

UNLOCK'S (ONLINE) CONFERENCE | 28-29 NOVEMBER 2022

UNLOCKing CREATIVE & INNOVATIVE TEACHING IN HIGHER EDUCATION

Extended Abstracts



Title: UNLOCKing Creative & Innovative Teaching in Higher Education Extended Abstracts

Publisher:

UA Editora | Universidade de Aveiro, 1st Edition – February 2023
ISBN:978-972-789-843-5
DOI: <https://doi.org/10.48528/k340-7j36>

Editors:

Déspina Kortésidou (University Industry Innovation Network; UIIN)
Fleur Schellekens (University Industry Innovation Network; UIIN)
Alexandra Zinovyeva (University Industry Innovation Network; UIIN)
Marta Ferreira Dias (GOVCOPP, University of Aveiro)

Acknowledgement to project partners:

Marta Ferreira Dias (GOVCOPP, University of Aveiro)
Jessica Reuter (University of Aveiro)
Marlene Amorim (GOVCOPP, University of Aveiro)
Audrone Daubarienė (Kaunas University of Technology)
Asta Daunorienė (Kaunas University of Technology)
Ingridd Wakkee (Amsterdam University of Applied Sciences)
Richard Martina (Amsterdam University of Applied Sciences)
Kristin Webb (Amsterdam University of Applied Sciences)
Hacer Tercanli (Münster University of Applied Sciences)
Isabel Gomes (Advancis Business Services)

Illustrator:

David León de la Torre

Authors:

Alessandra Scroccaro (University of Trento)
Alexander Heinz (King's College London)
Alvis Misjuns (Vidzeme University of Applied Sciences)
Ana V. Rodrigues (University of Aveiro)
Anders Bouwer (Amsterdam University of Applied Sciences)
Cécile Agullo (Euskampus Fundazioa)
Charlotte Norrman (Linköping University)
Elizabeth Conradie (Central University of Technology)
Erika Ribeiro (University of Aveiro)
Faye (Falmouth University)
Ieva Gintere (Vidzeme University of Applied Sciences)
Itziar Rekalde (Euskampus Fundazioa)
Isabel Gomes (Advancis Business Services)
Jessica Reuter (University of Aveiro)
Jonna Järveläinen (Turku School of Economics, University of Turku)
Julieta Barrenechea (Euskampus Fundazioa)
Laura Jankauskaitė-Jurevičienė (Kaunas University of Technology)
Marta Ferreira Dias (GOVCOPP, University of Aveiro)
Marlene Amorim (GOVCOPP, University of Aveiro)
Mário Cruz (Universidade de Santiago de Compostela)
Michelle Erasmus (Central University of Technology)
Nicolas Dietrich (INSA Toulouse)
Paula Carolei (Unifesp)
Suzette Duarte Oliveira (Universidade de Santiago de Compostela)

UNLOCK

Co-funded by the
Erasmus+ Programme
of the European Union



TABLE OF CONTENTS

Research-Based Extended Abstracts

Selecting A Suitable Educational Escape Room: A Facilitating Set Of Propositions	6
Challenge Thinking: Challenge-Based Learning pedagogy applied to Sustainable Chemical Engineering - a first attempt at INSA Toulouse	11
The ImGame project: Refinements to the Theory of Immersive Aesthetics and Innovation in Serious Art Gaming	14
This is not a Escape Room: Controversies and inconsistencies evidenced in the design of educational experiences	18
A formative proposal for pre-service primary school teachers: an intercession between STEAM education and the creative thinking through Challenge-Based Learning	23
Designing Educational Games with the Didactics-Driven Development Methodology	27
The entwining of “creactical” thinking skills beyond a synergistic thinking classroom	31

Good Practice Cases

Developing perceptions between educators through the escape room	35
Challenge-based learning as a tool for the understanding of the urban and social environment	40
Innovative entrepreneurship - a CBL master’s course	46
Compulsory real-world problem-solving assignment to teach innovation at a Higher Education Institution in South Africa	53
Interdisciplinary Co-Creation of Short Term Programming	60
Ocean I3, A Cross-Border Community Engaged With The Ocean	63
Challenge: Alpine Smart Working: Your Office in the Mountains	70
A case study of errors in the journey towards greater emotional intelligence (for staff and students alike)	74

Introduction to the Document

The following publication was prepared as part of the *UNLOCKing creative & innovative teaching in Higher Education* Conference (referred to for brevity as the *UNLOCK Conference*) that was organised by UIIN and AUAS as part of the Erasmus+ UNLOCK project, which has the objective of identifying the use of educational escape rooms (EERs) in higher education environments and examining the role of educators in those activities.

The UNLOCK Conference, which took place online on November 28 – 29, 2022, focused on **game-based and challenge-based learning approaches in Higher Education Institutes, aiming to unlock students' creativity and design thinking and foster entrepreneurial skills through innovative teaching**. The UNLOCK conference welcomed research-based abstracts, good practice cases and workshops with themes falling under four domains: (1) Serious games and Game-based learning; (2) Creative digitalisation of learning and e-Learning experiences; (3) Collaborative and Challenge-based learning, and (4) Next-generation entrepreneurial teaching.

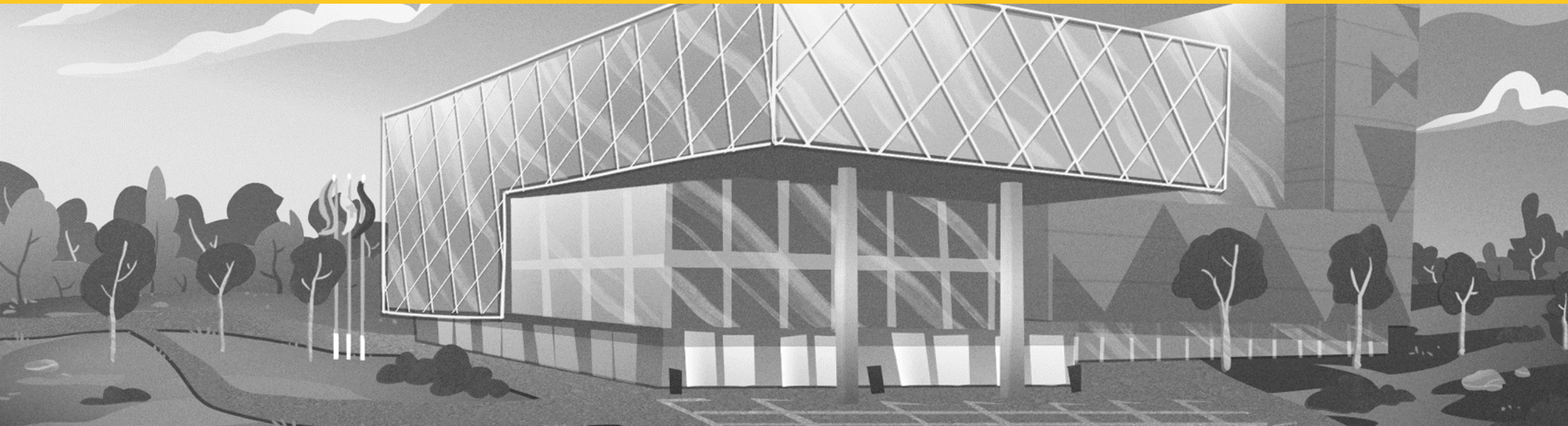
This publication covers the accepted submissions under the categories of extended research-based abstracts and good practice cases.

The extended-abstracts' presentation starts with the abstracts' domain of focus and pedagogic topic, followed by Background Information and Research Aim, Methodology, Results, Discussions and Recommendations and Conclusions. Then, the good-practice cases are presented in a consistent way, starting, starting with a pitch and the domain of focus and followed by Background & Objectives, Activities Undertaken, Support Mechanisms, Collaborations, Outcomes and Impact, Lessons Learned and Conclusions & Future Outlook.

We encourage you to review the abstracts and the cases, discuss them with your colleagues and further experts and get in contact with the respective authors in order to adapt the approaches to your own environments and utilise the full value of the presented cases. Through this publication, the UNLOCK consortium strives to support and stimulate the Future of Education and the development of entrepreneurship skillsets through the adoption of educational escape rooms and in general game- and challenge-based learning.

Research-Based Extended Abstracts

Conference | November 2022



Selecting A Suitable Educational Escape Room: A Facilitating Set Of Propositions

Author: Jonna Järveläinen

ORGANISATION	Turku School of Economics at University of Turku (Finland)
KEYWORDS	Educational escape room; Design science research; Design considerations
DOMAIN	Serious games and Game-based learning
PEDAGOGY TOPICS	Innovative educator profiles: competencies, skills, attitudes and their professional development

I. Background & Aim

Commercial escape rooms are often thrilling, and educational escape rooms (EER) seem also enjoyable for students (Veldkamp et al., 2020), especially the physical ones. There are actual locks, ultra violet lamps and hidden clues and with a good background storyline, the physical EERs can be very engaging. During Covid-19 restrictions locking a small team to a room was not an option, but a digital escape room became an alternative. There are some digital EER applications (BreakoutEDU, Genially escape rooms, Google forms escape rooms) that offer ready-made templates for teachers to create EERs. Prior research has presented some useful frameworks for designing an EER (e.g. Clarke et al., 2016; Tercanli et al., 2021).

However, when teacher decides to develop an EER for a course, there are several choices to be made: should the EER be in the beginning or in the end of the course, how long should the play time be, is teacher presence required etc. The aim of this study is to develop a set of recommendations focusing on the design elements of EERs, which facilitate the selection of an EER design.

II. Methodology

The study uses design science research (Kuechler & Vaishnavi, 2008) and formulates a set of recommendations based on literature and practitioner experiences to facilitate the selection of a suitable EER design. Prior EER literature (e.g. Abu Deeb & Hickey, 2019; Järveläinen, 2021; Tercanli et al., 2021; Veldkamp et al., 2020; Warmelink et al., 2017) forms the basis for the recommendations. The author has created several EERs and delivers the practitioner's perspective to the literature. The set of recommendations aims to summarize the design choices prior to the actual development of an EER. They are not exhaustive but reflect the discussions the author has conducted with colleagues interested in developing an EER.

III. Results

Recommendation 1: Firstly, the learning goal of the educational escape room affects the EER format (student teams playing simultaneously or consecutively), the need for monitoring (synchronous, asynchronous or none), and the course schedule (in the beginning, middle or end of the course). Secondly, the number of students on the course affects EER design. Several studies have mentioned that the typical team size is 3-6 students in an EER (Eukel et al., 2017; Järveläinen & Paavilainen - Mäntymäki, 2019). However, if the course has 20 or 120 or even more students, the design of the EER should reflect that. With a large course, a simultaneous EER could be more convenient than organising a series of consecutive EER sessions for each team on the course. Assessment of student knowledge can also be included on extensive courses without the teacher physically monitoring the players. Especially in remote teaching settings, it is possible for a student team to play a digital EER together, for example, in a Zoom breakout room and video record their discussions and progress.

If an individual assessment is not required, one option is to provide a number, letter or syllable from each successful solving of a game puzzle, which forms a final code or a word, which team members enter into a learning management system quiz. A simultaneous physical EER on an extensive course is possible, and digital tools can facilitate the delivery of the puzzles or control of the student team's progress. Moreover, in consecutive EERs, the resources can be reused.

Recommendation 2. The number of students on the course using an EER affects its format, need for monitoring, and the required resources (time and tools). The third dimension is related to time, for instance, a) how long play time is possible to organize and b) how much time the teacher or teacher team has for building a room (Tercanli et al., 2021; Veldkamp et al., 2020). If the EER play time is very short (30 minutes or less), a simpler, perhaps digital game, is more suitable since there are several ready-made templates available such as Breakout EDU or Genially. However, the typical playtime seems to be 60 minutes (Veldkamp et al., 2020), which allows more complex EER tasks, which also take more time to develop.

The more complex rooms also require other resources, such as materials (physical locks, boxes, props, digital tools). Developing a complex game can take multiple weeks since the game requires a storyline, puzzles that support the pedagogical goals, materials etc. (Tercanli et al., 2021).

Recommendation 3: The available development time for EER creation affects the design of an educational escape room (simple to complex design) and the required resources (time and tools).

Recommendation 4: The available playing time for an educational escape room affects the EER format (student teams playing simultaneously or consecutively) and the required resources (time and tools).

Recommendation 5: The delivery media affects the design of the EER (puzzles, storyline, sense of urgency).

IV. Discussion and Recommendations

Finally, the choice of delivery media affects the design of the EER. Many puzzles in a physical escape room can be easily transferred to a digital setting (Järveläinen, 2021). Code and number locks can be found in digital escape room tools, but for example, finding hidden messages in texts or pages is also possible. One crucial element of an EER is urgency, which in physical games can be created with a clearly visible countdown clock, set of handcuffs or some form of time lock. In a digital game, the visible countdown clock is also available, but it is challenging to create the same feeling of being in a closed room (not locked) together with the team and finding locks, hints etc.

In a digital game, the visible countdown clock is also available, but it isn't easy to create the same feeling of being in a closed room (not locked) together with the team and finding locks, hints etc. An engaging storyline is therefore essential also in the digital EER. However, EERs have pedagogical objectives and thus, placing too much emphasis on hidden locks or clues leaves less time for the students to solve the puzzles with learning goals.

This study discusses selecting a suitable EER design for a course. It presents a set of recommendations to facilitate the selection based on prior EER literature and prior experiences of a practitioner.

V. Conclusion

A set of five recommendations introduce some essential design considerations for EERs. The EER format – simultaneous or consecutive – is affected by the learning goals, the number of students on the course, and available playing time. The need for monitoring of student performance – synchronous, asynchronous or none – is affected by the learning goals and the number of students on the course. The required resources – time and tools – depend on the number of students, development time, and playing time. The design of an EER should be determined based on available development time and delivery media, and EER placement on the course schedule depends mainly on learning goals.

This study extends the research on educational escape room development by introducing a set of propositions to facilitate the selection of a suitable EER. Creating an educational escape room without experience can be exhausting, and some interested teachers may decide to drop the idea. This paper presents a tool for first-time EER developers, which may facilitate the selection of a suitable EER. Therefore, the design decisions should be straightforward if a teacher considers learning goals, the need for monitoring, required resources, delivery media, available development time and playing time.

“

One crucial element of an EER is urgency, which in physical games can be created with a clearly visible countdown clock, set of handcuffs or some form of time lock.

– Jonna Järveläinen

”

Challenge Thinking: Challenge-Based Learning pedagogy applied to Sustainable Chemical Engineering - a first attempt at INSA Toulouse

Author: Nicolas Dietrich

ORGANISATION INSA Toulouse (France)

KEYWORDS Challenge-Based-Learning; Challenge Thinking

DOMAIN Collaborative and Challenge-based learning

PEDAGOGY TOPICS Measuring impact on students and educators

I. Background & Aim

Challenge-based learning (CBL) is an emerging learning approach in higher education. It has been developed as a means for students to align the acquisition of disciplinary knowledge with the development of transversal competencies while working on real and concrete societal grand problems (Nichols and Cator 2008). On top of being worth solving because of economic or societal leverage, these real-life challenges also provide a stimulating environment for in-depth learning for students, experimenting with problem-solving skills and innovative competencies to develop practical solutions. A CBL experience is an activity in which students learn about a sociotechnical problem by identifying, analysing, and designing a solution to it. The learning experience is usually interdisciplinary, takes place at an international level, and attempts to generate a cooperatively developed solution that is ecologically, socially, and economically sustainable. A key point in this approach is that CBL is learning with partners in society, using the grand challenges they face in reality, to arrive at solutions to these challenges.

II. Methodology

This learning approach is aligned with the development of transversal skills/soft skills necessary to tackle the challenge of pedagogy 4.0 (Feise and Schaer 2021; Aymard et al. 2021). The advantages of CBL have been widely highlighted in the literature, either via an analysis of student or academic feedback or through a descriptive method. Industry networking improved technical skills, application of skills in a real-world environment, training in multidisciplinary teamwork, improved problem-solving skills, and a deeper understanding of knowledge were among the benefits for students. The Challenge Based Learning framework is divided into three interconnected phases: Engage, Investigate, and Act. Each phase includes exploratory cycles and activities that prepare the student to move to the next phase. Once the CBL approach is finished, pedagogical methods that unleash the creation of innovation or that permit the concrete implementation of solutions can be conducted.

This paper presents a Challenge-based learning activity that has been applied to chemical engineering and sustainability at a Master's level at INSA Toulouse. It has been tested with students from the fifth year in Chemical Engineering and Environment courses and with the fourth year in Fluids Engineering for Industrial Processes at INSA Toulouse during the academic year 2021/2022. These students were joined by more students from different universities in Europe to work online on the challenge.

III. Results

Around 20 students were divided into four teams of 4-7 students that all faced a real challenge provided by an external partner. The project lasted three months, with one month for each phase: investigate, engage and act. Each team were supervised by two “teamchers” (contraction of team and teacher). In the end, the students presented their solutions to a committee composed of the teamchers, an external partner and a discipline-related, interested stakeholder.

IV. Discussion and Recommendations

The feedback received from students who participated in this exercise during the period has been evaluated by a survey and by completing an individual feedback report. It corroborates the increase in motivation and teamwork through such activities. Furthermore, the student survey highlighted different skills development, such as Critical thinking/Problem-solving, Creativity & Innovation, Communication with an external partner from the society, Initiative and Persistence, Leadership & Social awareness. In the end, the advantages and limits of such an activity are discussed.

V. Conclusion

Challenge-based learning (CBL) is an emerging learning approach in higher education and has been developed as a means for students to align the acquisition of disciplinary knowledge with the development of transversal competencies while working on real and concrete societal grand problems. CBL is a promising pedagogy to develop initiative, critical thinking and to develop design thinking and entrepreneurial skills.

The ImGame project: Refinements to the Theory of Immersive Aesthetics and Innovation in Serious Art Gaming

Authors: Ieva Gintere & Alvis Misjuns

ORGANISATION Vidzeme University of Applied Sciences (Latvia)

KEYWORDS Serious art games; Immersive aesthetics; WebGL; Node-based shaders

DOMAIN **Serious games and Game-based learning**

PEDAGOGY TOPICS **Innovative educator profiles: competencies, skills, attitudes and their professional development**

I. Background & Aim

This article adds new theoretical facets to immersive aesthetics by referring to the thought of Kant, Lacan, Lyotard as well as Greek mythology. The aesthetics of immersion can be classified into two psychological modes that have not been explicitly defined in the discourse of immersiveness. The analysis of immersive artefacts shows that these modes are being used parallelly, shifting one to the other: 1. reflective, meditative or dreamlike state of contemplation, and 2. Medusian mode: a breathtaking, fascinating experience that leaves the viewer motionless for a moment (a “turning into stone” for a second). This article introduces the ImGame project (2022-2025) in the framework of Creative Europe’s program. The aim is to demonstrate immersive aesthetics in an innovative, educational digital platform dedicated to the latest artefacts as well as their theoretical background. The ImGame project intends to enhance serious art gaming related to immersiveness as well as develop immersive aesthetical theory. ImGame is grounded in James Paul Gee’s idea of the semiotic domain that isolates itself using communication and symbols. Based on it, educational games should be a gentle starting point to engage players in the semiotic domain of art to teach players about new media art.

II. Methodology

A review of the research literature reveals that the high-immersive gaming environment can lead to decreased learning. There is a need to maximize learning performance and only arouse the immersive feeling to a level that does not take the player's full attention so that one can focus on educational tasks. In contrast, the authors of ImGame believe that immersiveness has the advantage of reducing psychological distance while raising awareness. The calm mode of immersiveness is connected to the experience of peace and deep thought. It fosters a moderate rhythm of interaction and a harmonic view of the world. Hence the principle of slow gaming will be used in the ImGame prototype to pave the way to a thoughtful kind of education that produces an appreciation of art. In contrast to a purely entertaining game, the user of ImGame will need more time to reflect upon the messages and atmosphere of the digital environment. The authors believe that this type of game-based work has the potential to develop an intellectual approach to disciplines in the humanities through gaming. ImGame is being created with the aim of reflection and contemplation to open enhanced opportunities for deepened attention.

III. Results

ImGame is based on a post-doctoral project at the Vidzeme University of Applied Sciences (Latvia). The game Art Space (2021) demo version was created in this post-doctoral project's framework. It is a demo version of an educational virtual space that aims to transfer knowledge about contemporary aesthetics to a wider public. Art Space was made using the Unity game engine, which requires a gaming PC to function, but this approach makes knowledge transfer less convenient. ImGame is stylistically and educationally a continuation of Art Space. It will be created using the web framework A-Frame and playable through web browsers such as Firefox, Chrome, etc., thus increasing public accessibility. From the theoretical perspective, this study adds historical references that enrich the concept of immersiveness, which are: 1. an experience linked to the ancient myth of Medusa; a feeling of awe combined with a kind of loss of ability reframed in the Kantian theory of the sublime, and 2. a reference to the philosophical concepts of gazing by Lacan and blindness by Lyotard who say that we are not able to transfer our sublime feeling into any visual symbol, sound, and it has no accurate linguistic signification.

IV. Discussion and Recommendations

The niche of serious art games dedicated to the last decades' art styles has received very little attention. Globally, there are only a few games that teach contemporary art, these however, do not represent examples of immersive aesthetics specifically. ImGame will include immersive artefacts, indirectly teach their intertextual context, and thus support literacy concerning immersive aesthetics. ImGame's idea is patterned on the ancient phenomenon Wunderkammer, which was born in the Renaissance as a carefully constructed collection of oddities. ImGame will be a repository of information, audio-visual works and a place to cultivate and preserve specific artefacts. The conceptual framework of immersion merits being incorporated into modern educational games as immersive aesthetics, as a conceptual phenomenon, has been ignored in serious gaming. The ImGame project intends to teach its players to recognize the feeling of immersiveness, the idea behind it, and its contemporary exponents.

From the technical standpoint, the visual graphics components developed for ImGame related to digital shader creation and the established workflows will be documented and made available for artists and students. This process will generate the possibility for the community to create more visually complex and immersive virtual reality experiences for the web. Furthermore, a node-based shader creation workflow for A-Frame will be created and used for study at the Art Academy of Latvia. The new node-based tools will enhance the creative and technical possibilities for the new media creators using the A-Frame framework, thus generating new technological knowledge.

V. Conclusion

It is important to underline a difference between the two kinds of immersive experience that is missing in the vast field of educational games theory as well as in digital arts research. This difference includes 1. a state of being left 'without words' for a moment, characteristic of the Medusian (i. e. the rather shocking) mode of immersive feeling, and 2. the reflexive and meditative mode.

These types of immersive experiences can be distinguished only theoretically and are mostly experienced as shifting from the Medusian state to the calm reflection. The immersive experience presupposes moments of wonder or magic and hence can lead to awe that cannot be stated in words. This immersive feeling can also result in a loss of self-consciousness and thus leave the user in an amorphous mental state for seconds. To summarize, there is a shift from the meditative state, a brief, somewhat rational period of reflection, to the loss of self-consciousness, leading to the expression that has been called gazing by Lacan. In short, immersiveness is a captivating double-sided psychological experience.

“ *The [game's] calm mode of immersiveness is connected to the experience of peace and deep thought. It fosters a moderate rhythm of interaction and a harmonic view of the world.* ”

– Ieva Gintere & Alvis Misjuns

This is not a Escape Room: Controversies and inconsistencies evidenced in the design of educational experiences

Author: Paula Carolei

ORGANISATION

Unifesp (Brazil)

KEYWORDS

Escape Room; Design Educational; Cartography of controversies; Serious Game; Design Science research

DOMAIN

Creative games and gamification

**PEDAGOGY
TOPICS**

Innovative educator profiles: competencies and their professional development

Overcoming challenges in curriculum integration and learning outcomes alignment

I. Background & Aim

An Escape Room type game's main mission is to find an exit from some tense context, scenario or situation. But this exit may be an escape, or it may require connections and creative constructions in which participants propose alternatives and new ways of Escape. In Escape Room type games with an educational experience, one expects scenarios that demand immediate decision-making to solve urgent problems. This would thus promote the emergence of anticipated and controlled reactive dynamics or provoke the unexpected and the mobilisation of more complex skills that require reflection, authorship, critical positioning and speculative proposals. Since 2017, we have monitored and collected data on creating Educational Escapes from an open and free platform for creating Escapes that was developed as a research and teaching support device. But when analysing the creations made on SAE, we noticed some pedagogical inconsistencies and decided to investigate: *Were all the games created really Escape Rooms, did they have an urgency? Were more complex and creative answers required or were they as I wanted them to be? Did they have exploratory and/or fantastic scenarios? Were they inquiry and investigative experiences, or did they reduce to simplistic codes or content?*

II. Methodology

Following the methodologies of Design Science Research, this analysis corresponds to a stage of testing both the platform and the supporting artefacts and will give us clues for the improvement of this platform and identify the points of tension and controversies also to expand the formative proposals. We analysed the following elements based on the data provided by the platform: I. Title of the Escape (which indicates the theme); II. Type of triggering question (is the problematic issue complex, or is it something with simple and expected answers); III. Type of password: (passwords are codes or immediate responses or are more open answers or obtained from several exploration or interaction movements; IV. Type of feedback: is it validating feedback, or does it bring invitations to new questioning, and V. The use of scenarios: there is a use of platforms with an exploratory scenario. Over 400 exhausts were created in the new version of the platform launched in 2021 in 5 months, and 125 were analysed, with the prominent inclusion criteria being projects that had a full description of the challenges. Test Escapes and Escapes used by the team for the platform itself were excluded.

III. Results

Analysing the titles and themes shows less than 7% of themes that intend social but complex issues, evidencing a more content-based or entertainment focus. In most Escapes (87%), the passwords are objective answers or immediate codes, which infers that there is still a little exploration of contextualisation and complex challenges. The scenarios are still a little exploratory and are mostly representations of figurative scenarios with inductive explanatory relations to the concepts worked on. As for the scenarios, there are from Escapes created without scenarios, which use the structure of the passwords as a question and answer system, some use images, forms to google files, and interactive videos, but most use exploratory scenarios of platforms such as Scratch (www.scratch.mit.edu), Genially (www.genial.ly) and Thinglink (www.thinglink.com). There are few cases of fantastic scenarios, most linked to known entertainment scenarios. The more complex Escapes have several tests and demonstrate an iterative logic of improvement. Of the types of feedback, 92% were validating or, at most, invited further challenges. No feedback was identified that tenses more speculative questions.

On the issue of coherence and competence, we can say that most scapes only reach the most basic levels of the competencies of coding and description/understanding of phenomena and, in rare cases, problem-solving. It is still little in the argumentative and propositional skills. There are some examples of reflective experiences of self-knowledge, but there is still little exploration as a practice and as an exercise of the imaginary potential. The Escapes with more complex scenarios and more investigative proposals were mostly (78%) produced by workshop teachers who had contact with some framework for creating Escapes.

IV. Discussion and Recommendations

Improving practice towards a more reflective and formative stance requires devices that support and sustain but simultaneously expand the creative power. So it is necessary to improve these devices so that they help, not to direct, but to inspire and give examples to help in this authorial construction.

ABSTRACT: This is not a Escape Room: Controversies and inconsistencies evidenced in the design of educational experiences

To develop the posture of an Educational Experience Designer, the teacher needs to be willing to take risks in creation, design and understand the process and its various moments of iteration. It is important to know and understand various possibilities for creating scenarios, challenges and tracks and can adapt their own practice in a coherent and transformative way. The platform also needs to provide visibility for this process to be reflective. In addition to awareness of their own processes and challenges, collaboration can be a key ingredient to develop authorship, so the proposal is to build a space for sharing Escapes and a community of practice so that in addition to inspiring, remixing and enhancing teacher training in an open and creative logic, overcoming or reductionist and behavioural models.

We can also say that 83% of the constructions were not Escape Rooms but a kind of time-counting games in which urgency was not used as a challenge to get out of a difficult situation or some kind of prison or control. We did not identify this urgency or emergency in most of the games. This observation indicates this game type's creative potential and genre characteristics are not being explored.

The next functions to be developed through collective funding of the platform in order to launch a new stable, more secure and versatile version of SAE are:

1. Control panel to manage the games created
2. Decision-making in Escapes
3. Alternative endings
4. Creation of chat rooms for group games
5. Reinforcement of digital security
6. A gallery of Escapes shared by the network of users
7. Quick Escapes with creative templates
8. Edit the Escapes created
9. Easy export of a list of answers, passwords and choices.
10. Trainings developed to engage the network with workshops, courses and open materials.

V. Conclusion

Were all the games created really Escape Rooms?

Did they have an urgency? Were more complex and creative answers required or were they as I wanted them to be?

Did they have exploratory and/or fantastic scenarios?

Were they inquiry and investigative experiences, or did they reduce to simplistic codes or content?

Offering supportive platforms and frameworks is not enough for this transformation of practice. But this work has helped identify the controversies and challenges and point to improvements in the artefact itself with more examples and inspiration and the formative need for more creative and authorial training.

This formative and creative attitude is not simple to develop. The open platform can be complex for teachers who do not yet have a repertoire of game creation or a well-developed authorial stance.

The idea of building experience (experience design) instead of reactive activities is a big paradigm shift. Leaving the logic of question and answer for more authorial, exploratory, investigative and creative activities is a formative process. The solution is not to return to a closed logic full of templates in which the teacher only chooses and reproduces models because this does not develop autonomy.

“

Improving practice towards a more reflective and formative stance requires devices that support and sustain but simultaneously expand the creative power. So it is necessary to improve these devices so that they help, not to direct, but to inspire and give examples to help in this authorial construction.

”

– Paula Carolei

A formative proposal for pre-service primary school teachers: an intersession between STEAM education and the creative thinking through Challenge-Based Learning

Authors: Erika Ribeiro & Ana V. Rodrigues

ORGANISATION University of Aveiro (Portugal)

KEYWORDS STEAM Education; Creativity; Teacher Education; Active learning methodologies

DOMAIN Collaborative and Challenge-based learning

PEDAGOGY TOPICS Innovative educator profiles: competencies, skills, attitudes and their professional development

I. Background & Aim

The STEAM education is an interdisciplinary active learning approach that promotes skills such as good communication, collaborative work and improving interpersonal skills (Perignat & Katz-Buonincontro, 2019). In association with the CBL methodology, it has been described as enhancing learning capabilities for the 21st century (P21, 2015), such as creativity (Putri et al., 2019; Saunders, 2019). Creativity has an important role in the learning process as it's a key point for problem-solving and a potential skill for innovation in the educational, economic and social spheres (Runco, 2004). The school context should ignite students' creativity, not limit it (Robinson & Aronica, 2015). Also, teachers should be trained to develop skills, knowledge, attitudes and values, balancing curricular goals and learners' soft skills (Aydin-Gunbatar et al., 2018). This research aims to develop, validate and evaluate a formative proposal with the STEAM approach, promoting the creative thinking of pre-service primary school teachers in order to allow them to teach science, promoting students' creativity. Also, to develop a set of recommendations from the results for initial teacher education.

II. Methodology

This is a Design-Based Research (DBR) as it is a participatory and interventionist project that seeks to solve practical problems and develop principles and theories, linking practice, research and policy (McKenney & Reeves, 2012). As DBR states, we designed three cycles of implementation of a formative proposal, interleaved with two cycles of analysis and redesign, so that we make modifications based on the feedback received and the analysis of data collected from the previous cycle of implementation. It is a qualitative study framed in the socio-critical paradigm due to its interventional, transformative and emancipatory character (Coutinho, 2013; Creswell, 1994). The data gathering techniques are the documentary compilation with a portfolio made from class activities, the participant observation of the formative proposal implementation, a focus group with students, a validated creative thinking test and questionnaires about perceptions about education and creativity. The data undergo a qualitative analysis as the categorial content analysis (Bardin, 2009).

III. Results

At this moment, we are during one of the cycles of implementation, so it is only possible to give preliminary results. Nevertheless, the formative proposal developed has been implemented with students from a Bachelor course and three Master courses, both of them in Education, through a Project of Pedagogical Innovation, The Form@tive Project, at the University of Aveiro. The results analysed until now show that the students appreciate the experience during the proposed activities. The analysis of a questionnaire to monitor the learning process at the first implementation cycle reveals that most students focused on the positive contribution of learning through a CBL methodology. Moreover, students can demonstrate an increase in the perception of the development of transversal competencies (collaborative work, communication, creativity, proactivity, critical thinking, autonomy), science literacy, teaching and learning methodologies and resources. From the analysis of this first cycle, it was highlighted the necessity of expanding the duration of each cycle of implementation. The results show that the students understand and see positively the integration of the Sustainable Development Goal, stated by ONU, in their CBL projects.

The project dissemination has been made during many scientific events and publications, for example, the EERA Summer School 2022, Research Summits at the University of Aveiro, book chapters and short-term teachers training, all with great feedback from reviewers and the general public.

IV. Discussion and Recommendations

As the previous results show, the integration of CBL and creative thinking through a STEAM approach has been well accepted by the students. Creativity was one of the 21st learning skills most highlighted by students. Nonetheless, the impact on their level of creative thinking might be confirmed once the Torrance Test of Creative Thinking (TTCT) analysis is completed. In terms of teaching and learning skills, the results show positive aspects of teacher education. As these pre-service teachers can experience and learn about new and diverse teaching methodologies, they can be prepared to apply them to their students in the future.

Other aspects to point out are the CBL experience, the variety of strategies and resources used during the formative proposal, the use of technology in the teaching and learning process, and the interdisciplinarity approach during the activities. In what concerns the redesigning to the second cycle of implementation, the duration increased from an academic semester to an academic year so that it could possibly be better to develop their skills as students and pre-service teachers and also improve their experience in this formative proposal. Furthermore, in the next cycle, a gamification proposal will be included, so they can get in contact with this strategy and learn from practice how to participate as a student and use it as a teacher according to specific learning goals.

“*As the previous results show, the integration of CBL and creative thinking through a STEAM approach has been well accepted by the students. Creativity was one of the 21st learning skills most highlighted by students*”

– Erika Ribeiro & Ana V. Rodrigues

V. Conclusion

V. Conclusion The result of this research shows that pre-service teachers are developing their conception of teaching and learning from new active methodologies, promoting interdisciplinary knowledge combined with creativity. The development of several of the 21st learning skills helps these students, as global citizens and future teachers, prepare for problems of nowadays and the future. Being teachers and educators more prepared, they can intervene in the education of future citizens and their potential impact on the world.

In order to contribute to initial and continuous teacher education, with further results yet to come, we expect to adapt this formative proposal in an online course and develop a set of recommendations from the final results of all the data analysis.

Designing Educational Games with the Didactics-Driven Development Methodology

Author: Anders Bower

ORGANISATION Amsterdam University of Applied Sciences (The Netherlands)

KEYWORDS Educational Game Design; Serious Games Development; Didactics-Driven Development

DOMAIN **Serious games and Game-based learning**

PEDAGOGY TOPICS **Overcoming challenges in curriculum integration and learning outcomes alignment**

Rethinking assessment of learning outcomes

Involving didactic concerns in serious game design

I. Background & Aim

The goal of this study is to illustrate how didactic concerns can be incorporated into the design and development of educational games using the Didactics-Driven Development methodology (Bouwer, 2021). The problem being addressed is that in current practice, didactic goals and intended learning outcomes are typically considered at the start, and the end of the development process but are often neglected during the iterative design cycles in between, causing a potential mismatch between the intended learning outcomes and actual learning experience. The Didactics-Driven Development methodology aims to prevent this mismatch from occurring by making explicit the didactic concerns involved and their relationships with design decisions during the whole development process of an educational game.

II. Methodology

The Didactics-Driven Development methodology is inspired by ideas from test-driven development, requirements analysis for educational games, and especially, the Live Game Design approach (Bouwer & van Rozen, 2019), but has been adapted for educational games. The methodology supports representing dynamic requirements relating to didactic goals and intended outcomes, and tracking design decisions related to didactic concerns. These didactic concerns include:

- the didactic and other expertise required for and existing within the project team;
- the didactic goals, learning goals and & desired learning outcomes;
- the intended audience, and expected prerequisite knowledge and skills;
- the didactic approach in terms of educational philosophy, learning theory, and pedagogical strategy;
- the validation of didactic ideas in the early stages of design and development;

- opportunities for learning (and teaching) during, but also before and after gameplay;
- play traces to register players' behaviour and identify learning opportunities during gameplay;
- recording evidence about the occurrence of learning opportunities and whether they were realized or not;
- teaching or learning scenarios specifying the educational context, related materials, etc.;
- test materials and evaluation results, and interpretations, i.e., learning effects in relation to what was expected;
- design decisions for the game and additional test materials, and their relation with the above;
- changes to any of the above during the whole development process;
- integration of the above with other methods used in the design and development process.

Parts of this methodology are currently being implemented in a tool that can be used during the development process of an educational game. In this tool, the focus lies on the representation of didactic goals, design decisions, intended learning outcomes, learning opportunities, play traces, evidence for learning during gameplay, and resulting insights that can be used to improve the design of the game.

III. Results

The Didactics-Driven Development methodology has been used as a conceptual tool to support the design process of several educational games, including a single-player online game about the economics related to banking (Bouwer & Brinkkemper, 2021), a multi-player virtual reality game about group decision-making and alternative future scenarios (Boon, 2020), and a multi-player 3D island survival game for learning about collaborative, cooperative, and competitive behaviour (Bicker Caarten, 2020). All three games offer various pedagogical opportunities for experiencing and reflecting on the topics they address at different times during and also after playing the game. Currently, a prototype interactive tool has been implemented that supports part of the Didactics-Driven Development methodology for a particular tutorial game. The tutorial addresses learning goals for different types of skills in the classic board game Go, such as recognizing danger and opportunities to fight and stay alive. The tool makes several explicit types of didactic concerns involved in the design process, in particular, didactic goals, intended learning outcomes, learning opportunities, play traces, and evidence for learning outcomes during gameplay.

IV. Discussion and Recommendations

Using the methodology during the development of three educational games has led to a greater awareness of the didactic concerns during the design process and resulted in more flexible games that can support multiple learning goals following different teaching scenarios. The use of the methodology by other game developers and researchers will be necessary to test its value for other users. It is expected to lead to more and better information about learning outcomes and other didactic concerns at different times during the development process of educational games. The prototype tool is still under development but can already be used to interactively illustrate several processes in the Didactics-Driven Development methodology for a particular tutorial game. Future work will address testing and further development to make the tool reusable for other educational games, incorporate different pedagogical strategies, and improve the tool's usability.

V. Conclusion

The use of the Didactics-Driven Development methodology as a conceptual tool has been valuable during the development of a single-user game about the economics of banking (Bouwer & Brinkkemper, 2021), and two multi-user games that can be used to learn about collaboration vs. cooperation vs. competition (Bicker Caarten, 2020), and group decision making leading to alternative future scenarios (Boon, 2020), respectively. Consequently, the resulting games are better suited to the didactic concerns involved and more flexible, offering learning opportunities for different teaching scenarios. In addition, the games can be used to address specific learning objectives, with relevant learning opportunities that are integrated into the gameplay.

These experiences have also led to the insight that the methodology can be used to model different pedagogical strategies in educational games, which is input for further refinement of the methodology and the interactive tool that is currently under development to support the methodology.

The entwining of “creactical” thinking skills beyond a synergistic thinking classroom

Authors: Suzette Duarte Oliveira & Mário Cruz

ORGANISATION Universidade de Santiago de Compostela (Portugal)

KEYWORDS Gamification’s Octalysis’ Framework; Concept-Based Learning; “Creactical” skills, Sustainable Development

DOMAIN **Serious games and Game-based learning**

PEDAGOGY TOPICS **Understanding and boosting student readiness for innovative teaching methods**

Measuring impact on students and educators

21st-Century entrepreneurial skills toolbox

I. Background & Aim

I. Background & Aim This project’s cynosure reflects on Chou’s (2016) Gamification Octalysis’ framework and the critical emancipatory pedagogy of Concept-Based Inquiry (Marschall & French, 2018). It is our intention to provide evidence that uses the core tenets of both frameworks and interweave them with “creactical skills” (Ohler, 2013; Oliveira, 2017) and to successfully anchor the design of this conceptual lens into student’s transferable understandings that add coherence to the collection of students’ skills and knowledge. In this way, we can build our capacity as practitioners and create enriching learning environments that not only promote the ideation and creativity of the conceptual lens but can also lead to a better understanding of the connectivity of these transferable ideas within and across disciplinary bounds, while allying with students’ “creactical” thinking. It is within the classroom that students’ intellectual development, mindful learning, and creative expression can lead to the key instructional goals (Erickson, Lanning, & French, 2017) and to students’ global development (UNESCO, 2005; Sá, 2007; Sá & Andrade, 2008), which facilitates their inclusion in society, and promotes the essential skills for 21st-century living. (Erickson, Lanning & French 2017).

II. Methodology

An ethnographic methodological approach was resorted to by including the triangulation of qualitative research methods such as the following data collection tools: a) questionnaires applied to both students and teachers focusing on the “creactical” skills and the frameworks which foster these; b) field notes on the observation of practices; c) projects/self-assessment worksheets developed by students; d) audios/videos from practices; e) analysis grids on coursebooks and teacher training courses; f) didactic units with resources.

III. Results

We developed a conceptual teaching and learning model which integrated all the core tenants of the frameworks and applied them in our teachings. Results show that the tenets between the Gamification approach and Concept-Based learning intermingled with “creactical” skills encourage inductive and transferable understanding, promote thinking and reasoned discussion, and build students’ sense of agency and responsibility while encouraging them to take ownership over their thinking and learning so that they become true “creactical” thinkers, which can ultimately lead to curricular transformation.

IV. Discussion and Recommendations

The conceptual framework of the design principles that evolved from this study can potentially provide a grounding for future design research and serve as an actionable guide for transferable classroom practices in terms of its educational implementation within schools and communities that engage in active learning pedagogy.

V. Conclusion

It is understood that the Octalysis Framework is a means to interpret all the motivational Core Drives and can be used in the classroom to understand how to design for motivation within a particular classroom setting, and to transform activities into meaningful and enriching experiences (Oliveira & Cruz, 2018).

“*It is understood that the Octalysis Framework is a means to interpret all the motivational Core Drives and can be used in the classroom to understand how to design for motivation within a particular classroom setting, and to transform activities into meaningful and enriching experiences.*”

– Suzette Duarte Oliveira & Mário Cruz

Good Practice Cases

Conference | November 2022



Developing perceptions between educators through the escape room

Authors: Jessica Reuter & Isabel Gomes

PITCH	This study aims to capture the perception of educators when using escape rooms as an active teaching methodology.
ORGANISATION	Advancis Business Services (Portugal) and University of Aveiro (Portugal)
DOMAIN	Serious games and Game-based learning

I. Background & Objectives

Educators need to be constantly adapting to new technologies and new teaching methodologies. For this to occur, continuous skills development and identity reformulation are required. It is a creative adaptation and direction for self-development. The implementation of methodologies based on games in the classroom is a practice that has been utilised in educational institutions, at different levels of education, as well as in different countries and environments.

In this context, the use of escape rooms in teaching is an innovative learning methodology in Europe and is still in its infancy. Nevertheless, some experiences are emerging in different areas of education to boost active learning, develop different transversal skills, and boost students' motivation and participation. However, many educators are unaware of this tool in teaching and need more knowledge about using this methodology. The UNLOCK project – Creativity through game-based learning at higher education- aims to support educators and HEIs to facilitate educational escape room activities in Portugal and Europe as a strategy to support formal education and foster creativity and other transversal and entrepreneurial skills in higher education students.

As important as the effectiveness of the tool in teaching and the skills development, it is also important that educators experience through practice this activity and develop their perceptions on the subject. Thus, the objective of this case study was to understand the perception of the educators while playing escape room.

II. Activities Undertaken

The escape room was developed in the context of the UNLOCK project after the pilot testing of the MOOC's massive open online course on the creation of EERS, with the objective of introducing educators to the game-based learning methodology with the use of the escape room. The authors developed two escape room activities for educators in two different contexts. The first activity was conducted on 30 March 2022, with the participation of 8 higher education educators. In the first part of the event, the educators were introduced to a brief theoretical part of the methodology and got to know the pedagogical framework. In the second part, the educators got to know different types of puzzles, and finally they played an escape room, whose theme and narrative focused on sustainability entrepreneurship.

The second escape room for educators was conducted on 25 August 2022 at Advancis, involving a group of 11 teachers, implemented on the last day of an intensive masterclass as a moment to integrate the learning acquired through the training week. The escape room consisted of 3 separate rooms with various challenges. The different groups had to solve the puzzles to escape the room and then work together to escape the school, where they had been locked because everybody left the building without knowing they were trapped within.

III Support Mechanisms

For the development of the first escape room, the main mechanisms used were the materials made available by the UNLOCK project. During the workshops conducted, the authors used the pedagogical framework, the case studies to seek inspiration and the MOOC of the project. The materials provide all the processes for understanding and replicating the methodology. Starting from the institutional aspects and theory, up to practical aspects such as the narrative, the puzzles and how to conduct the evaluation of the activity.

To design the activities, the partners first defined the learning objectives, and the game's narrative would be. Then they defined the puzzles and challenges that would be integrated according to the established learning objectives. For the first escape room we chose the theme of entrepreneurship with sustainable attitudes. As the teachers were from different areas, we sought a common theme. The activity lasted 30 minutes and required solving three main puzzles to unlock the final puzzle and escape the room. The activity was recorded, and participants could ask for help via the laptop provided in the room that was logged into Skype. In this way, they could receive hints as they felt the need for them.

The design of the second escape room followed the same process as the first one, and specific challenges, devices and puzzles were developed to implement it, according to the narrative (escaping the school). The teams successfully solved all the puzzles in 40 minutes, and they were supported by three game masters who were watching them and giving them hints through local computers and Google chat. All the groups were also recording while solving the escape room through the google meet device.

IV. Collaborations

The activities were conceived and implemented together, by members of Advancis and members of the University of Aveiro, who are the coordinators of the UNLOCK project. Research fellows of the University also participated in the creation and testing of the puzzles.

V. Outcomes / Impact

In the first escape room:

- 90% found the activity immersive enough for the development of soft skills;
- 50% managed to complete the challenge in time;
- Of this total, 80% were playing their first escape room;
- Among the most cited soft skills were creativity, communication, teamwork, interpersonal relationships, critical thinking, analytical skills, patience, perseverance, problem-solving, time management and attention to detail.

In the second escape room:

- 70% played for the first time;
- 90% considered the activity immersive for the development of transversal skills;
- Among the transversal skills most cited were communication, leadership, empathy, determination, tolerance to stress, assertiveness, the capacity of observation, concentration, cooperation, conflict resolution, patience, flexibility and resilience.

The **overall and immediate assessment** and perceptions of the participants revealed that:

- For those who were experimenting with an escape room for the first time, this was a very positive experience and generated a lot of interest in the approach;
- For those who had already participated in a (commercial) escape room, it was also a positive experience, namely because of the relational dynamics that emerged between the participants;

- Some participants admitted that they were initially anxious about being in a closed room, but when they perceived that the facilities where they took place were not definitely closed, that helped them feel calm;
- The participants considered that the challenges were not too difficult, and that the hints provided by the game masters were very important to solve the puzzles;
- The groups broke out of their rooms almost simultaneously. Later, they reached the consensus that they should have had a moment to regroup and think of a strategy before trying to solve the final challenge together, as they were coming up with different reasonings from their specific rooms.

VI. Lessons Learned

In the first escape room, the focus of the activity was to present the methodology to educators so that they are aware of its possibilities, replicate it and apply it in their classes in the future.

In the second escape room, those were also important impacts, but the fact that it was included at the end of an intensive training week, also gave it the opportunity to become an integrative moment of the masterclass, promoting not only the reflection on the contents learned about the specific topic of the training, but also about the ways this pedagogical device (EER) can be integrated into different educational contexts and levels.

The use of gamification and game-based learning strategies has a great potential for development among educators to promote student motivation, participation, the development of soft skills, and the review of specific content that can be intensified through this teaching methodology. But for this, educators need to know the methodology and its benefits. We believe that the best way is for the perception of these benefits to occur through practice.

In these experiences, the educators reported interest in the methodology and a lack of practical materials to implement the methodology in the classroom. We hope that in the future, educators will be able to participate in more of these experiences and apply them in the educational context.

Challenge-based learning as a tool for the understanding of the urban and social environment

Author: Laura Jankauskaitė-Jurevičienė

PITCH

To understand how the urban and social environment influences people's behaviour and how their daily activities in the urban environment create a social context.

ORGANISATION

Faculty of Civil Engineering and Architecture at Kaunas University of Technology (KTU; Lithuania)

DOMAIN

Collaborative and Challenge-based learning

SECURITY

I. Background & Objectives

Challenge-based learning is applied in a master-level of architecture studies in Urban Sociology and Space sociology courses. The main idea of using this method is to give the skills for students to be able to identify the urban and social characteristics of the urban environment by becoming active participants in the process and later applying this knowledge in the area of environmental research management and design fields. We can notice that sometimes architecture students lack awareness of the social contexts or understanding of the behaviour and needs of the public, mostly focusing on urban space design. Therefore, students, during the challenge-based learning phases, understand the problem of a real challenge, analyse the context and find a solution. Constructing a solution to the challenge is based on active engagement and experimentation. That means that students not only propose the possible solution but also test it by doing different types of experiments in the local context. In the presentation on how challenge-based learning works in architecture studies, I will present a few cases implemented in a few years on the topics of "Kaunas - Learning city" and "Kaunas - Liveable city".

II. Activities Undertaken

The urban sociology module consists of theoretical lectures and a practical assignment. Practical work carried out using the challenge-based learning method helps to master the theoretical classes, which make up 1/3 of the course lectures. Practical work consists of three main stages:

The engagement stage consists of – topic analysis, search for the big idea through the analysis of the criteria of a liveable/learning city, sample analysis, territory selection and analysis. Students themselves choose how they will analyse the territory and how much and what information they need to find out to understand the territory's problems.

The analysis stage consists of – prioritising the problems of the territory and clarifying the most important problem. At this stage, different sociological studies are conducted, which guide the refinement of the idea of the experiment.

The stage of action consists of – Experiment, which is some kind of action in the selected territory in order to experiment with how the proposed solution can solve the problem or find out the people's behaviour and needs.

The final stage of the project consisted of presenting the summarized material to the public.

When learning the Challenge-based method methodology, a lot of time is devoted to independent group work, and teaching theoretical materials decreases, but discussions and creative workshops, and games increase.

III Support Mechanisms

International support: ECIU is an international consortium of research-intensive universities that collectively emphasize innovation, creativity and societal impact, promoting the development of a knowledge-based economy. ECIU University is a new university model based on the needs of society and industry. It is a pan-European ecosystem based on open and inclusive collaboration, providing the opportunity to work together as an open agora to solve multidisciplinary societal challenges. Kaunas University of Technology joined ECIU in 2016 and is the only Lithuanian university in the consortium in 2021.

The Urban Sociology course was one of the challenges offered to an international student audience. We worked with one of the ECIU University topics, "Creation and support of informal networks to make Kaunas a city of sustainable learning", which was proposed by the Kaunas city municipality. Participation in this challenge gave students and teachers the opportunity to work in interdisciplinary and international teams with authorities, business and public sector organizations, develop teamwork skills in international teams and expand the network of experts and like-minded partners in their field.

Internal support: the Kaunas University of Technology has a training centre for university teachers - EDU_lab. EDU_lab is a tool for teachers to help implement various educational methodologies in their courses. It is a teaching, learning and educational laboratory. The centre develops and implements a modern didactic competence development system at KTU, which encourages teachers to choose and apply appropriate and innovative didactic tools to ensure the quality of studies.

Internal university financial support: In the spring of 2022, University published an invitation to support the implementation of a challenge-based learning methodology in the study process. A grant was received for the teaching methodology of the Spatial Sociology course, which is intended to improve the structure and content of the course layout, as well as the didactic competencies of teaching.

IV. Collaborations

In applying the challenge-based methodology, the participation of external parties is important. When participating in the ECIU University Challenge, the external partner was the Kaunas City Municipality, which presented the topic of the challenge, participated in presentations, and provided information and suggestions. The involvement of a partner, such as a municipality, is important in implementing challenge-based learning, as they provide a holistic view of the problem. However, in the Urban or Space sociology modules, the big question of the challenge is usually formed by the students themselves, so the necessary partners who may be interested in the solution or provide information are found by the students themselves as well.

For example, during the development of the theme "Learning City", the students chose the territory of the Kaunas Lagoon Regional Park for their project, so the stakeholder they found was the park directorate, which became an expert in their project. Using this method, students are responsible not only for finding the solution but as well for taking care of responsible or interested stakeholders' involvement. That allows the course to be more open and search for more challenging fields and different problem solutions. Also, it gives freedom to the students to find collaborators according to their solution and to collaborate not with just one stakeholder.

V. Outcomes / Impact

The use of the challenge-based method develops the personal qualities of students and teachers: creativity, critical thinking, cooperation, initiative and social skills, and empathy for the urbanized and social environment. For architecture students, such experiences and skills are important to understand how the social environment affects people's behaviour and how they create a social environment through their daily activities in an urbanised setting, in which case short-term experiences have an impact on long-term skills.

During challenge-based learning, the student himself "manages" learning, analyses, looks for solutions, critically evaluates and, most importantly, implements. The challenging task is real and relevant, and decisions are made as a team, not individually. Learning with this method becomes a challenge not only for the student but also for the teacher, which also helps the study process to improve in the long term. For example, none of the completed projects is the same, so the study module is improved in order to achieve good results. In addition, stakeholders have the opportunity to participate in the process, and receive new input, thus improving the area that is important to them. For example, in cooperation with the Directorate of the Kaunas Lagoon Regional Park, an interactive map of hiking routes was offered, which would not only help attract more visitors to the park but would also provide knowledge about attractions without investing a lot of money into information boards.

VI. Lessons Learned

The main challenges are related to student engagement in the topic. Since projects are carried out in teams that are often cross-cultural, there are questions about the responsibilities of team members, cultural differences and language barriers. The ability of students to be empathic, creative, active, open-minded and willing to understand people's behaviour is very important. We usually work in small teams, where there is no space for social laziness, so all student miscommunications are quickly seen and resolved in discussions during lectures or by giving individuals additional tasks. Also, the students themselves evaluate the involvement of their team members in the process by doing peer-review, which helps them to be responsible for the team's work.

Another challenge in the implementation of projects is the reluctance of interested parties to get involved, so it happens that students do not find external experts, but in this case, other groups of students become experts, providing feedback.

The last but not the least challenge is the finances required to carry out the project. The course does not have any financial support, which is intended specifically for the implementation of student projects. This problem is very relevant because testing an idea to solve a challenge requires an experiment, and experiments are diverse and often expensive to implement. So finances are the biggest obstacle to creatively looking at the solution.

“ *The use of the challenge-based method develops the personal qualities of students and teachers: creativity, critical thinking, cooperation, initiative and social skills, and empathy for the urbanized and social environment. For architecture students, such experiences and skills are important to understand how the social environment affects people's behaviour.* ”

– Laura Jankauskaitė-Jurevičienė

VII. Conclusion and Future Outlook

During the Urban Sociology and Spatial Sociology courses, the projects carried out using a challenge-based methodology give students the opportunity to be active creators of the city and social life themselves, help to look at the urban space through the eyes of its users, develop empathy, creativity, cooperation and sociological imagination. The teacher and students become active participants in the process, which promotes not only the course but also personal development, and those interested receive additional ideas to solve the challenge. The next steps are to improve the course, involve more interested parties, and increase student motivation and empathy for the urban and social environment.

Innovative entrepreneurship - a CBL master's course

Author: Charlotte Norrman

PITCH	A lot of entrepreneurship courses focus on learning about entrepreneurship. In this course the students we let students experience entrepreneurship and develop sharp real-life solutions.
ORGANISATION	Linköping University (Sweden)
DOMAIN	Next-generation entrepreneurial teaching

I. Background & Objectives

"Innovative Entrepreneurship" (6 erts) is an engineering course at the master level, where students from different engineering educations get the opportunity to learn about innovation and entrepreneurship processes both in theory and practice. The overall purpose of the course is for students to acquire knowledge and abilities within the general areas of entrepreneurship and innovation, with a particular focus on business planning for new, innovative ventures.

A large part of the course is hence the group work, where the students, in groups of four to five, develop a business case on a challenge leveraged by an external party, e.g. a commercial or private organization. All challenges have sustainability as a horizontal requirement for the development of solutions. During the latest course (spring 2022), about 120 students were involved, and they dealt with 14 challenges from external challenge providers. The learning goals are formulated as follows:– account for, compare and take a position on different theoretical perspectives on entrepreneurship and relate different empirical examples to them;

- account for and compare different theories that describe what it takes to start up and organise innovative ventures;
- discuss the advantages and disadvantages of business planning for innovative ventures;
- account for the information and the analyses needed to do a feasibility analysis and write a draft business plan for an innovative venture and have the ability to collect and analyse relevant information for that purpose; and
- communicate a feasibility analysis/business plan orally and in writing.

II. Activities Undertaken

The course mixes theoretical lectures (development tools) with practical workshops. Since the academic level is advanced, the students do a literature review supported by an academic writing seminar. The most significant part of the course is the group work, where the below-listed workshops form the bearing line.

1. IdeaJam – this 4-hour workshop starts with that challenges are pitched by the challenge providers.

Then the teams make their choices on what challenge to take on and, after this, start to work on defining how to take the challenges. Finally, all teams give a 30-second pitch on their takes and can go home knowing in what direction to continue their development.

2. Shitty prototyping – during this 3-hour serious play workshop, all teams create a visual prototype of their solutions on the challenges taken on. Craft material and “garbage” are used.

3. Value Creation Forum – during this 2-hour workshop, the teams leverage one slide 5-minute pitch explaining their solution so far and gets feedback based on roles – good/keep, improve, stakeholder/investor perspective and customer perspective.

4. Open trade fair – this is the final presentation event, and here all groups gather in a public area and display their idea on a 3-parted cartoon wall. Half group guards the stand; half group visits the fair, listens to pitches and comments on the other groups. Guests from the support system and the challenge providers are invited. Fast 1-minute pitches are leveraged from the podium and followed by all participants staking “venture capital” in case of a sum of fake money in three colours for the best idea, best pitch and best stand. Then winners and honours are awarded.

After the course a business plan of 15-20 pages are leveraged to the challenge providers. The students also hand in an individual learning reflection.

III Support Mechanisms

Challenge-Based Learning (CBL), a form of experiential learning, is the main pedagogical approach used in the course. We define CBL as "an experiential learning approach that starts with wicked, open and sustainability-related real-life challenges that students, in multidisciplinary teams, take on their way and develop into innovative and creative solutions which are presented in open forums" (Eldebo et al., 2022). In this course we, more or less, follow the ECIU way of working with CBL. The process starts with an open wicked challenge labelled "big idea", which commonly relate to SDG 11 in one way or another (however, in deference to ECIU, all 17 SDGs could be focused in this course and the challenges are not publicly announced on the ECIU platform) and is launched by an external partner, which could be a company, a municipality, a region or an NGO.

Starting out from the big idea, the CBL process comprises three phases. The first is "Engage", where students form essential questions and, based on these identify the challenge they want to work with - i.e. they decide their take on the challenge they have chosen. The second phase is "Investigate, " and here, the students analyse the context around their chosen challenge. The third phase is "Act", where the students develop their solution and implement and evaluate what they have achieved. The students are expected to document, reflect, and share during the process. Hence CBL could best be described as an open innovation process. In the case of the "Innovative entrepreneurship" course, the focus is on creating business ideas to solve the challenges given.

The teachers are in this course labelled as "teamchers", which we define as "an individual who, either on their own or as a part of a team, arranges, leads and supports CBL activities. Teamchers take, and often also slide between, the roles of teacher, coach and organiser of CBL activities" (Eldebo et. al, 2022).

IV. Collaborations

To be able to create a CBL course such as the one described above, several external actors need to be involved. Our main collaborative partners are LiU Innovation (the Linköping university internal organ for the facilitation of business support for the commercialisation of research), LiU Student innovation (the Linköping university internal organ for facilitation of business support for the commercialisation of ideas generated by students), and Lead incubator (the business incubator within the region of Östergötland). Besides these three main actors that support the teamchers with contacts and cases, close relations with the regional trade and industry are a prerequisite for success. In our region, a cooperation organ ESBR (East Sweden Business Region), organise actors and facilitate networking among private companies, academy and political actors.

To facilitate the entrepreneurship courses at LiU and also to benefit the verification process of ideas emanating from research groups, startups, established firms, organisations and NGO's we have developed what we have named "The LiU-model".

In this work, teachers, researchers, support actors, and the regional trade & industry cooperate toward the joint goal of strengthening innovation and entrepreneurship. Engaging students in the business idea verification process gives several benefits:

- 1.The students get the opportunity to learn and get real-life experience, which creates relevance to their education.
- 2.Those supplying ideas, the challenge providers, get the opportunity of having people investigate their ideas with new eyes and new perspectives, giving hands-on advice on how to continue their work.
- 3.Through the interaction among the parties, the regional innovation system is straightened.

Hence, this is a win-win process.

V. Outcomes / Impact

This course has been run for several years and has always leaned on an experiential learning approach. We have worked with external challenge providers and focused on enabling both knowledge and skills among the students. During the last few years, the course has been listed as an ECIU

course, and due to this, we have elaborated on the pedagogic so that it now follows the ECIU take on CBL, which has been described above.To adjust the teacher competence, we have written two conference papers on CBL – one focusing on the teacher/teamcher role (Eldebo et al., 2022) and the other focusing on how to involve, and efficiently work with external challenge providers (Norrman et al., 2022). In these papers, we have also defined the concept of challenge-based learning, challenges and challenge providers, and the concept of teamcher. These learnings have also been disseminated within the Boogie-U (BOOstinG Innovation and Entrepreneurship through European Universities) network, a sub-project within the ECIU (European Consortium of Innovative Universities) community.

Regarding what has come out from the courses, we have noted that it has led to spin-off companies, i.e. the start-up company Arboair AB, which currently has grown into about ten employees. In addition, it has resided in ideas leading to a master thesis, and it has strengthened a lot of researchers, firms and organizations that have acted as challenge providers and whose ideas have been elaborated on by the students.

VI. Lessons Learned

What has been learned from this work is described in the papers of Eldebo et al. (2022) and Norrman et al. (2022). Regarding challenges and challenge providers, we can conclude that challenges need to be wicked and structured as a “big idea” possible to break down into a graspable take; focus waits for a solution that is not obvious to the Challenge providers (CP) nor the students. Additional learnings can be summarized as follows. A real-life challenge:

- can be formulated by the teacher or the students themselves, but cooperation with external stakeholders such as industry partners, governmental bodies or organizations is desirable;
- should be formulated to fit and utilize a cross-disciplinary team;
- originates from a CP or stakeholder that is curious about keeping in contact with the students and likes to interact and cooperate with them;
- should be written for a pedagogic purpose for the students to acquire both knowledge and skills;
- enables the open innovation process and is directed toward sustainable and responsible innovation, and
- aims to lead to A solution of a wider interest at all levels. This opens up opportunities for cooperation and open innovation.

Regarding the organization of CBL courses, we have concluded that:

- For challenge-based learning to work, three main roles are required: the academic teacher, the coach and the organizer.
- If taken together, these three roles could be labelled as “teamcher,” which we define as an individual that, either on their own or as a part of a team, arranges, leads and supports CBL activities.
- From a teamcher perspective, CBL can be seen as both demanding, especially regarding resources, and rewarding. Hence, we recommend starting small and adding on until a full CBL setup is reached.

VII. Conclusion and Future Outlook

The main conclusion is that it takes (at least) two to tango. Creating and maintaining courses like “Innovative entrepreneurship” requires cooperation, endurance and innovative entrepreneurial abilities among the involved staff. A weakness is that it is highly dependent upon individual enthusiasts and personal networks – hence, the organizations facilitating such courses need to be formalized to become resilient. This implies that it also needs to be supported by the management level of the university. Through the EU-financed program Boogie-U, cooperation has been increased between the regional actors, and through international cooperation with five other European universities, new insights that could improve the work have been made.

The future work will focus on building an organization that can support CBL courses.

“ *In this work, teachers, researchers, support actors, and the regional trade & industry cooperate toward the joint goal of strengthening innovation and entrepreneurship. [...] Through the interaction among the parties, the regional innovation system is straightened. Hence, this is a win-win process.* ”

– Charlotte Norrman

Compulsory real-world problem-solving assignment to teach innovation at a Higher Education Institution in South Africa

Authors: Izabeth Conradie & Michelle Erasmus

PITCH

Breaking news: Innovation on demand is achievable when students innovate within the boundaries of a relatable real-world problem for an academic reward.

ORGANISATION

Central University of Technology (CUT; Free State, South Africa)

DOMAIN

Collaborative and Challenge-based learning

I. Background & Objectives

Everyone who has had kids in the car and has been given options about where they would like to go for ice cream will know that freedom of choice can lead to a fight in the back seat and result in no ice cream. There was also no ice cream when innovation was an optional activity student could partake in at the Central University of Technology (CUT) in 2018, 2020 and 2021. However, when the innovation assignment was made compulsory in 2019 and 2022, the Engineering Mathematics third-year students submitted over a hundred ideas (ice creams). It was found that these students comply with innovation if it is made compulsory for course mark definition, has a reward component and is given the necessary structure and boundaries, which allows a fine balance between free thinking and focused output. The compulsory assignment topic in 2019 was directed at innovative ways of saving water, which resulted in 21 ideas, but the voluntary assignments in 2020 (waste management), and 2021 (special needs) resulted in no ice-cream outcomes. In the compulsory assignment in 2022, students had to improve an existing product with over 100 novel ideas submitted.

At universities of technology such as CUT, the engineering council of South Africa (ECSA) requires engineering students to accumulate a number of graduate attributes of which "Problem-solving" or rather "Innovation and problem-solving" is one. Extending compulsory problem-solving within boundaries in the subject Mathematics to solving a real-world 'X' not only prepares students for the formal GA innovation engineering projects required at the exit level but also equips students with useful skills to enhance (self) employability.

II. Activities Undertaken

The innovation component in the third and last semester of mathematics takes the form of an assignment alongside other classical mathematics assignments. The topic is aligned with a specific problem relevant to the Free State province of South Africa students can associate with. Students have three weeks to innovate a product and consult the mathematics lecturer. It is during the consultation that the most learning takes place as aspects including logic, usability, uniqueness and comparison to products already on the market are discussed.

Post consultation, students have two weeks to improve their innovation and populate a 5-page powerpoint presentation using a template designed by the lecturer and the Idea Generator Unit manager. The presentation includes their proposed product, the first milestone estimated costs of creating a prototype, as well as comparisons with comparable products (pricing and function).

Similar to solving a mathematical problem, students are equipped with the necessary tools, such as an information session with regards to the functions of the innovation & technology stations at CUT, e.g., i-Gym / Idea Generator, a unit promoting entrepreneurship education, Product Development Technology Station; Centre for Rapid Prototyping and Manufacturing and the FabLAB (a maker space).

The presentation submitted by students is academically rewarded on product research, the logic of the design and estimated costs, as well as inputs reflecting virtual visitation to the technology stations. The academic innovation assignment contributed 10% towards a student's course mark. However, the innovation itself is not evaluated as the requirement to produce a product (innovation maturity) is not included in the subject description of mathematics; only problem-solving is.

Post grading, innovations identified as having patentable-commercial-product potential are forwarded to a non-academic innovation competition hosted by the i-GYM where top innovations were rewarded with a money-in-pocket incentive as well as an opportunity to further their innovations.

III Support Mechanisms

A collaboration between the i-GYM / Idea Generator and the department of Mathematical and Physical sciences extended the i-GYM service delivery to initiate innovation and entrepreneurial challenge-based assignments in other departments and faculties at CUT. In addition to services already on offer, such as training programs (consisting of several modules covering marketing, management and administration aspects of a business); masterclasses in finance; inspirational talks; annual CUT challenges (with incentives to further develop innovative ideas in the form financial support), the support for compulsory challenge-based departmental competitions add another institutional incentive to students to consider becoming innovators and entrepreneurs and possible employers to alleviate the high percentage of unemployment in South Africa.

In support of lecturer workload pressure, the i-GYM assists with the assessment, both academic and for innovation furtherment of all submitted assignments. The i-GYM also diverts innovations, such as those with a potential social impact, to selected innovation competitions suited to such innovations, which are also hosted by the i-GYM. Winners of these competitions receive the necessary support in product furtherment and the opportunity to be included in various i-GYM training programs.

The aim is not only to identify ideas or projects for commercialization but also to identify and nurture students with an entrepreneurial nature and interest. Lecturers do not receive academic recognition for innovation assignment involvement and do so voluntarily with the support of the university as an entrepreneurship component is a required graduate attribute and a key inclusion in the university's Vision 2030.

The Vision 2030 statement identifies ten graduate attributes that must be inculcated in its graduates. "By 2030, Central University of Technology, Free State will be a leading African University of Technology, shaping the future through innovation."

Clearly, the incorporation of innovation, entrepreneurship and problem-solving within the educational landscape is supported by CUT. However, realising these attributes requires the alignment of activities in teaching and learning, curriculum renewal and re-designing assessment tasks and outcomes as was done for the subject Engineering Mathematics third-year students through a compulsory problem-solving assignment with a furtherment option.

IV. Collaborations

Internal stakeholders

Intuition incentives implemented in 2019 by the DVC Research Innovation and Engagement identify 'Innovation Champions' within the four faculties of CUT. The Deputy Dean of the Faculty of Engineering, Built Environment and Information Technology identified the mathematics lecturer driving this initiative as an innovation champion and appointed them to attend entrepreneurship education training and seek ways to promote interest among students in innovation and entrepreneurship. Deputy deans are tasked to promote entrepreneurship at CUT among students and staff.

When the i-GYM reached out to the innovation champion for the Department of Mathematics, a collaboration effort was forged, which resulted in an annual (except for the effect of the Covid19 pandemic) competition. Staff members from the three engineering fields, mechanical engineering, electrical engineering and civil engineering, contributed to the evaluation of projects and were available for student consultations to advise students on improving their innovative ideas or projects. They also served as adjudicators along with the CUT's Technical Transfers Officer, who could advise on Intellectual Property issues. In addition, support was offered by the i-GYM for one-on-one presentation training which was facilitated by lecturers in refining and streamlining powerpoint presentations and how to pitch.

External stakeholders

Appointing adjudicators from the industry ensures interest and support from external stakeholders. The industry connection delivered feedback to the winners' projects regarding their technical refinement. During the 2019 innovation challenge, a staff member from the Trade Industry Agency (TIA), a government agency that promotes and funds innovation projects, also provided a valuable contribution with feedback at the competition. TIA falls under the South African Government Trade, Industry and Competition Department.

V. Outcomes / Impact

Before assignment grades were communicated to students, they had to partake in a compulsory survey post the innovation experience. The survey, completed by the 176 partaking students, contained five questions addressing innovation on demand, problem-solving in the real world, innovation in their future workplace and personal realization. In solving real-world problems, they indicated that their thinking processes corresponded well with the problem breakdown associated with solving a mathematical problem. The comment best describing what students took away from this assignment on a personal level was, "I learnt that I tend to be a lazy thinker. Initially, my first instinct was to go to the internet and look for ideas or inspiration, but most of the ideas just seemed generic. It was only when I forced myself to close the internet and investigate my own life and own life experiences that I was able to come up with good ideas." 80% indicated that they are open to innovation in future, having had a first-hand experience.

A response that stood out as to the means of the inclusion of innovation in a future workplace was a student that responded that if he was an employer, he would employ people with different perspectives as this would lead to more options during problem-solving. Only 52% of the students believed they would have gained the same insights into innovation through a theoretical approach as opposed to the hands-on approach required by the assignment. The overall success of this assignment in reaching its objectives of innovation awareness and eventual entrepreneurship is evident in the 73% yes response to the question if they will pursue a business adventure in future and the 80% that indicated that they would be interested in taking part in more innovation activities in future.

VI. Lessons Learned

In 2018, all students and staff at CUT were invited to submit innovations to the i-GYM annual competition. To feed into the system, the mathematics lecturer promoted this competition during the mathematics class session.

Students responded with “what must we innovate” and “what do I win”, which was responded to with ‘it’s a free choice’ and ‘winning is product furtherment’. As there was no in-pocket reward to serve as a driving force, students were not interested and focused instead on academic assignments. Not satisfied with this outcome, an experiment was initiated in 2019 where the mathematics department, in collaboration with the i-GYM, incorporated the assignment ‘solve ‘X’ in the real world’ into the mathematics three syllabi. The name was chosen not to deviate from mathematics as a problem-solving subject. Compared to the CUT innovation competition, the topic in the assignment was within a given boundary of innovation addressing drought in South Africa, but the incentive remained product furtherment only. With the first student-lecturer consultation, it was evident that students required training in word choices in web searches as well as estimating the cost of material and general manufacturing. Students were referred to relevant staff at the technology stations at CUT, after which they populated a powerpoint template. It was observed during an in-class innovation competition only for the mathematics students that language use in the presentation, background choices and presentation skills required intervention in future endeavours.

All students presented, and the assignment grade was sourced from the adjudicators. From lessons learned in 2019, the powerpoint template in 2022 included compulsory visitation to the technology stations, powerpoint and presentation skill support were made available, and a cash-in-pocket prize system was put into place.

“ *Realising the incorporation of innovation, entrepreneurship and problem-solving attributes within the educational landscape of CUT requires the alignment of activities in teaching and learning, curriculum renewal and re-designing assessment tasks and outcomes as was done for the subject Engineering Mathematics third-year students through a compulsory problem-solving assignment with a furtherment option.*

– Iizabeth Conradie & Michelle Erasmus

VII. Conclusion and Future Outlook

Students respond well to compulsory innovation when they are given a free choice within boundaries, an innovation addressing a real-world problem students can associate with and a tangible incentive. Mathematics is not restricted to solving problems on paper but is suited to problem-solving in the real world, which makes for an excellent innovation base at academic institutions.

The next steps are as follows:

- Extending the compulsory assignment to other faculties.
- Tapping from adjudicator recommendations.
- The survey responses from the students and the experiences from the lecturers involved in increasing interest amongst students and improving shortcomings experienced during competitions.

The survey questions were also refined and made adaptable for other faculties where the assignment will be absorbed in other subjects, not mathematics.

Interdisciplinary Co-Creation of Short Term Programming

Author: Alexander Heinz

PITCH	Innovative education can come about through disrupting organisational and disciplinary boundaries. This presentation speaks about HE-focused business development bringing about new educational projects.
ORGANISATION	King's College London (United Kingdom)
DOMAIN	Other: Co-creation of and innovation through short term programming

I. Background & Objectives

The current consensus sees faculty-to-faculty initiatives in a context of almost organic or research-grant accelerated collaborations. Associated notions of purity and academic elite are inherently problematic.

This case study shows, with in-depth examples, that new impetus on pedagogical strategies as well as new, future-focused education content, can be created by matchmaking, curatorship and market expertise.

This case study's presentation is based on 15 years of experience in the area and a wealth of created programming at King's College London.

The presenter is Co-Chair of the Summer Executive at King's College London. A senior associate director, he has been building King's extensive education portfolio of cutting-edge, diverse academic summer education opportunities from their early beginnings in London and overseas. As an experienced leader of dynamic teams, he was brought in to set up and transform two key internationally-facing units in the College's international strategy: King's Global Engagement and King's International Programmes.

Dr Heinz was a degree and doctoral scholar of the German National Merit Foundation and the German Academic Exchange Service (DAAD). His research into education and learning sets out a wide range of progressive education initiatives. Alongside his commercial work, Dr Heinz is passionate about access to education, for example, through setting up summer schools in India and education schemes for refugees and students with disabilities.

II. Activities Undertaken

The session will speak about a number of initiatives that have been undertaken or are being planned by King's College London's Summer Programmes. The presentation will use case studies from projects in areas such as inter-cultural studies, leadership, art, social science, and political science:

- Fulbright Summer Institute
- Dialogues on Disability
- Leadership and Creativity
- Herstory: Family History

III Support Mechanisms

The presentation will speak about the ethos and professional services make-up required to allow for new spaces and possibilities for creative education projects. How do we need to recruit and think Higher Education to enable creativity in short-term programming?

IV. Collaborations

The presentation will speak about projects with Fulbright Commission, the British Council, UNHCR, the National Archives in London, as well as internal collaborations instigated by the presenter in projects that bring together, for example, King's College London's geneticists, historians and archivists or entrepreneurship experts with literature experts and artists.

V. Outcomes / Impact

Innovative education for the presenter includes universities accepting a more holistic approach to student empowerment and problem-solving that doesn't always satisfactorily sit within the confines of disciplinary research.

Student satisfaction with these collaborative programmes can be very high, as the programming feels unique and personal.

VI. Lessons Learned

- Small-scale "curated" collaborations in short-term programming can lead to lone-standing, embedded innovation projects.
- Initiatives help shape individual research and career trajectories.
- Universities require thinking and agile professional services units that support the strategic development of innovative education.

VII. Conclusion and Future Outlook

We need to rethink the spaces for innovation in education and empower actors that have often been ignored. How can we create trust and openness for these possibilities? How can we make space and time?

Ocean I3, A Cross-Border Community Engaged With The Ocean

Authors: Julieta Barrenechea, Itziar Rekalde & Agullo Cécile

PITCH

Universities in the 21st century must commit to the sustainability of the oceans. Ocean i3 represents an eco-environment of educational innovation to make this commitment

ORGANISATION

Euskampus Fundazioa (Spain)

DOMAIN

Collaborative and Challenge-based learning

I. Background & Objectives

Ocean pollution is an issue that leaves no one indifferent. Images of large plastic islands roaming the seas and marine animals surrounded by waste are becoming increasingly common. Our concern for the environment and the health of the planet is unquestionable. This is not a time for lamentation because nothing is lost; with will, commitment and responsibility from all of us, we can cope with this situation.

Ocean i3 brings commitment and responsibility towards the Sustainable Development Goals and contributes to their incorporation into the University. It is an educational innovation initiative that drives the university community towards commitment, involvement and action for the care, protection and study of the ocean.

Ocean i3 is developed within the framework of the strategic alliance of the Euskampus Bordeaux Campus of International Cross-border Excellence and involves the academic communities of the University of the Basque Country (UPV/EHU) and the University of Bordeaux (UBx). It began as a pilot experience in the 2018-2019 academic year and has received funding from the European Regional Development Fund (ERDF),

through the Interreg V-A Spain, France and Andorra Territorial Cooperation Programme (POCTEFA 2014-2020). Additionally, in September 2021, Ocean i3 was included in the Sustainable Development Solutions Network of good practices and is considered a good international practice in the framework of the ENLIGHT Erasmus+ European University Alliance.

Students from different bachelor's and master's degrees from both universities, accompanied by their teachers, live an experience of Education for Sustainable Development that consists of an interuniversity, transdisciplinary, multilingual and multicultural itinerary of intensive co-training in which they develop skills specific to their degree as well as transversal skills by getting involved in real challenges proposed by stakeholders from the Basque-Aquitania cross-border coastline and linked to the problem of plastics pollution in the sea.

II. Activities Undertaken

The triangle that articulates the innovation of this project has three vertices:

a) Training: consisting of an itinerary of five challenge-oriented learning workshops. Associated stakeholders propose real challenges linked to the ocean and coastal plastic pollution and participate with a high level of commitment in three of the five workshops with a focus on 1) the complex and shared understanding of the challenge posed, 2) the adaptation of expectations between what the stakeholders request and what the interdisciplinary team will be able to produce and 3) the contrast and valorisation of results. The students from the two universities and different degrees, together with the tutoring faculty, form multidisciplinary work teams and participate synchronously in the itinerary of 5 workshops. In addition and asynchronously, digital platforms such as Oktonine, Euskampus Digital, Gather and other virtual tools and applications (Mentimeter, Miro, Mural) are used, which are ideal for collaborative work and project development.

b) Collaborative research: teamwork integrates the contributions of individual academic work (Bachelor or Master's thesis, doctoral theses) co-creating results and collective responses to the challenges posed by stakeholders.

c) Development of skills for sustainability: the activities proposed in the training itinerary contribute to developing the transversal skills corresponding to the three dimensions of the Ocean i3 model based on the UPV/EHU's IKDi3 educational model: a) Learning/Ikaskuntza referring to intercultural communication, Negotiation and horizontal commitment, active listening, b) Research/Ikerkuntza referring to analysis, understanding and resolution of complex problems, creativity and application of research methods and c) Sustainability/Iraunkortasuna referring to transdisciplinarity: integration and management of the environment and the social context, Integration of the dimensions of the SDGs, global and integrative vision of the problems and multilingualism and interculturality.

III Support Mechanisms

The Ocean i3 Challenge-Based Learning project is being developed thanks to an institutional framework based on the agreement between the two participating universities to develop training and employability actions on the Euskampus Bordeaux Cross-Border Campus,

thus involving three organizations: University of the Basque Country, University of Bordeaux and Euskampus Fundazioa (an entity in which both universities participate and which is the instrument for the deployment of the Cross-border Campus since the creation of the campus of excellence programs of each university).

Ocean i3 has a technical project team of two people, three academic coordinators (one per institution) and a pedagogical team of teachers with clear innovation objectives thanks to their alignment with the educational strategies and models of both universities ([IKD i3](#), [New Deal](#), and [Transition sheets](#)).

Thanks to this institutional framework, it is possible to mobilize a community of teaching staff, students and territorial stakeholders around a mission and a framework theme agreed and recognised as a priority by all parties.

The project has been funded internally by the universities and Euskampus Fundazioa in its different phases. During the period from January 2020 to December 2021, it received external funding from the territorial cooperation programme I INTERREG V-A Spain-France-Andorra. Regarding supports that ensure the development of the project, we highlight:

- Ocean i3 website, where resources and publications produced by the whole community can also be consulted;
- An internal and external communication plan based on its own social networks and coordinated with the communication departments of both universities and Euskampus Fundazioa;
- A protocol for the management of Multilingualism and interculturalism, Policy Language developed by Euskampus Fundazioa in collaboration with the consolidated UPV/EHU research group DREAM of UPV/EHU, and
- The Euskampus digital collaborative platform is mainly oriented towards community development and management of projects and tasks in challenge-oriented teams.

IV. Collaborations

Ocean i3 assumes the keys of the UPV/EHU's own educational model called IKD i3, which combines Learning, Research and Sustainability, and integrates the values of the United Nations Agenda for Sustainable Development (2015) included in the EHUagenda 2030, and in the

Roadmap for Transitions (environmental and social) that is part of the University of Bordeaux strategic plan for the year 2030 (U30), thus aligning the work of these universities with the great challenges of the planet and of people.

In this same sense, Ocean i3 is fully aligned with environmental and social transition strategies in a perspective of responsible innovation in which the resolution of real problems and challenges is aimed at achieving positive impacts. Furthermore, its strong territorial anchoring favours the direct collaboration of the cross-border university community with territorial stakeholders to become directly involved in problem-solving, knowledge production and research while developing actions of intervention and inclusive citizen science.

As for the internal complicities sought in the academy, we can point out: a) the institutional support that Ocean i3 receives from the administrative-academic leaders of both universities; b) the disciplinary diversity it mobilizes; c) the joint work between students and teaching staff enriched by multilingual and intercultural dimensions; and, d) the monitoring of the teaching-learning processes and the use of languages in intercultural contexts by research groups within the university.

With regard to external complicities, the involved stakeholders have a clear professional, and work connection with the ocean (Surfrider, Mater museoa, Gaia & Rivas Protech, T.E.O., etc.), and the challenges they propose are shared concerns that can only be solved with the participation of the extended university community.

V. Outcomes / Impact

Ocean i3 outputs and results are significant in innovation because they align with the educational innovation approach shared by the two universities regarding their engagement to innovative and sustainable learning, territorial commitment as extended universities, and employability. Taking into account the 4 academic years as a whole (2018-2022), impacts are identified at four levels:

– **Students:** 144 students have participated; 37 internship contracts with entities located in the territory have been linked to the project, 22 transdisciplinary works that respond to the challenges of stakeholders, and 104 academic works involving bachelor's and master's degrees in 19 different disciplines.

– **Teaching staff:** 47 teachers have been involved and have formed an inter-university-international teaching team for educational innovation supported by the Educational Council Department (UPV/EHU) and which is oriented towards reflection on teaching practices and the development of instruments (guides, etc.) for the dissemination of the Ocean i3 pedagogical approach in other curricular training programs.

– **Territorial:** The collective construction of knowledge of the Ocean i3 community has materialized in 22 challenges proposed by 14 stakeholders in the Basque-Aquitain territory. An immediate impact is evident in the co-creation of knowledge and procedures that have been transferred to the territory itself.

– **Institutional:** The solid collaborative work between two public universities with different cultures that have designed, implemented and evaluated agreements and action procedures in terms of education for sustainable development.

Ocean i3 is an authentic and significant learning eco-environment for students because it proposes actions in which they have to combine knowledge, know-how and know-how-to-be, and where their decisions and actions are reflected and leave their mark on the ocean's health.

VI. Lessons Learned

Many initial challenges have had to be overcome, and we believe that many of them make the Ocean i3 unique in its novelty and complexity. Some of these challenges have been:

– to introduce transformative learning approaches grounded in the SDGs (UN, 2015) at the university level;

– to challenge public administrations to embrace education as sustainability, and higher education institutions to transform themselves into eco-universities;

– to deepen collaboration between public universities (UPV/EHU-University of Bordeaux) and -Euskampus Fundazioa-, involving entities with different missions and cultures;

– to promote mentalities that assume the complexity of reality, relying on collaboration and co-construction of knowledge as the main keys to contribute to the challenges and transformations required for sustainable development and the 21st-century society;

– to promote trans disciplinary to understand environmental and social challenges in an integrated way,

- to assume the direct impact of the results that come from research in living laboratories (planning together with the socio-economic actor the design of actions, and implementing and evaluating on the ground), and
- to enable its mission-oriented approach to integrate broad thematic agendas and align approaches and efforts that promote the "capacity to act" at the territorial scale.

One of the success factors of this experience is the methodology implemented, through which it has been achieved:

- to implement a challenge-based learning experience involving the extended community (university society);
- to acquire transversal competencies for sustainability;
- to develop specific competencies based on the subjects of research reports (under and post-graduate);
- to contribute to real challenges with knowledge, procedures, attitudes and scientific results;
- to weave complicities and strengthen relationships between the universities and the socio-economic environment, and
- to activate an extended learning community around challenges linked to global sustainability issues.

VII. Conclusion and Future Outlook

Ocean i3 is an authentic and significant learning eco-environment for students because it proposes actions in which they have to combine knowledge, know-how and know-how-to-be regarding sustainability issues. Also, their decisions and actions leave their mark on the well-being of the ocean.

In the medium to long term, the aim is to investigate the emerging pedagogical innovations that Ocean i3 will require in order to respond meaningfully to Education for Sustainable Development from its territorial, transdisciplinary, multilingual and intercultural dimensions. At the same time, it aims to contribute to the co-construction of extended universities that promotes quality training and research for sustainability.

Challenge: Alpine Smart Working: Your Office in the Mountains

Author: Alessandra Scroccaro

PITCH	An international hybrid challenge for promoting co-working spaces in mountain villages and valleys, including online mentorships and an in-presence hackathon in the Italian Dolomites.
ORGANISATION	University of Trento (Italy)
DOMAIN	Collaborative and Challenge-based learning

I. Background & Objectives

In recent years, peripheral territories have often been considered a dormitory from which people commute daily to city centres. In the worst cases, people have to leave home in order to stay near their place of work. Small coworking spaces offer an alternative: people spend less time driving, thereby also contributing to reducing traffic and pollution, and don't need to relocate to city centres, thereby improving their work-life balance.

The demand for workers for a flexible way of work is steadily increasing in this period: we are observing a growth in resignations due to a bad life-work balance and a switch to a “remote-first” approach by more and more companies. Developing smart working is also a priority project for some PA, and Provincia Autonoma di Trento has recently approved its own strategic plan.

Despite these global tendencies, it is not easy to convince people and companies about the benefits of remote working: **I.** many organizations (and workers) aren't really ready for a change in general and this could be seen as a radical transformation **II.** preCOVIDly, coworking spaces were mainly used by (and offered to) freelancers or startup teams. Thus they are often perceived as non-suitable to “normal office work”.

II. Activities Undertaken

- 06/04/2022 at 19:00-21:00 | Challenge Kick-off | Online.
- End of April: Mentorship | ONLINE. Each team will be supported by 30 minutes of online mentorship, in preparation for the hackathon.
- End of April (Not mandatory): Organized visits to Trento surroundings smart workplaces might be planned, based on the needs of participants and challenge providers, in order to collect information and data, and better understand the background and the context. Virtual visits can be organized for those who can't participate in person.
- 06/05/2022 at 9:00-22:30 | Start of the Hackathon activities| In-person (Arrival to Trento on Thursday 05/05)
- 07/05/2022 at 9:00-18:00 |Challenge Activities and Grand Finale| In-person

III Support Mechanisms

Develop our description of possible customer segments, identifying key factors useful for “micro-targeting” and building a better value proposition (e.g. commuting key characteristics such as distance and frequency, general interest services localization, pull/push migration factors, etc.). You'll work in teams in order to:

- identify and define the target segment, key characteristics and problems to be solved;
- identify territorial KPIs (Key Performance Indicators) to evaluate the creation of a coworking space, and
- ideate strategies to communicate coworking's value proposition.

IV. Collaborations

Launching these new working modes, however, is not easy, and that is why the opportunity must be better communicated to succeed. Students from various ECIU universities who participated in the “Alpine Smart Working Challenge” tried to solve this problem and, for a few days, working on a solution with the challenge providers, that is ImpactHub Trento, Trentino Social Tank and Federazione Trentina della Cooperazione.

Fifteen students from Trento, Barcelona, Aveiro and Stavanger, grouped in four teams, took on the challenge. The representatives of the challenge providers also participated in the two days in Mezzana: Claudio Tagliabue (Trentino Social Tank), Danilo Ropele (Federazione Trentina Cooperazione) and Paolo Campagnano (ImpactHub Trento).

The students were supervised by Alessandra Scroccaro (UniTrento) as contact person for the challenge (teamcher) and, for the first time, by two mentors from an ECIU university, Sanaz Masoumeh Shahverdi and Timothy James Marshall of the University of Stavanger (Norway).

V. Outcomes / Impact

Identify targets and key factors useful for “micro-targeting” and build a better value proposition for the customers, considering sustainability in all aspects:

- Persons, brains, machines and jobs stay on the territory. We embank local “brain drain”. We prevent the use of cars, and consequently we decrease the number of car accidents. People work in the most wonderful places in the world where they can enjoy the breath-taking landscape and breathe clean and pure air (social sustainability);
- Car commuting reduction. We prevent environmental, acoustic, visual, and atmospheric pollution. We reduce the Carbon dioxide emission (environmental sustainability)

– Fewer car accidents, more productivity, more happiness while working, etc., have an economic impact. Local communities, companies, the environment, and people have an Economic gain related to coworking (economic sustainability).

These are some examples of sustainable impacts due to coworking space use.

VI. Lessons Learned

In terms of lessons learned, we understood that it's important to maintain a playful learning environment and that the challenge have to be located where the problem is in order to have a direct experience with stakeholders. It's also useful to be supported by mentors and to stimulate the creativity with lateral activities.

VII. Conclusion and Future Outlook

The “Valley Workers” team of Sofia Greganti, Rewanth Radhakrishnan and Sofia Gurskaia, won the challenge. The students bet on innovation: they proposed to invite small and large companies to get in touch with the “InCooperazione-Coworking” project to organize "workations", that is, vacations that allow you to work remotely and include training, group work and team building initiatives while visiting Trentino. In the future, we plan to continue to propose the same activities.

“*Launching these smart working modes, however, is not easy, and that is why the opportunity must be better communicated to succeed. Students from various ECIU universities who participated in the “Alpine Smart Working Challenge” tried to solve this problem and, for a few days, working on a solution with the challenge providers.*”

– **Alessandra Scroccaro**

A case study of errors in the journey towards greater emotional intelligence (for staff and students alike)

Author: Faye

PITCH	Striving to develop 3rd year students' emotional intelligence to improve their collaborative working practices did not go as smoothly as I had hoped.
ORGANISATION	Falmouth University (United Kingdom)
DOMAIN	Collaborative and Challenge-based learning

I. Background & Objectives

By supervising 3rd-year practice projects (namely short films), it became apparent that the biggest challenge the students faced was not technical competence or artistic vision. It was collaboration. And not collaboration in terms of set etiquette, hierarchy, roles and responsibilities, but more simply, how to play nice with others. The students had little sense of how they fit in a group at an interpersonal level and even less idea of how to troubleshoot the invariable issues that arose. In the endeavour to address this, the sister issues of bias, exclusion, ignorance and fear became increasingly evident.

Our students needed to develop their emotional intelligence, sense of self, and awareness of peers and foster greater inclusivity. In this session, we will share our experiences of teaching 'Dare' and 'Showcase' modules with 3rd year BA Television students, outlining pitfalls (managing fall out after more challenging discussions) and opportunities (creating more inclusive crew recruitment processes) in this area that is often neglected despite its potential impact on inclusive classrooms, to identify and share the good practice.

The 3rd year practice module 'Dare' is now in its third iteration. Prior to the module running, I realised that we had taught the students very well in relation to on-set etiquette for filmmaking as well as their roles and responsibilities and on-set hierarchy. However, we had not explicitly taught more general concepts of group working, group dynamics, conflict resolution, etc. 'Dare' set out to address this.

II. Activities Undertaken

I commissioned a group working specialist to curate and lead some content around non-industry specific roles in groups (such as co-ordinator, completer, shaper etc). I created tasks that required students to work with people they didn't know.

During the first iteration, I realised that within the learning outcome 'collaboration', the more important primary focus actually needed to be the development of the students 'emotional intelligence'. In the 2nd iteration, I implemented more specific strategies to tackle this. For example, inviting a key influencer and speaker on emotional intelligence to give guest talks.

There was a specific incident around one of these talks that did not go well (a private social media chat happening concurrently with the guest talk that raised some challenging issues in an unsupported environment). This led to one individual largely being ostracised and the conversation stalling.

The exercises from the first iterations and the 'challenge' to work with new people and outside their comfort zones were not well received. I've rebuilt the module for this current iteration to help the students find a more accessible way to engage with the content. For example, co-creating a code of conduct, discussion around how to have a difficult conversation ahead of the conversation, contextualising the tasks and challenges more firmly around the explicit gain for the students and community and the advantages for the final year graduation projects (typically short films). I've made the process of finding new people to work with more supportive using online tools and in-class support. I've added a mechanism to support (and therefore expect) transparent and managed recruitment processes for final-year projects to attempt to give fair and equal opportunity to all students to apply for roles. So far, it seems to be working much better.

III. Collaborations

Initially, I worked with an internal research partner to explore areas around bias and self-selection in our student cohort, for example, exploring women's attitudes to technical roles, an area I'm very familiar with as a female cinematographer myself and someone who has taught cinematography for over 20 years now. This is feeding into an ongoing area of research above and beyond the 'Dare' module. This also extended to the delivery of unconscious bias training within the module (now added to 2nd year to better prepare the way earlier for these conversations), through **I.** inclusion of an external group working specialist who works in private and community training areas, and **II.** inclusion of an influencer and commentator who is also a visiting professor at Kingston School of Art and key contributor to FACE (Fashion Academics Creating Equality).

Working with internal colleagues who are running a new first-year module called 'Belonging' within the fashion department, which I wish to include in BA Television on our next revalidation and which also has scope for cross-institutional take up.

IV. Outcomes / Impact

It used to be the case that the primary support I was offering in the latter part of the 3rd year, as the final year projects went into full swing, was helping the students manage themselves and their relationships with others. That has diminished since running the 'Dare' module so that support can go deeper into creative voice and more ambitious outcomes. The final year projects across the board have improved in quality and innovation. Employment outcomes take a while to filter through, but these look set to rise significantly (also impacted by the increase in production in the UK so hard to make a clear conclusion from this however, employers are increasingly asking for 'soft skills', which the students' emotional intelligence development is setting them up well for.

V. Lessons Learned

The challenges are many and ongoing. There is no ultimate 'success'; instead degrees of working towards it. One of the biggest challenges was the students' lack of readiness to have difficult conversations.

Working with those they didn't know, finding room for alternative viewpoints to their own and white privilege seems to be the most challenging for them. The 'actions undertaken' section above explores some of the solutions to these. Another big challenge is student feedback. The 'Dare' module's timing is immediately before the NSS. The Television degree does not yet have an NSS score meeting the university's expectations. The mixed and occasionally negative feedback for the 'Dare' module is a thorn in the side of the endeavour to improve the overall NSS. Even a flawed delivery has shown great advantages for the students' and graduates' emotional intelligence, employability prospects, creative voice, innovation, and approach to inclusivity; the challenge is that the students might not realise or appreciate this value for some time, perhaps not until years later. This doesn't support the timing and nature of surveys like the NSS. This current 3rd iteration of the module is likely my last chance to try to align all these elements to help the students understand the benefits of what they're getting more immediately.

VI. Conclusion and Future Outlook

I passionately believe in the need for the work I'm doing with the students on the 'Dare' module as fundamental to their development as inclusive and innovative practitioners. The approaches I've developed are starting to take shape and will hopefully have greater support across the student cohort when it comes to module evaluation time. I don't see the work and the development ever being 'finished' as it needs to constantly evolve to the differing needs of each cohort (the timing of where they were in their education journey when the pandemic hit changes things) and the different climate of the television and film industries as well as society at large. A key next step will be to introduce the new 'Belonging' module (a forum for students to investigate equality, diversity and inclusivity as it relates to students' practice) to the 1st year Television cohort so that the work I'm doing in 3rd year has a more solid foundation to build on.

“*By supervising 3rd-year practice projects (namely short films), it became apparent that the biggest challenge the students faced was not technical competence or artistic vision. It was collaboration. And not collaboration in terms of set etiquette, hierarchy, roles and responsibilities, but more simply, how to play nice with others.*”

– Faye

References

- Aydin-Gunbatar, S., Tarkin-Celikkiran, A., Kutucu, E. S., & Ekiz-Kiran, B. (2018). The influence of a design-based elective STEM course on pre-service chemistry teachers' content knowledge, STEM conceptions, and engineering views. *Chemistry Education Research and Practice*, 19(3), 954-972.
- Aymard, A. L., Teychené, J., Laborie, S., Bertrand, M., & Dietrich, N. (2021). Tournament Battle: Gamifying Bibliographic Research and Oral Argumentation Applied to Chemical Engineering Topics. *Journal of Chemical Education*, 98(9), 2937-2943.
- Bouwer, A. (2021). End Report of DGA Gaming Fieldlab Project "Didactics-Driven Development: Towards a Methodology and Toolset for the Systematic Validation of Applied Games". *Dutch Games Association, supported by ClickNL*. Co-financing by business partner Pillar Games.
- Bouwer, A., & Brinkkemper, P., (2021). End presentation DGA Gaming Field Lab Project "Didactics-Driven Development: Towards a Methodology and Toolset for the Systematic Validation of Applied Games", 18 May 2021. *Dutch Games Association, supported by ClickNL*. Co-financing by business partner Pillar Games. Video Recording of Presentation.
- Bouwer, A. & van Rozen, R. (2019). Live Game Design Project SIA RAAK-MKB Eindrapportage, *Hogeschool van Amsterdam*, Juni 2019.
- Chou, Y. (2016). Actionable Gamification: Beyond points, badges and Leaderboards. *London: Leanpub*.
- Clarke, S., Peel, D. J., Arnab, S., Morini, L., Keegan, H., & Wood, O. (2017). EscapED: A framework for creating educational escape rooms and interactive games for higher/further education. *International Journal of Serious Games*, 4(3), 73-86.
- Deeb, F. A., & Hickey, T. J. (2019, October). Teaching introductory cryptography using a 3D escape-the-room game. In *2019 IEEE Frontiers in Education Conference (FIE)* (pp. 1-6). IEEE.
- Eldebo, K., Lundvall, C., Norrman, C. A., & Larsson, M. (2022). How to make good teachers great in challenge-based learning. *Cover Design: Ágústa Sigurlaug Guðjónsdóttir*, 793.
- Erickson, H. L., Lanning, L. A., & French, R. (2017). *Concept-based curriculum and instruction for the thinking classroom*. Corwin Press.
- Eukel, H. N., Frenzel, J. E., & Cernusca, D. (2017). Educational gaming for pharmacy students—design and evaluation of a diabetes-themed escape room. *American journal of pharmaceutical education*, 81(7).
- Feise, H. J., & Schaer, E. (2021). Mastering digitized chemical engineering. *Education for Chemical Engineers*, 34, 78-86.
- Järveläinen, J., & Paavilainen-Mäntymäki, E. (2019). Escape room as game-based learning process: causation-effectuation perspective.
- Järveläinen, J. (2021). Collective Mindful and Mindless Behavior in Game-Based Learning—Comparing Physical and Digital Educational Escape Rooms.

References

- Marschall, C., & French, R. (2018). Concept-based inquiry in action: strategies to promote transferable understanding. *Corwin Press*.
- McKenney, S., & Reeves, T. C. (2014). Educational design research. *Handbook of research on educational communications and technology*, 131-140.
- Nichols, M., & Cator, K. (2008). Challenge Based Learning White Paper. Cupertino, California: Apple. Inc. Recuperado de.
- Ohler, J. (2013). Digital Storytelling in the Classroom. New Media Pathways to Literacy, Learning and Creativity. *London: SAGE Publications*.
- Oliveira, S. (2017). The UBUNTUfication of a 21st Century Transformative Primary English Classroom. Retrieved from <http://recipp.ipp.pt/handle/10400.22/10789>
- Oliveira, S., & Cruz, M. (2018). Gamifying the Story or Storifying the Game?-Chou's (2016) Octalysis Framework in English Learning at Primary Schools. *Proceedings of Play2Learn 2018*, 351.
- Perignat, E., & Katz-Buonincontro, J. (2019). STEAM in practice and research: An integrative literature review. *Thinking skills and creativity*, 31, 31-43.
- Putri, E. M., Ekowati, V. M., Supriyanto, A. S., & Mukaffi, Z. (2019). The effect of work environment on employee performance through work discipline. *International Journal of Research-GRANTHAALAYAH*, 7(4), 132-140.
- Robinson, K., & Aronica, L. (2015). *Creative schools: Revolutionizing education from the ground up*. Penguin UK.
- Sá, S. (2007). Educação, diversidade linguística e desenvolvimento sustentável. *Aveiro: Universidade de Aveiro*.
- Sá, S., & Andrade, A. I. (2008). Aprender a respeitar o Outro e o Planeta: potencialidades da educação para o desenvolvimento sustentável nos primeiros anos de escolaridade. *Revista iberoamericana de ciencia tecnología y sociedad*, 4(11), 115-138.
- Saunders, J. N. R. (2019). *Dramatic interventions: A multi-site case study analysis of student outcomes in the School Drama program* (Doctoral dissertation).
- Tercanli, H., Martina, R., Ferreira Dias, M., Wakkee, I., Reuter, J., Amorim, M., ... & Gutiérrez Pérez, J. (2021). Educational escape rooms in practice: research, experiences, and recommendations.
- Veldkamp, A., van de Grint, L., Knippels, M. C. P., & van Joolingen, W. R. (2020). Escape education: A systematic review on escape rooms in education. *Educational Research Review*, 31, 100364.
- de la UNESCO, I. M. (2005). Hacia las sociedades del conocimiento. *Publicaciones Unesco*. París.
- Warmelink, H., Mayer, I., Weber, J., Heijligers, B., Haggis, M., Peters, E., & Louwse, M. (2017, October). AMELIO: Evaluating the team-building potential of a mixed reality escape room game. In Extended abstracts publication of the annual symposium on computer-human interaction in play (pp. 111-123).



www.un-lock.eu



[@unlock.eu](https://www.facebook.com/unlockproject)



[@unlockproject](https://www.linkedin.com/company/unlockproject)

Publisher:

UA Editora | Universidade de Aveiro, 1st Edition – February 2023

ISBN:978-972-789-843-5

DOI: <https://doi.org/10.48528/k340-7j36>

How to cite this material

Scroccaro, A., Heinz, A., Misjuns, Rodrigues, A.V., Bouwer, A., Agullo C., Norrman, C., Conradie, E., Ribeiro, E., Faye, Gintere, I., Rekalde, I., Isabel Gomes, I., Reuter, J., Järveläinen, J., Barrenechea, J., Jankauskaitė-Jurevičienė L., Cruz, M., Erasmus M., Dietrich, N., Carolei, P., Duarte Oliveira S. (2022), Educational escape rooms in practice: Research, experiences and recommendations. *UA Editora | Universidade de Aveiro*.

DOI: <https://doi.org/10.48528/k340-7j36>

UNLOCK is a KA2 Cooperation and Innovation for good practices for higher education 2020 -2022 project.

Agreement No. 612645-EPP-1-2019-1-PT-EPPKA2-KA

UNLOCK is a project carried out, under the leadership of University of Aveiro, by the strategic partnership between seven partner European organisation.

The sole responsibility for the content of this publication lies with the authors.

This work is licensed under a Creative Commons Attribution 4.0 International License.

