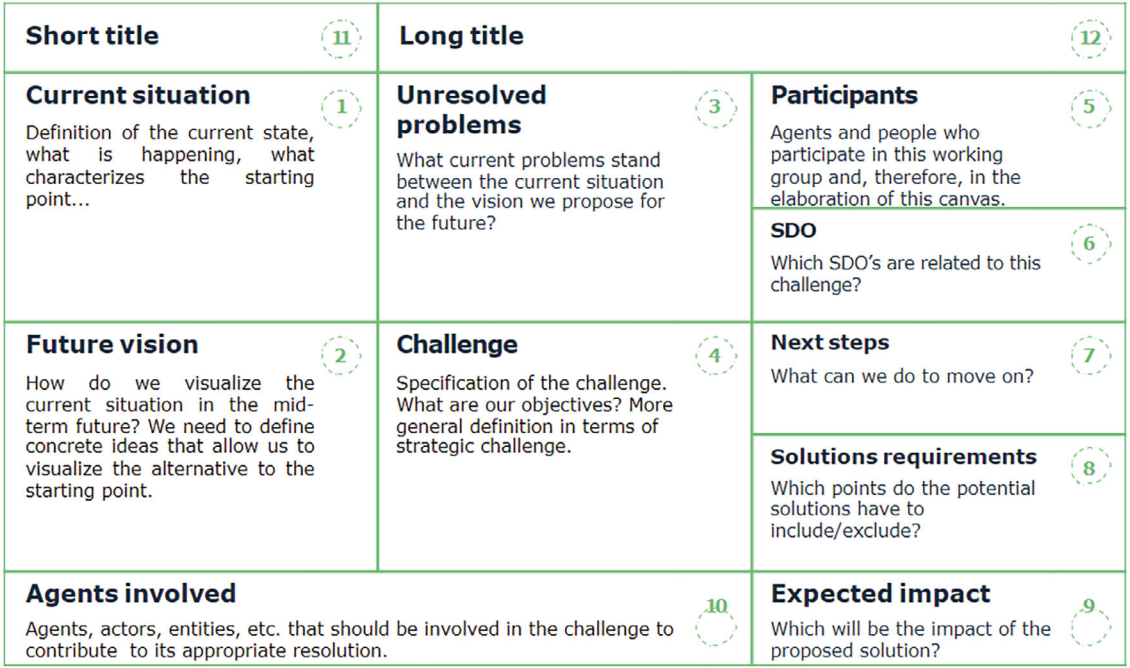

Fig. 6.8 Challenge definition canvas

In order to define the challenge, the specific methodology described in the previous section was put in place, with the help of tools such as the canvas template that guides the process previously introduced. In Fig. 6.9, the first part of the canvas presented before (Fig. 6.8), thinking about the current scenario description with one idea per post, is shown.

Once the challenge was defined, it was published on the ECIU webpage[5] and opened to the participation of the students of all the ECIU university members. 25 students enrolled voluntarily, 16 from the UAB and 9 from other ECIU universities, but only seven got to the end of the full CBL process: 4 from the UAB, 2 from Hamburg University of Technology, and 1 from the University of Trento.[6] The challenge was developed in a hybrid context, combining local face-to-face meetings and remote work.

The challenge was coordinated by three professors from the UAB, with different academic backgrounds:

- Xavier Gabarrell from the Department of Chemical, Biological, and Environmental Engineering
- José Luís Molina from the Department of Social and Cultural Anthropology
- Jordi Verdú, from the Department of Telecommunications and Systems Engineering.

They were all involved in different functions: organising, coordinating, coaching, creating materials, facilitating documentation, supporting, and evaluating the students and their work during the process.

The challenge was developed following the three main phases of the CBL methodology.

Engage *(Empathisation and Definition)*
During the first phase, the students, with the teamcher support, created the teams and got to know the stakeholders and the starting point to learn about the context, to know and learn from each other promoting

[5] https://engage.eciu.eu/browse.

[6] Some more statistical data about the 7 students who completed the challenge: 4 females and 3 males, 4 Bachelor students and 3 Master students. The fields of studies were Environmental studies, Economics and Business, European and International Studies, Food Science and Technology.

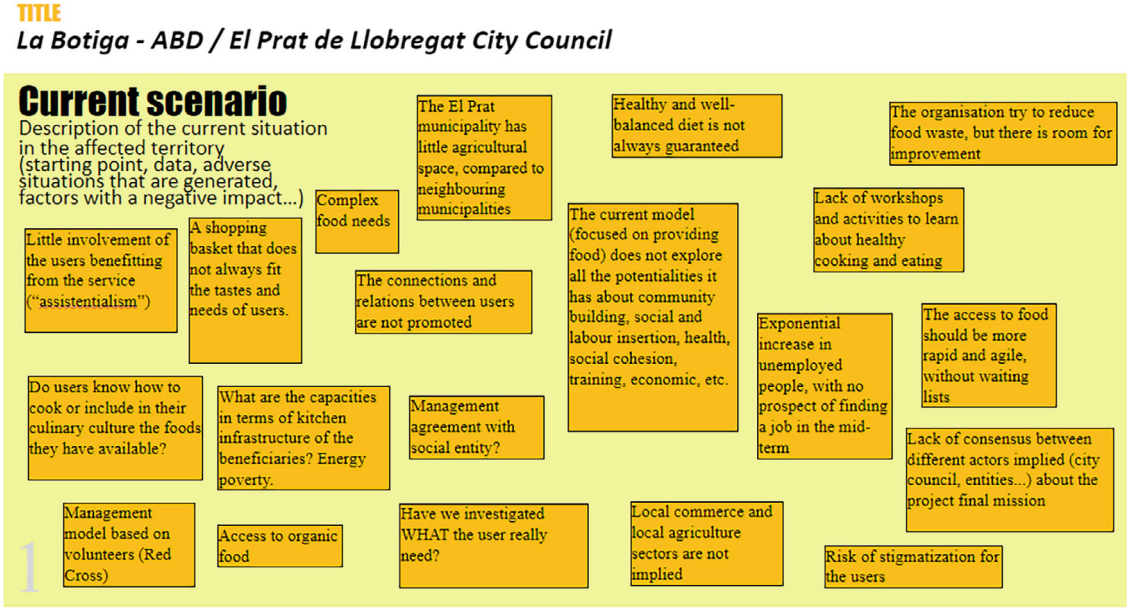

Fig. 6.9 First phase of the canvas to define the general challenge

an empathic environment.[7] Students started to generate some questions and focused to define their challenge:

- How to define an operational and sustainability model for a project that generates a new space of value and a point of reference at a territorial level?
- How can we generate an active community, committed to the project, and connected to the local/global ecosystems that can guarantee the resilience of the project?

Additionally, teams with different profiles and backgrounds are created showing high motivation.

Investigate *(Definition, Ideation, Prototyping)*
The teams shared focus on different proposals with the aim of:

- Rethinking the agro-food chain (local/global) related to the key project of the circular economy.
- Design a new disruptive, inclusive, and social empowerment food management model that can produce a positive change in the agri-food paradigm.

After different contacts with the stakeholders, the students and the Teamchers decided to propose a possible solution in creating a shop, "la Botiga," and they worked on the prototyping of the solution.

The students worked thinking about different concepts such as the target group of the Shop, sustainability, circular economy, cooperation, participation, education, communication, care, etc. They investigated on different successful models such as social gardens, food bank, city allotment, cooperatives, and legal aspects.

[7] A very important presential activity in this sense was the visit to "La Botiga," done by the teamchers and the local students, to better understand the subject and collect ideas on the development of the challenge. The students from the other universities were then informed about the outcomes of the visit.

Act *(Prototyping, Testing, Evaluation, and Transferability)*
The solution of creating a shop was presented in a special public open event in a hybrid mode, with key representatives of the stakeholder and the university (Photo 6.1).

The students, in a cooperative way, explained the process and the proposal of the shop, with a viable plan that considered the technical and economical elements. The final proposal is shown in Fig. 6.10.

The final proposal was collectively evaluated with the students, teamchers, and the stakeholders, taking into account the environmental impact (local production, 0 waist, minimum contamination, clean energy) and the social impact (equality, social inclusion, participation, and education).

The students put into value the learning process, and the transversal competences developed during the challenge, such as entrepreneur spirit, teamwork, and leadership among others. The impact on the territory has been significant, as the shop was created and it is currently working, as shown in the following image (Photo 6.2)

Photo 6.1 La Botiga

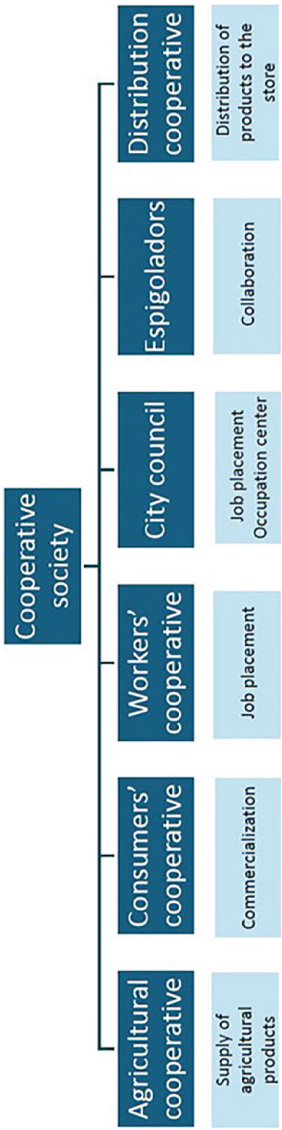

Fig. 6.10 Structure of the cooperative

Photo 6.2 Final presentation

The teamchers valued this first CBL experience very positively: there was a lot of effort and work to do, but the process and outcome were worth it. Some of the lessons learned from their first experience can be resumed it in 5 main points, that we present with their own voices:

- **Previous Training**: It is fundamental to receive training not only about CBL, but also about other strategies that need to be implemented during the challenge, such as how to create the teams and engagement at the beginning…
- **Learning Outcomes**: Quoting the teamchers, "the learning and the results obtained have being higher than our initial expectations, the students were excellent, really motivated and engaged."
- **Adequate Format**. Initially, there were some doubts regarding having to work in a hybrid format, but at the end, it was feasible, and a great way to work CBL in a both local and international level. In this sense, the fact to count with a shared online platform helps to communicate and work easily.

- **Evaluation**: It was difficult to think about a detailed evaluation process, especially about the students' skills and competences. A previous phase with the teamchers, to define the evaluation and to integrate the experience with formative modules, would have helped. The teamchers agreed on the need to create templates and rubrics to help to evaluate the three-phase process of CBL, and to reflect during the process.

  The evaluation processing focused on the active participation of the students, and lead to a pass/no pass grading. The 7 students who were evaluated positively, received an official certificate from ECIU University.[8]
- **Collaboration**: a long-term collaboration between research groups, teamchers, and institutions or businesses would help to increase the impact of the challenge. Several challenges can be concatenated to work on different phases of the same project, and this could be beneficial for the stakeholder, as well as for the learners.

Conclusions

The "La Botiga" challenge has been one of the first CBL experience developed at the UAB, and probably the first one with such a deep intercultural and interdisciplinary perspective.

The general feedback received from the several actors implied (teamchers, students, stakeholders, technical staff) has been overall very positive and enthusiastic, and it is aligned with the one collected from other challenges.[9]

The UAB is now working on the institutional implementation of the CBL methodology in several faculties: challenges are being included in subjects, bachelor thesis and master thesis. The teaching staff is being trained to get familiar with the methodology, and it is clear that students should gain the proper skills and competences to make the most out of the experience, much before being directly involved in a challenge.

[8] Additionally, in some cases, the 6 ECTS of the challenge could be recognised and included in the transcript of record of the student, as an optional academic activity.

[9] The feedback shared by teamchers, stakeholders, and students about the experience of participating in this and other challenges a the UAB can be seen here https://youtu.be/q5s9v3_u4WM and here https://youtu.be/qCcSfqR1N2E (subtitles in English).

In this sense, if the challenges are being offered starting from the 3rd year of academic career, training should start from the very beginning of the bachelor experience, as it covers many transversal skills such as autonomy at work, critical thinking, intercultural competences… all competences that require time and practice and can be applied to any learning experience.

The vision at the UAB is to keep working on the gradual implementation of this innovative teaching methodology at our institution, and to do so in a both local and international perspective, thanks to the institutional commitment, from one side, and the participation in the ECIU University, on the other side.

Case Study Eight—Combining Challenge-Based Learning with the Writing of a Master's Thesis: The Pilot of the ECIU Strategic Challenge

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Introduction

This case study introduces a unique concept of combining CBL with the writing of an individual master's thesis. In this case study, we describe the original CBL-coaching process as well as the actual implementation of the thesis supervision. We reflect on our own experiences and present the participants' reflections on their engagement in this pilot study. We also provide practical implications for those who are interested in combining the supervision of the thesis writing with the coaching of an international, multidisciplinary team challenge within the framework of CBL.

Background and Participants

The ECIU is a consortium of 13 technical universities in Europe and one associate partner in Mexico, which are connected by their shared ambition to 'challenge conventional thinking.' To put this ambition into practice in education, the ECIU started the ECIU University, a real European university that would operate according to CBL. To learn about how CBL could be organised to make students learn, several projects were started