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educational practices

Design Factory Global Network

DESIGN FACTORY JAVERIANA BOGOTA

Pontificia Universidad JAVERIANA Colombia

Aalto University Design Factory

DFGN UnBoxed Magazine 2024: Educational Practices

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DFGN UnBoxed Magazine 2024: educational practices

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The UnBoxed 2024 Organising team would like to acknowledge and appreciate all the partners involved in this event's success. UnBoxed is the result of great minds coming together and collaborating across disciplines, time zones, and jetlags.

We would like to thank our incredible hosts, the **Pontificia Universidad Javeriana**, **Design Factory Javeriana Bogotá**, **Design Factory Javeriana Cali**, the **Design Factory Global Network members** for their contributions and the change they drive every day, and the Curator Team.

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UnBoxed 2024

Preface from the editors

Greetings, or rather, hugs, from the Design Factory Global Network team and the UnBoxed team! We are thrilled about this new experiment: *UnBoxed 2024*, which is part of the International Design Factory Week.

The Design Factory Global Network, or "DFGN" to friends ;), is a network of around 40 innovation hubs based in universities and research centres around the world. Our mission is to change the way education is delivered by empowering educators and changemakers within the vast world of education.

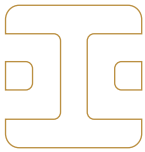
Our mission is bold, but having the support of our community is crucial to achieving this. We believe that knowledge should be shared to learn from and inspire each other. We believe in the power of collaboration.

This year, we come together to celebrate teaching practices from around the globe. As we reflect on the essence of teaching, we realise that the teaching tradition has been marked by hundreds of years of solitude: a teacher standing alone in front of students, who themselves are also working alone. This is precisely the tradition we want to break at Design Factories around the world. We aim to enhance co-teaching and student teamwork for a richer learning experience. At the UnBoxed unconference, we celebrate the educators' community, teaching experiments, and interdisciplinary collaboration between students and educators. We do this not only because it is enjoyable but because our students will need the skills to tackle wicked, complex problems, as the simple ones have already been solved.

In an era where rapid technological advancements and evolving educational paradigms demand our utmost attention, *UnBoxed 2024* offers a hands-on examination of how educational practices and strategies are influencing the future of higher education.

Through insightful research, compelling case studies, and thought leadership, this magazine aims to encourage readers to rethink how they approach teaching, coaching, and educating, and to explore new ideas for their everyday work. We are confident that these insights and discussions will serve as a catalyst for continued development within our global community. We invite you to immerse yourself in the content, engage with the ideas presented, and contribute to the vibrant dialogue that defines our network.

Main content



As education across various fields continues to evolve, it is crucial to address several emerging themes that are shaping how students are prepared for the future. The integration of sustainability into teaching, fostering real-life challenges, incorporating emerging technologies, and supporting teamwork competencies are key areas that are redefining the educational landscape. These themes not only highlight the need for forward-thinking and ethical considerations but also emphasise the importance of practical experience and technological advancement in preparing students for complex, real-world scenarios.

In the contributions addressing the theme “Integrating Sustainability into Teaching”, the need for future thinking is highlighted as a crucial component of the curriculum. Educators are increasingly focused on teaching students to envision and anticipate future challenges and opportunities, ensuring they are equipped to design solutions that are not only innovative but also sustainable. This involves guiding students to integrate a more holistic point of view, considering the long-term impact of their decisions and actions on the environment and society. As privileged educators, we have the opportunity to train future decision-makers.

In the featured contributions, we explore how critical design adapts to regional contexts (Sabogal), how systemic design fosters holistic sustainability (Vergara), how tools like the Social Impact Canvas address social risks in digital products (Kuikka & Eloranta), how methodologies ensure product development meets environmental criteria at every stage (Mendoza), and how the Future Design Factory uses future thinking to teach foresight and adaptability (Voigt).

A key aspect of this theme is helping students identify the meaningful connections between their own field and global challenges and see the impacts of their activities in the bigger picture. By embedding these considerations into the learning process, educators aim to foster a generation of decision-makers who are both forward-

thinking and responsible, prepared to tackle complex challenges with a balanced approach to ethics and sustainability.

The work presented in the theme "Real-Life Challenges in Education" involves integrating practical, real-world problems into the learning experience to better prepare students for professional practice. The contributions showcase approaches through collaborative methodologies and professional practices that simulate actual industry or government challenges, enhancing students' problem-solving skills and teamwork abilities. These initiatives emphasise the development of empathy and collaboration in problem-based learning scenarios while demonstrating the value of rapid prototyping and global multidisciplinary collaboration. Additional support for innovation projects is provided through toolkits for need-finding, reframing, ideation, and experimentation, ensuring students are well-equipped to handle complex problems, including societal issues such as peace-keeping and managing democracy.

Some contributions feature students revitalising a post-industrial town through a placemaking project in Greater Manchester (Micklethwaite), while others co-create culturally significant designs with urban communities (Quiñones). Professional experiences were fostered through a systematic internship programme, benefiting thousands of students (Ferrari & O'Toole), and a 'Dexagonal Thinking' approach addressed healthcare challenges in adult education (Xue, Ho & Ko). Design thinking workshops empowered volunteer managers with creative problem-solving skills (Ko, Ho, Neti & Koh), and an empathy-oriented prototyping toolkit improved student engagement in design thinking (Lee).

Further contributions include partnerships integrating technology and 21st-century skills into multidisciplinary learning (Martyn, Kocsis, Thong & Cook), a democracy experiment encouraging youth engagement in civic solutions (Iandoli et al.), rapid prototyping workshops that connected students with industry (Packalén), and open-access toolkits that supported project-based learning (Björklund, Kukka & van der Marel). Lastly, collaborative healthcare projects between academia and industry provided real-world experience, blending theory with practice (Xue, Chong & Tay).

The section "Integrating Technologies into Problem-Based Learning (PBL)" highlights the growing importance of AI and other technologies in the educational realm. AI tools are increasingly being integrated into educational settings to provide support for conceptualisation, analysis, and iterative development. By exploring and leveraging these tools, educators can offer students advanced capabilities for generating and

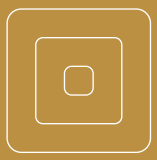
refining ideas, which enriches and expedites their problem-solving and creative processes. This integration not only helps streamline workflows but also provides students with the skills to utilise cutting-edge tools that are becoming integral to future-proof skills for students.

One contribution presents a methodology for introducing AI image-generation tools in design thinking, helping students and professionals integrate these technologies into their workflows (Neti, Ho, Ko & Xue). Another focuses on enhancing ideation in mobile app development by integrating AI tools into project-based learning (Pardo). The Critical Design Futures framework demonstrates how GenAI tools boost students' critical competence and foresight in both design and hospitality (Patel). Lastly, an interdisciplinary approach to video game design combines local cultural narratives with interactive experience and technical skills, spotlighting Colombian identity (Torres).

Lastly, in "Supporting Student Teamwork Competencies", there is a discussion about the importance of preparing students to excel in collaborative environments. Methods such as developmental reflection, tested in space and technology courses, play a crucial role in enhancing teamwork skills and facilitating effective collaboration. Facilitation techniques are designed to spark engagement and creativity in team settings, while oral case-based assessments provide a platform for scaling innovation teaching through more interactive methods. These approaches ensure that students not only develop technical and creative skills but also gain the interpersonal and collaborative competencies necessary to thrive in both academic and professional contexts.

Contributions include developmental reflection to foster critical thinking and professional growth (Vignoli & Monti), teamwork-driven product design innovation (Camacho & González), and the "Collective Project Laboratory" that promotes collaborative learning in real-world projects (Rugeles). The IdeaSquare I2Planet program uses space challenges to teach collaboration and systems thinking (Mesa, Batista, Werner & Tello), while other students build particle detectors to develop teamwork and creativity (Schadeva & Sierra). Design Factory Task Forces support industry collaborations, fostering agile teamwork (Reichert, Spiegeler Castañeda & Ackermann), and "Facilitation Fire Starters" enhance team dynamics through emotional intelligence (Monti & Vignoli). Finally, oral case-based assessments provide scalable, authentic evaluations, mitigating AI-authored concerns (Eriksson & Björklund).

Wrap-up



The integration of sustainability into teaching, the fostering of real-life challenges in education, the incorporation of new technologies into PBL, and the support of student teamwork competencies are pivotal themes representing significant advancements in multidisciplinary education. These insights collectively underscore the necessity of preparing students not only with technical skills but also with a holistic understanding of ethical and practical considerations, ensuring their formation is forward-thinking and ethical. By embedding sustainability into curricula, educators guide students to anticipate and address future challenges responsibly and make informed decisions accordingly; while integrating real-world challenges and collaborative practices in teaching equips students with the practical experience needed to tackle complex problems and collaborate effectively in diverse and fast-changing settings. The incorporation of AI tools and other emerging technologies enhances students' ability to develop and refine concepts, and the emphasis on teamwork competencies prepares them to thrive in collaborative environments.

Moving forward, it is crucial to expand these themes into broader educational practices, encourage ongoing dialogue among educators, and continuously adapt curricula to incorporate evolving practices and methodologies.

As we reflect on these contributions, it becomes clear that the work initiated lays a strong foundation for future exploration and innovation. It invites all stakeholders to engage deeply with these themes, drive forward the evolution of multidisciplinary education, and better equip students for the challenges and opportunities ahead.

Shall we get started?

Elina, Lucas, Felipe & Sara

Real-life challenges in education

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'Reframing Stockport' - Innovation coloniality?

Summary

This paper is based on a presentation delivered at the Design Factory Manchester, Manchester School of Art. Students undertook a placemaking exercise focused on culturally activating Stockport, a post-industrial town in Greater Manchester, UK. Students were supported in developing proposals to enhance the town's vibrancy, community engagement and creative economy. We here present a student project as a means of activating a larger partnership for Design Factory Manchester, and reflect on a risk of imposing a particular version of innovation on our intended beneficiaries.

Reflections, insights & paradoxes

'Reframing Stockport' student project took place within the Stockport Creative Campus initiative, a £2.5 million investment funded by Arts Council England, the first project by Design Factory Manchester. Partners included Stockport Metropolitan Borough Council and Future Everything, a digital arts organisation, who are working together on a regeneration

scheme to bring residents into the town centre and revitalise its residential property and retail markets. The project saw 60 students from six undergraduate design courses work in 12 mixed discipline groups: “you will undertake a placemaking exercise centred on culturally activating Stockport town centre, employing physical and digital, temporary and/or permanent, proposals as potential solutions to enhance the overall vibrancy, community engagement and creative economy.” Proposals had to be site specific, but the choice of site was free. The nature of the output (‘an intervention’) was entirely open. The project had to allow students to meet existing generic Learning Outcomes focused on creative response, working in unfamiliar contexts, collaboration, interdisciplinarity, and presentation. Students used an existing design research ‘toolbox’ provided by an agency for architecture, interior, urbanism and design, who helped deliver the project, to research the place and its people. Student projects sought to improve conditions for the Stockport community. For all these good intentions, there was, however, an incomplete feedback cycle with the community – not enough was done to ensure they saw the final work, and the students moved on to their next projects. ‘Reframing Stockport’ might therefore be accused of extractivism - the university came, saw, took what it needed, and left, under the guise of serving the community.

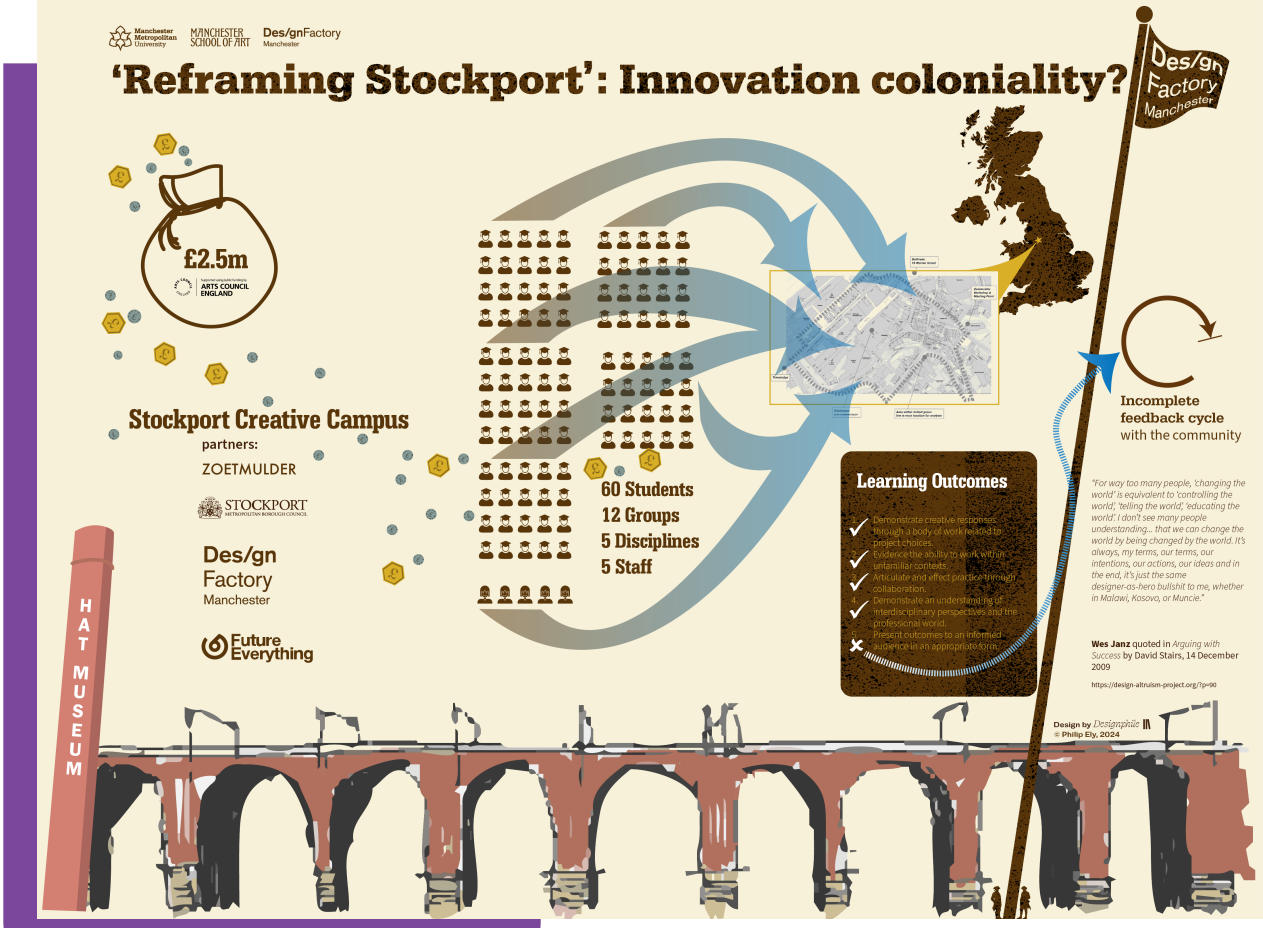
Personal relevance

The ethos of Design Factory Manchester is to have a participatory approach to designing and innovation which is social and inclusive. Stockport is a prime location for this, a historical industrial town that was originally the centre for the hatting industry and later the silk industry during the 18th & 19th centuries. Once thriving with small industries and local businesses, Stockport town centre now bears the scars of major social and economic changes. The ‘Reframing Stockport’ project is also a testbed for the student activities of Design Factory Manchester, and it is therefore important that we establish a way of working with students that manifests our Design Factory’s ethos and intentions.

Showcasing an initiative from the author’s institution

The ‘Reframing Stockport’ student project took place within the wider Stockport Creative Campus initiative, a £2.5million investment funded by Arts Council England into culturally activating the town.The Stockport Creative Campus initiative involves the application of ‘design thinking and doing’ with creative businesses and social enterprises coming together to actively develop sustainable ways of collectively thriving. Stockport Creative Campus seeks to act as a catalyst by cultivating the creativity that already exists in the town to help

bring about visible positive change for its communities. Stockport is representative of many towns across the UK whose town centres have suffered decline in recent years. What we do there could, therefore, be translatable and useful to other similar towns, and the development of a ‘Stockport Model’ is a goal of the Creative Campus initiative.



Conclusions

'Reframing Stockport' took design students into a real-world setting and provided a structured and focused learning experience. It also activated an already funded higher-level initiative, and consolidated organisational partnerships via a live project focused on generating creative proposals that could provide productive routes forward for the cultural activation of the town. In doing so, is there, however, a risk of imposing a singular version of innovation on our intended beneficiaries, and the Art School manifesting a form of 'innovation coloniality' with the communities of Stockport? To import our own, albeit tried-and-tested, approach to innovation to the town is to potentially override existing effective innovation approaches. This is a danger to be aware of as we continue to work in and with the communities of Stockport.

Discussion and questions

Discussion points:

1. Is the 'Reframing Stockport' project an example of 'innovation coloniality'?

2. What are the best foundations for student projects to ensure a positive learning experience for students whilst meeting the strategic goals of a Design Factory?

Questions:

1. Can you share a project from your Design Factory which you think may have manifested innovation coloniality? This might relate to the topic addressed, who took part, how they took part, and how outputs were shared.

2. What might you do differently next time to reduce the risk or extent of innovation coloniality?

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Teaching & learning methodologies:

Symbolic pluriverses and co-creation of identity objects

Summary

Envolves the development of a socially-centered design methodology applied to a specific community. The project focused on creating a functional yet culturally significant accessory that reflects the identity and values of their urban community. By employing co-creation with the community, the project highlights the importance of integrating cultural symbols into product design, ensuring the final product resonates with users on a personal and communal level.

Context

The course aimed to teach students how to engage with specific communities understand their cultural context, and co-create products that reflect their identity and values. Techniques such as ethnographic research, co-creation workshops, and prototype development were used to help students connect theory with practice, leading to the creation of culturally resonant designs. This example is of a Biker subculture.

Methodologies, techniques & implementation

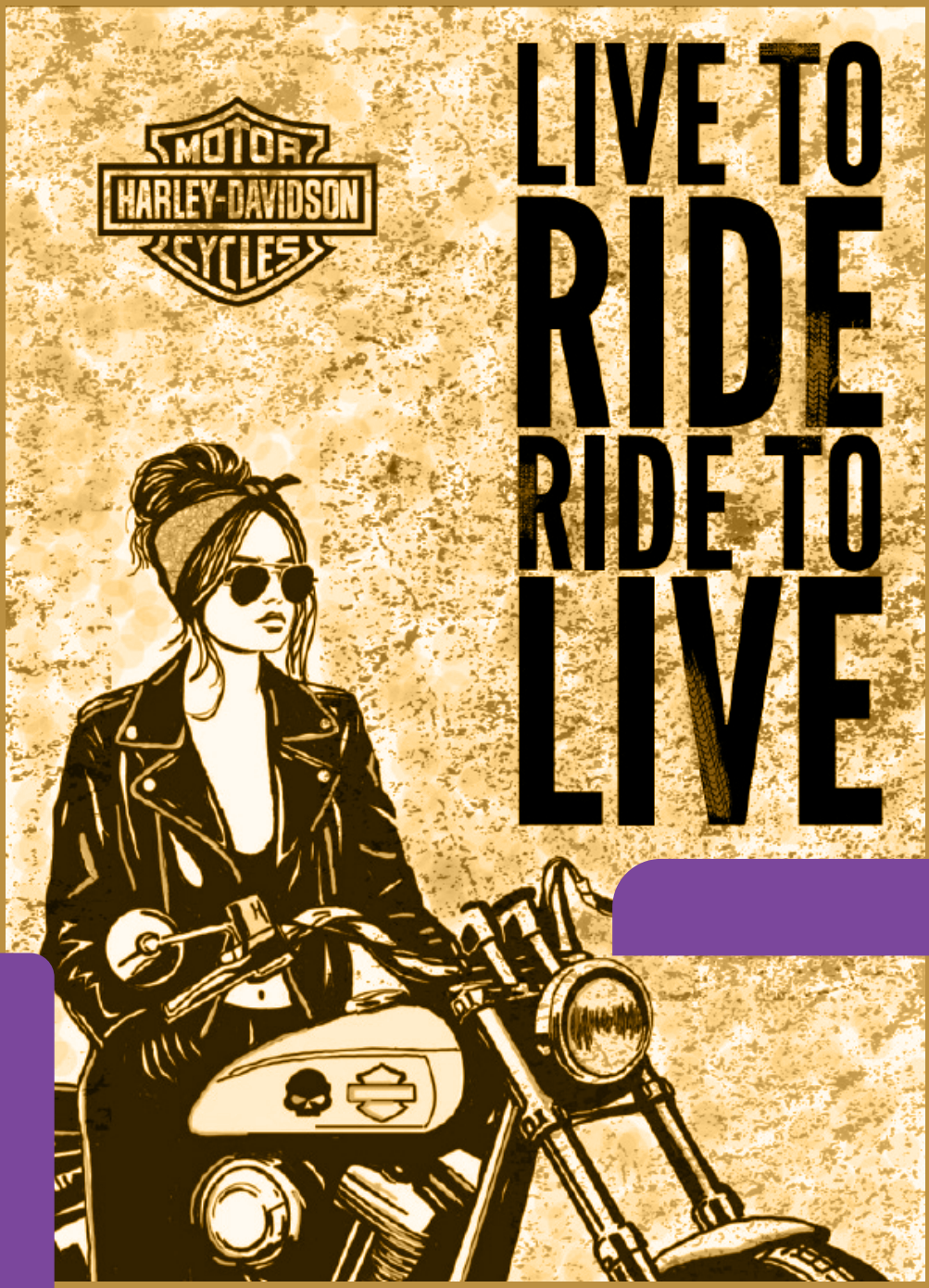
Ethnographic Research: Students began by conducting in-depth research to understand the cultural, social, and historical context of the community they were designing for. This involved studying the community's values, symbols, and practices through a combination of literature review, observation, and participation in community events. The goal was to gain a deep understanding of the community's identity. *Co-creation:* after the initial research, students engaged directly with community members in co-creation workshops. These sessions allowed community members to share their needs, preferences, and cultural symbols that were meaningful to them. This collaboration ensured that the design process was inclusive, with community input shaping the direction of the project. *Iterative Design:* The final stage involved iterative design, where students developed prototypes based on the insights gained. They presented these prototypes to the community for feedback, which was then used to refine the designs. This cycle of feedback and refinement continued until the final product met both functional and cultural criteria.

Learning outcomes

The goal was for students to understand how to identify and address the specific needs and desires of a community, in this case, the women of the Harley community. Students were expected to learn how to apply co-creation to develop more relevant and personalized designs, especially when exploring new communities with limited initial references. Additionally, the goal was for them to experience how incorporating cultural symbols into the design can strengthen emotional connections and authentically represent the community, demonstrating that a collaborative design approach significantly enriches both the process and the final product.

Feedback

Was collected through surveys, interviews, and discussions with both students and community members. Surveys were distributed at key stages of the project, and follow-up interviews provided deeper insights. The feedback highlighted that the cocreation process was crucial for ensuring the design met community needs and resonated culturally. Students learned the importance of ongoing dialogue with the community and iterative design, discovering that real-time feedback greatly enhanced the relevance and authenticity of their final product. This underscored the value of engaging with users.


MOTOR
HARLEY-DAVIDSON
CYCLES
LIVE TO
RIDE
RIDE TO
LIVE

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Curriculum development:

Programa R.E.D.

Enriching and systematizing professional training in design education

Summary

Programa R.E.D. is our response to the purpose of enriching design education by fostering professional experience through a range of interventions. The program exposes each student to at least 6 experiences (one technical and one professional internship, and four other). Since 2016, +1,458 students have collaborated with 258 external organizations. What sets this initiative apart is its systematization and our KPI driven efforts to fulfil our promise

Overview of student project

The course aimed to teach students how to engage with specific communities understand their cultural context, and co-create products that reflect their identity and values. Techniques such as ethnographic research, co-creation workshops, and prototype evelopment were used

to help students connect theory with practice, leading to the creation of culturally resonant designs. This example is of a Biker subculture.

Skills & competencies fostered by the curriculum

Our undergraduate program is based on competencies; thus, the focus is not on the transmission and accumulation of knowledge, but on its application. This involves selecting and using knowledge in solving practical problems like those faced by a professional. Design at UDD declares 20 competencies (8 institutional and 12 specifics to designers) and distributes their development across various courses in the curriculum. Thus, Programa R.E.D. develops the competencies assigned to the courses it impacts (mostly studio courses). Regardless, there are competencies naturally fostered in these settings, including critical thinking, problem-solving, entrepreneurial attitude, creativity, and teamwork, all of which align with industry needs for real-world applications. In recent years, there has also been an emphasis on sustainability and technology as drivers for innovation.

Field-specific learning outcomes

The field-specific intended learning outcomes of Programa R.E.D. focus on preparing students to tackle complex design challenges. These outcomes include developing a deep understanding of design methodologies, mastering advanced design tools and techniques, and cultivating the ability to innovate within various design contexts. The program emphasises critical thinking, communication, collaboration and enabling students to work effectively with multidisciplinary expertise. Currently, there is a strong focus on sustainability and the use of technology to drive innovation, ensuring that graduates are equipped to contribute to the evolving demands of the design industry. This comprehensive approach ensures that students are well-prepared to apply their design skills to create solutions that are both innovative and practical, meeting the diverse needs of the industry.

Curriculum structure

Programa R.E.D. comprises six instances of collaboration with external organizations. These instances include a technical internship at the end of the second year and a professional internship at the end of the fourth year. Additionally, students engage in at least four other instances that may involve collaborative projects, participation in open competitions, or presentations at fairs. This structure provides a balanced mix of theoretical learning

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RED.
relationship. environment. design.

Design School at UDD is aware of the importance of connecting students with the real context of the discipline as early as possible. Our efforts towards that goal that had been permanently developing since 2013 and were systematized in 2016 under the name of Programa RED. This program links the School with public and private organizations enhancing students' experiential learning, and contributes to the generation and transfer of knowledge from academia to the different productive sectors of the country.
The Program seeks to demonstrate how design, interdisciplinary collaboration and innovation contribute to the development of our economy, anticipating future challenges. Through it, institutions may obtain creative solutions and fresh ideas for their needs and problems coming from academia, in addition to being in contact with young talent.

Link Typologies

Competitions

We encourage our students to participate in various competitions, addressing them in different courses of the curriculum according to the themes being contested. Additionally, we organize private competitions with companies and institutions as a way to motivate the development of creative proposals.

Interdisciplinary Projects

We connect with other faculties of the university through the development of joint projects that promote interdisciplinary work or address specific design needs of these units.

Collaborative Projects

We undertake projects in which we establish a direct relationship with public and private institutions, working alongside with our students in collaborative settings with the purpose of solving specific problems. These projects are incorporated into various courses of the degree program, depending on the level of complexity and depth required to address the challenges.

Internships

We promote vocational training by introducing our students to the labor market through Technical and Professional Internships, where they can gain experiential learning and apply classroom knowledge. Additionally, we support the employment of our graduates by continuously posting job opportunities through the UDD Design Alumni Network.

Workflow

We work with organizations to challenge our students and ideate innovation within curriculum.

1 We adjust expectations /
We carry out various meetings between the Director of each major, the coordinators in charge and those responsible for the counterparty involved to understand the challenge and define the project, subject and cycle where it will be inserted.

2 We define the project /
We engage instructors of the courses to ensure the project is approached to meet the defined academic goals.

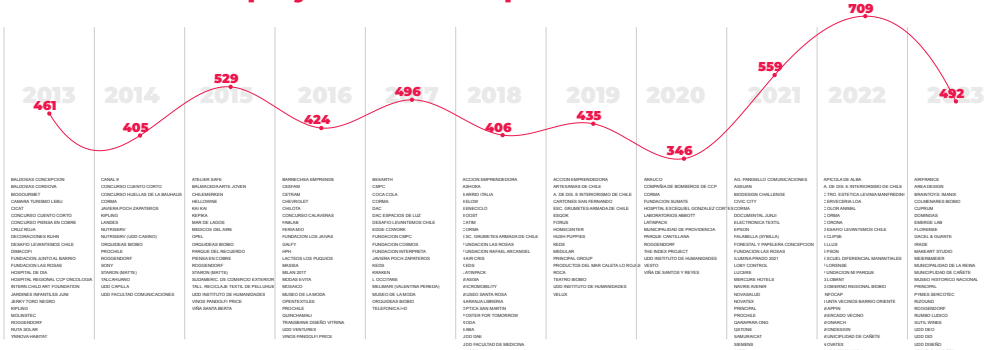
3 We formalize the agreement /
We developed and sign an agreement of Academic Cooperation that sets forth the roles and responsibilities of each of the parties, seeking to safeguard the academic spirit of the collaboration.

4 And we begin/
We set a milestone to begin the project that helps students to investigate about the subject, motivate with the challenge and commit to its development. In this first immersion, the participation of the organizations is essential, as they describe the project in first person, and on several occasions, they receive the students in their own settings.

5 We develop the project /
We pursue that the organizations become involved in the process, this is why they participate actively in intermediate meeting in which they deliver their feedback to students.

6 We Celebrate! /
Each project is a reason to celebrate, we thrive to ensure that the final showcase becomes a closure of the process where outstanding results and the teams involved can be recognized.

Students participation in collaborative projects and competitions



and practical, hands-on experience to solve real problems or needs, and experience in interacting and communicating with external parties. While internships are fixed in the curricula, the other four instances are variable. The structure for collaborative projects, design competitions or design fairs are different, and timeframes are also variable depending on complexity, deadlines and stakeholders.

Curriculum implementation challenges

From the school perspective, one of the most significant challenges is the academic management required to ensure that all students achieve the goal of participating in six different instances. This involves continuous, quantitative, individualized monitoring of each student to ensure they are meeting and progressing towards this objective. From the teacher's perspective, one of the most significant challenges is aligning the academic expectations set by the course description (syllabus, assessment, activities, competencies) with the expectations of external organisations. Another one is synchronizing both schedules. Frequently, organizations have schedules that might not align with the times in which the class meets. However, to facilitate this process, the undergraduate directors usually lead the negotiation. Our experience has led us to establish collaboration protocols.

Conclusions

Reflections on the program suggest that while it successfully fosters essential competencies such as critical thinking and problem-solving, there is an opportunity to further enhance synchronization between academic schedules and external collaborations. Moving forward, continuous refinement of collaboration protocols could streamline project implementations, thereby maximising learning outcomes and better serving both students and industry partners. We've observed that student's motivation is often higher than in traditional academic settings. This is likely due to excitement to work on projects with real-world implementation potential, the enrichment of their own portfolios for further job applications and/or greater exposure of their work through university platforms and communication channels.

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Curriculum development:

Dexagonal thinking for driving innovation in healthcare

Summary

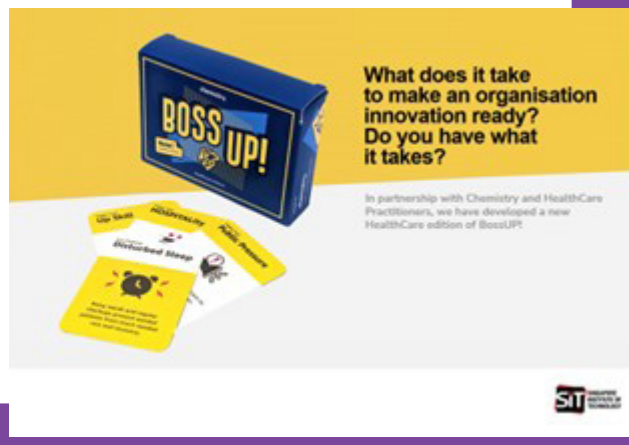
Healthcare, medtech, and pharma are changing rapidly, and at an exponential rate; and they are having to adapt - only hopefully for the better. In the curriculum development of a Continuing Education and Training (CET) program, targeted at adult learners who are professionals in the healthcare sector, we designed a new, integrated, multidimensional, 'Dexagonal Thinking' approach to addressing wicked problems that face healthcare professionals, innovators, and providers daily.

Curriculum development context

To adequately address the challenges our healthcare system faces in the near and distant future, service providers, managers, and leaders must put innovation, not in the rearview mirror, but instead place it directly into the driving seat to shape the future of our healthcare. Two autonomous universities, SIT and NUS, developed this joint-CET programme to respond to constantly evolving industry needs, as well as foster a culture that supports lifelong learning.

Skills & competencies fostered by the curriculum

This curriculum is positioned at a level for any working adults, regardless of their starting qualifications, as long as they wish to continue to build and deepen their skills and competencies, throughout their careers. The strategic positioning, which both universities agree to, is to design and introduce a new, integrated, multidimensional, 'Dexagonal Thinking' approach to participants, which it can enable them to bring back this approach to their workplace to address wicked problems. There are 10 dimensions in 'Dexagonal Thinking': they are Design Thinking vs System Thinking, Exploratory Thinking vs Breakthrough Thinking, Expansive Thinking vs Realistic Thinking, Divergent Thinking vs Convergent Thinking, and Retrospective Thinking vs Futures Thinking.



Field-specific learning outcomes

The field-specific intended learning outcome is to demonstrate multidimensional thinking through a two-fold approach; first, in a gameplay, and second, through project-based learning on real-world healthcare challenges, curated specially for the programme. In the gameplay component, participants were introduced to the BossUp! Innovation card game (Healthcare Edition), co-designed by Design Factory@SIT and Chemistry. The gameplay mechanics and rules were designed to confront players with real-life situations that people and healthcare organisations face daily. Second, real-world challenges were curated as project briefs assigned to participants in the 3-day programme, for example, the topic on "Healthcare Waste Reduction and Sustainability". These projects covered strategic directions such as sustainability, intrapreneurship, parallel thinking, and digital transformation.

Curriculum structure

The programme began with a face-to-face introduction and gameplay session which lasted for 3 hours. Two weeks later, the core content was delivered online via Zoom, across 3 full days. Participants attended several lectures per day in the mornings, and in the afternoon, they worked in teams of 5-6 persons per team, on pre-assigned real-world healthcare challenges. Participants were introduced to Miro as the virtual whiteboard for group work. Facilitators were present throughout the programme to engage participants in several rounds of discussions and sharing. At the end of the programme, teams prepared a presentation pitch each, and that was concluded as the assignment for final assessment to qualify for their certification.

Curriculum implementation challenges

Coordination between the universities can be complex and time-consuming. Aligning the curricula, teaching methods, and administrative processes takes time. Bridging the cultural and institutional differences between universities and healthcare organizations to create a cohesive learning experience can be challenging. The trainers worked fiercely to continuously update the course content to keep pace with the rapidly evolving healthcare industry and technological advancements and that requires significant effort and resources. We are most concerned with the branding and customization of the content because we want the material to be relevant and applicable to the diverse roles and

specializations within the healthcare sector; we want to keep our adult learners, the working professionals, engaged and motivated throughout the course, especially when balancing work, family, and study.

Conclusions

In this inaugural run of this programme, which was a very comprehensive and intense 3- day course, we had 22 participants, who are mid-management to senior professionals from diverse backgrounds, engaged in dynamic learning. The curriculum focused on innovative strategies and practical solutions for contemporary healthcare challenges. Participants collaborated on real-world challenges, explored case studies, and applied theoretical knowledge to real-world scenarios, fostering a culture of continuous improvement and patient-centred care. We will attempt to improve the programme in two ways: first, we will design a 1-1.5 day primer in session where Dexagonal Thinking will be explained and for those who can spend more time and wish to dive deeper into the concepts can still sign up for the 3-day course, but we will convert the learning from online to face-to-face in our next run.

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Teaching & learning methodologies:

Volunteer Management Sandbox
Transformative design thinking in action

Summary

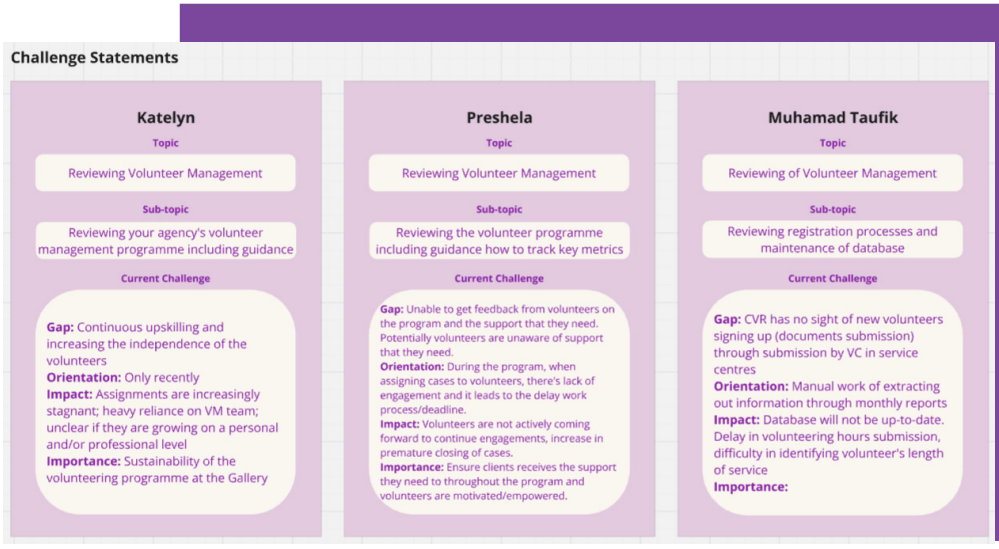
The National Council of Social Service (NCSS) requested DF@SIT with a five-day workshop for Volunteer Managers (VM) on Design Thinking, part of the VM Sandbox project, to boost practitioners' capabilities. The course adopted blended learning, merging active and collaborative learning methods. Participants addressed real-life challenges in teams, engaging in concise lectures, hands-on activities, and feedback sessions to hone creative problem-solving skills.

Context

In a five-day workshop,11 volunteer managers, divided into three groups, engaged in immersive design thinking activities. Sessions, totalling 30 hours, featured weekly meetings from 9 am to 5 pm. A0-sized templates facilitated hands-on exercises, with participants utilising physical tools like Post-it notes and digital platforms like Miro for documentation and collaboration. AI design tools like Ideogram enriched the prototyping process, fostering innovative solutions.

Methodologies, techniques & implementation

The workshop employed active and collaborative learning methods, well-suited to participants' expertise, fostering enriching cohort discussions and feedback exchanges. Instead of merely commenting, the facilitator guided participants through the design thinking process, elucidating each exercise's purpose. Structured around Discover, Define, Develop, and Deliver stages, the workshop allowed participants to select problem statements, form groups, and engage in hands-on activities. Initial tasks involved documenting contextual challenges, followed by stakeholder mapping, user research, and intergroup interviews. Informal presentations facilitated iterative validation and refinement, complemented by a user journey map demonstration. Participants revisited tasks independently and engaged in post-presentation discussions. The ideation stage, incorporating SCAMPER and sorting, proved effective. The workshop culminated in AI prototyping, intergroup user testing, and pitching to panellists, showcasing innovative solutions.



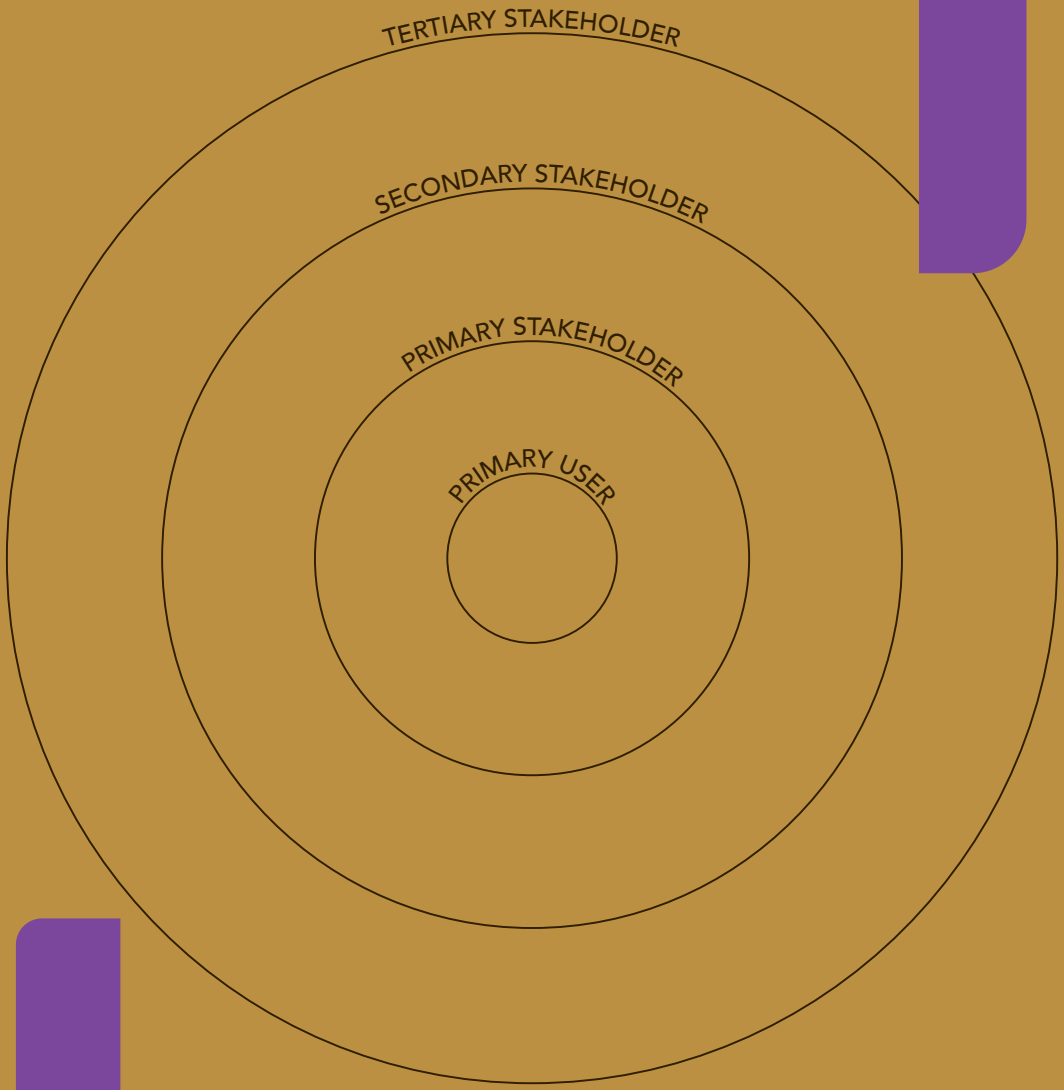
The intended learning outcome of the methodologies

The workshops aimed to enhance participants' problem-solving abilities through design thinking within a blended learning framework, fostering critical thinking, creativity, and collaboration. Volunteer managers collaborated to apply design thinking in their workplaces, aiming to improve processes and outcomes. This aligns with NCSS Volunteer Resource Optimisation (VRO)'s goal of enhancing Volunteer Management Practitioners' capabilities through innovative solutions in the VM Sandbox project, fostering efficiency in volunteer management. The methodology integrated active and collaborative learning to engage participants with real-life problems, promoting deeper understanding and practical application of theoretical concepts. Ultimately, these methods sought to improve engagement, facilitate knowledge acquisition, and develop practical skills in problem-based contexts, benefitting both.

Feedback

At the end of the five-day workshop, we collected feedback from students through a mandatory survey (quantitative). Before concluding each workshop, participants submitted their responses using Post-it notes or provided feedback on the methodologies used by writing on the designated feedback paper displayed on the wall (qualitative). This interactive feedback collection method ensured that participants could easily share their insights and perspectives before leaving. Additionally, we gathered feedback from the organising partner, NCSS, to further evaluate the effectiveness of the approach.

STAKEHOLDER MAP



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Teaching & learning methodologies:

Supporting student development of teamwork competencies in problem-based learning

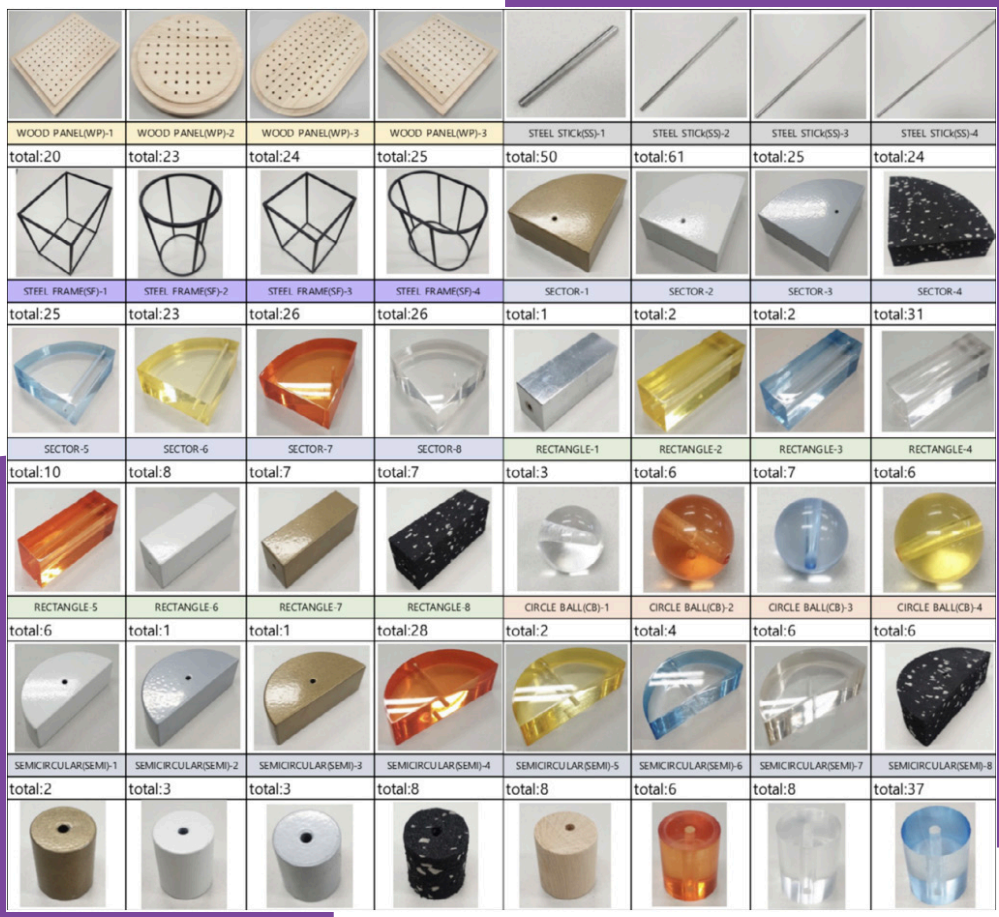
Empathy-Oriented Prototyping Toolkit

Summary

This study examined the effectiveness of a new empathy-oriented prototyping toolkit that was carefully developed to aid empathy gaining in students who find it difficult to express their ideas using only traditional paper-based prototyping materials. The toolkit has a simple structure and uses basic geometric, three-dimensional forms. I have used this toolkit for the Design Thinking courses and workshops for master's and bachelor's.

Context

Students used it for early rapid prototyping stages that has benefits for translating their ideas faster compared to the materials usually used in rapid prototyping. The toolkit substitutes the items used in paper-based prototyping, such as construction paper, glue, scissors, paper cups and permanent markers. Students' thoughts are expressed in three-dimensional forms while they empathise with other students through conversation. It is more sophisticated and easily accessed.



Methodologies, techniques & implementation

(1) explain the components of the developed toolkit, (2) provide a specific curriculum guide, (3) show the results of student experimentation with the toolkit in the prototyping stage of the design thinking workshop process, and (4) demonstrate the toolkit's effectiveness by observing the students' creations and statements. Open coding and selective coding were used to analyse the themes that emerged from the interviews with students who participated in the workshop. We argue that the new prototyping toolkit can significantly promote students' creativity and design sensibility. In terms of feedback, I have considered future directions for advancing the use of this toolkit to be more movable and sensorial.

The intended learning outcome of the methodologies

We developed a novel prototyping toolkit that provides students with easy access to a variety of tactile sensations that foster their creativity and design sensibility. We expected this toolkit to overcome the limitations of paper-based prototyping tools. The new toolkit consists of basic geometric three-dimensional forms and a wide range of materials in different shapes, textures, colours and compositions. The new toolkit is more sophisticated than traditional ones, yet it retains the same goal of allowing students easy access to rapid prototyping. We believe that this novel toolkit could help students overcome the fear of making or creating and enhance their creative confidence and design sensibility as they build shapes and forms and match materials and colours.

Feedback

Many students commented that they enjoyed making something using the new toolkit, as it was possible to create without the need for much time and deep thought. A special aspect of this toolkit is its simplicity; the participants played with the blocks and placed them however they wanted. A simple toolkit enables anyone to express their ideas in a simple but compelling way.

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Curriculum development:

A visual design process for the development of an integrated curriculum for 21st century learning

Summary

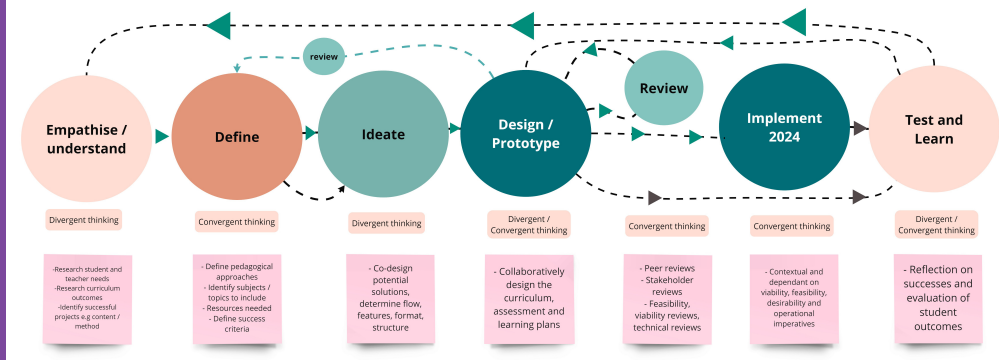
We are investigating real-world challenges of preparing students for the future within a traditional structured education system. The context of the research is a university-high school partnership aimed at furthering experiential learning curriculum by including technology and 21st-century skills. This is achieved through integrating subjects in a multidisciplinary approach. Visual design methods are used as the catalyst for developing an integrated curriculum.

Context

Teacher/participants in the study developed an integrated curriculum for secondary school students in middle high school, at two independent traditional schools in Melbourne, Victoria, Australia. The teacher/participants were invited to engage in a visual co-design process and used collaborative software Miro Board, to facilitate the construction of a shared language across subject silos for building capacity in the curriculum development of integrated subjects.

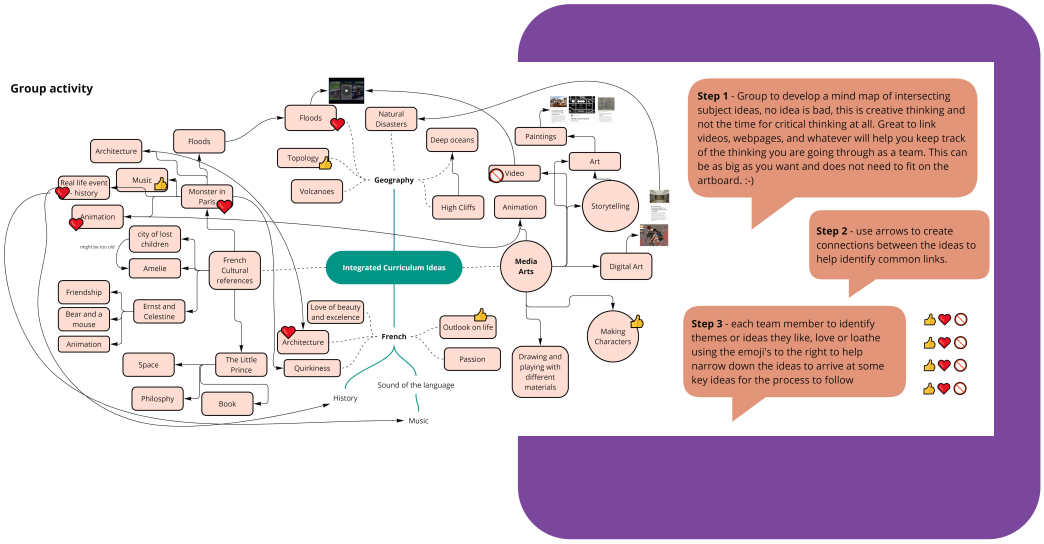
Skills & competencies fostered by the curriculum

The skills and competencies the curriculum aims to address include capabilities outlined in the K-12 Australian Curriculum. This includes critical and creative thinking, digital literacy, ethical understanding, personal and social capabilities and the cross-curriculum priority: sustainability. The skills and attributes are connected to the Design Factory Melbourne (DFM) curriculum that aims to build a generation of responsible global innovators. The activities in DFM include integrated and multidisciplinary teams working together to create innovation that informs the applied and integrated aspects of the curriculum development project. Approaches such as problem-based learning, design-driven and interdisciplinary experiential learning (Kolb, Dewey) and fostering a learning culture for students to experience the shift from novice to expert by contributing to authentic challenges.



Field-specific learning outcomes

A literature review revealed scant process documents around developing integrated curricula in secondary education, particularly in an Australian context. Principles of curriculum development were adapted and interwoven with visual design methods to create a novel process for authentic integrated curriculum development. Teachers/participants gained both a deeper knowledge around principles of integrated curriculum and sessions were planned around important linking pedagogies with learning outcomes including the development of a shared visual language. The novelty in this research is that the teachers gained new design literacy by participating in the professional development sessions where they collaboratively developed the integrated curriculum. Interviews, surveys and observations were conducted with stakeholders participating in and supporting the project to gain insights.



Curriculum structure

The curriculum structure for the professional development sessions for teachers was built around visual design process activities with the goal of developing an integrated curriculum. This was a co-design process with secondary school teachers collaborating across disciplines that used collaborative design software Miro Board. When teachers worked through the process, they would develop an integrated subject and then develop each unit's curriculum structure accordingly. The curriculum structure of each integrated subject was built with a vision to include transversal skills informed by 21st century learning and sustainable development goals. The implementation and structure of these

integrated subjects ultimately varied and were highly dependent on student interest, staffing, infrastructure and contextual situation of the schools involved.

Curriculum implementation challenges

One of the biggest pain points for teachers is time to develop the curriculum. While this project attempted to ameliorate this, it continues to be an issue that needs to be resolved across the K-12 area. Recognition of the unprecedented challenges faced by educators is needed along with support by governments to invest in curriculum development, and recognition that teachers need more time to develop content and curriculum that responds to our continually changing world. Providing more development hours for teachers vs more face-to-face teaching hours is a crucial step in supporting future generations of teachers, students, and society.

Conclusions

Working across disciplines and respective learning silos is challenging. While the Australian curriculum policies discuss the need for integrated learning in practice in high school, there are competing factors including a school's capacity to enact the curriculum. The curriculum developed in this project is undertaking iterations for 2024 and 2025. Early signs indicate that teachers and schools recognise the value of integrated curriculum and its connection to 21st-century skills. Improvement in the implementation and delivery of the curriculum is most likely if teachers are given ongoing time and support to develop it. As the driving force for any change, planning for teacher progression and self-learning, pace of implementation and nuances in school policy are all factors that in practice reveal themselves in the development and implementation of the curriculum.

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Curriculum development :

Prototyping democracy

An experiment in design thinking and civic education

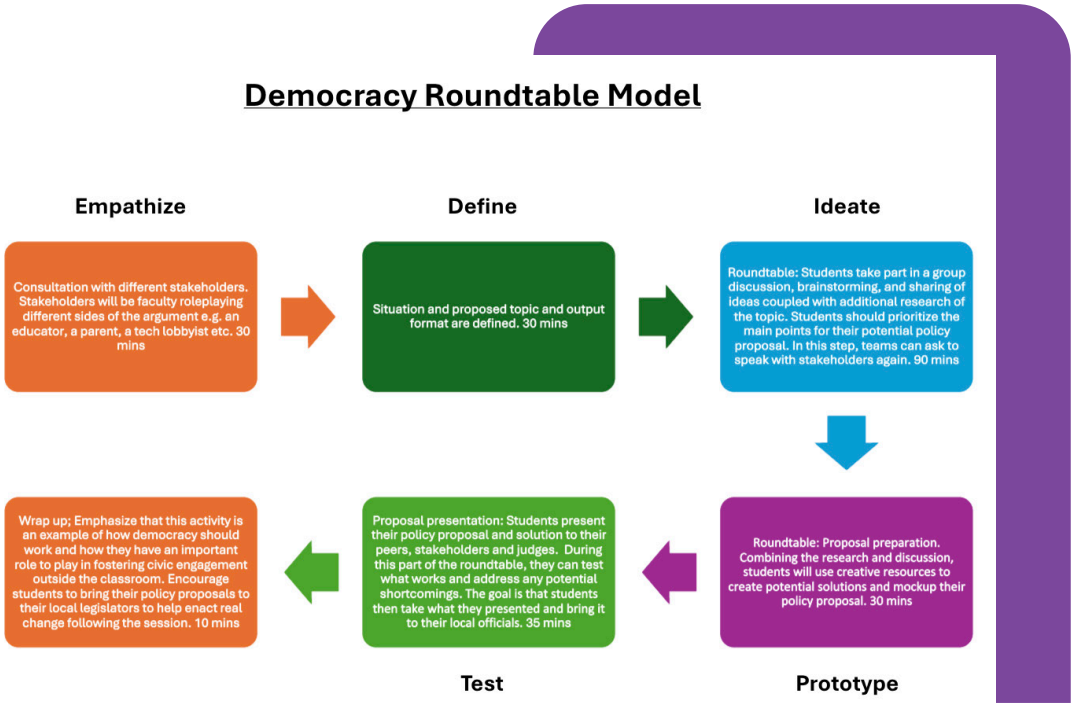
Summary

Young people have the power to change democracy. However, recent surveys show they have less and less trust in it. The Democracy Roundtable experiment aims to address this issue by teaching civic education in a more engaging way, driven by Design Thinking, through an exercise to "prototype democracy." The idea is that Democracy is a tool for change if citizens participate in the democratic process by co-creating legislative solutions for their communities.

Context

The Democracy Roundtable originated within the "America The Possible Project" a collaboration between the American Bar Association, St. John's University, and advertising experts to understand how to engage young people in democracy and drive civic engagement. We targeted

high schoolers because they are becoming first-time voters, and civic education is finding less room in school curricula. We enrolled students from three local High Schools.



Skills and competencies fostered by the curriculum

The skills include empathy, understanding complexity, and prototyping.

• *Empathy:* Students are exposed to disagreeing stakeholders and invited to connect emotionally with spokespersons to embrace and see their various angles and perspectives on the issue at stake.

• *Understanding complexity:* the format encourages students to understand the complexity of the issue (trade-offs, conflict, need to compromise) and develop an iterative problem-solving strategy through iteration and feedback

• *Prototyping:* By crafting and visualising policy proposals, including their rationale, applicability, and enforceability, students can engage with the issue with a maker attitude that goes beyond acquiring passive knowledge about how the legislative process works.

Field-specific learning outcomes

Engage students in civic education by prototyping proposals around an issue relevant to them and their local community. Motivate students to actively engage by encouraging them to take what they create in the experiment to their local elected officials. Create a blueprint for other Design Factories and universities to implement Democracy Roundtables. Use a Design Thinking model to create a more effective pedagogic approach to reach civic education.

Curriculum structure

We hosted 30 students from two local high schools during our first roundtable. The half-day version of the format starts with presenting the issue from disagreeing stakeholders acted out by faculty advocating for and against the topic. Students then work in small teams to discuss and research the topic and decide their position. In our first roundtable, students discussed "Local Government Approval of Age Verification for Social Media Use." Students are given craft supplies to draft their ideas before presenting them to their peers and judges. The aim is for students to understand the nuances of the problem better, revise and discuss ideas, abandon or at least criticise ideological assumptions, and propose solutions pragmatically. For example, one team recommended that children under eight shouldn't have social media access without parental permission.

Curriculum implementation challenges

Significant challenges include the process's scalability and the topic selection. The issue must be relevant, engaging, and within reach. Scalability involves defining the teams and group sizes and the optimal duration of the experiment. We will work with local high schools to address these challenges and understand what topics interest them. Letting the students lead on the topics ensures we create a platform and safe space for them to share how issues impact them locally and nationally. Furthermore, by contacting teachers in social studies, as we did with our first roundtable, we will be able to capture students with an understanding and curiosity for civic engagement. Regarding scalability, we will experiment with different group sizes and session duration.

Conclusions

Democracy is in danger. Now more than ever, we need to build awareness about how democracy works. By "prototyping democracy," we can better engage young people in civic education, mobilise students to take action for democracy, and create the blueprint for other universities. Through the roundtable, the students are simulating democracy and experiencing its complexity. In future roundtables, we hope to be able to survey and interview students to gain not only their insights on democracy but also if this experiment changed their perspective and, if so, how. Secondly, this project exemplifies our mission as a Design Factory around prototyping, problem-based learning, and design-thinking infusion within the syllabi. The roundtables will become an extension of our goals with the Design Factory and further foster innovation and entrepreneurial thinking for social innovation.

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Student contributions & outcome reporting in theoretical & problem-based courses:

I used to engineer... ...and now I design

Summary

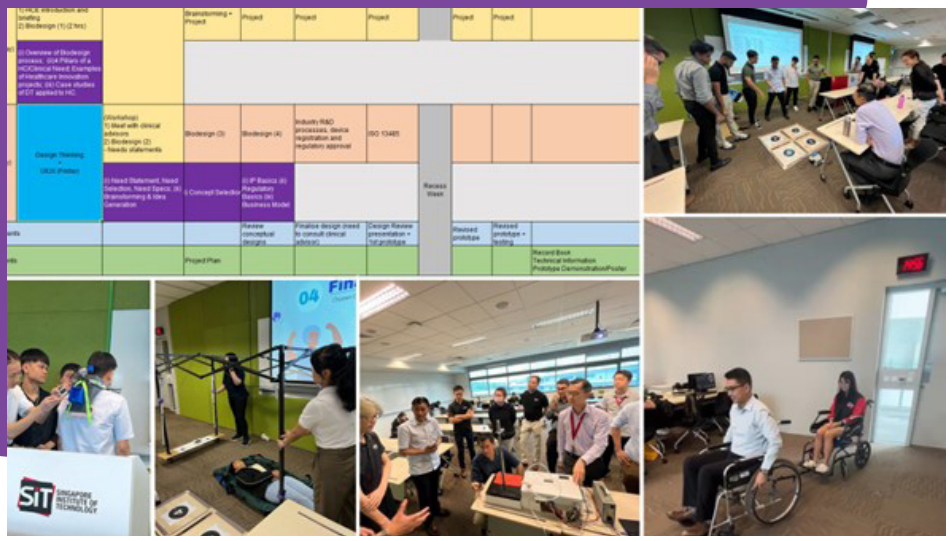
Engineering curricula often include practical projects that allow students to apply theoretical knowledge. Collaborative projects in healthcare, involving academia/industry, offer valuable real-world experience beyond typical assignments. In this article, the authors discuss weaving design education methods into a mechanical engineering module. Their experiences cover objectives, benefits, challenges, and lessons learned from educational, teaching, research, and industry perspectives. These insights can motivate and guide other institutions and companies planning similar collaborative projects.

Overview of student project

Students will apply an iterative approach to their typical engineering design process, however, there is a strong emphasis on the needs-finding process, and students consider marketconsider about market analysis and business models. These topics help equip students with the skills needed to think about how they could possibly commercialize their future innovations. This entrepreneurial aspect is a key differentiator from other PBL.

Key outcomes, intended learnings & student deliverables

The students will apply design thinking principles in this module and the contents will include appreciation of clinical concepts, the Stanford Biodesign process, regulatory registration/approval and classification, ethical consideration, industry practices, and prototyping of healthcare solutions. Students are required to apply these approaches to work on their group assignment which is a healthcare challenge provided in class. Next, by integrating Biodesign with their engineering and design skills, students are expected to work in teams on a group project to establish a substantial and clearly framed problem to solve, propose feasible designs, to screen the concepts and to prototype a sound engineering solution. Students are expected to communicate effectively by pitching their solutions to a panel of stakeholders including healthcare professionals, engineers/technologists, industry partners and technopreneurs. The students are required to submit technical reports for both the individual assignment and group project which will enhance their technical writing and communications skills.



Assessment of learning outcomes

Students will need to submit an individual report on the need statement, DTSM and gap analysis (based on Biodesign Process). At the endAt end of term, students in groups of four to five members, are required to integrate Biodesign with the engineering design process to define, design, screen and propose an engineering solution. The students are to refine the healthcare need statement and develop the need criteria. Students will present and demonstrate the functionality of their prototypes. They will pitch the solutions to a panel of stakeholders and also submit a report and e-poster for their projects.

Stakeholders involved in the initiative

The feedback from industry partners was very positive. All of them understood that balancing students' educational goals with the practical needs of industry partners can be tricky. Industry partners often require projects that deliver tangible results, while educational objectives emphasize broad learning experiences, including developing critical thinking. We managed to achieve a balance by selecting those thatselecting that have clear, achievable goals but also incorporate elements that challenge students to think creatively and apply their theoretical knowledge in diverse ways.

Project relevance & personal impact

As an educator, project-based learning (PBL) transformed my teaching. It energized classrooms, with students actively participating due to real-world relevance. PBL shifted my focus from content delivery to facilitating experiential learning. We became guides, not just professors. Authentic assessment of skills beyond exams revealed students' growth in problem-solving, teamwork, and adaptability. Collaborating with industry enriched our teaching through real-world insights and mentorship. PBL's dynamic approach equips our engineering students to the VUCA world while invigorating educators.

Conclusions

From the Stanford Biodesign innovation process, where the emphasis is on a rigorous and systematic process for identifying and validating needs, ensuring that the problems addressed are both significant and solvable, working alongside different disciplines, supports the transformation of engineering students from linear thinkers into innovative, critical thinkers capable of tackling complex, real-world problems. From regular feedback sessions where students present their progress, receive critiques, and iterate their designs accordingly, they were able to move away from linear thinking.

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Scaling support for innovation projects

Toolkits for needfinding, reframing, ideation and experimentation

Summary

Project-based courses and design sprints are becoming increasingly popular, growing the demand for supporting teams. To complement the workshops our Aalto Design Factory staff run, we've developed four open-access toolkits to help students and other project teams run workshops for need-finding, reframing, ideation, and planning experimentation. Users can use toolkits as they are, or pick and choose different activities or adapt them to their own use.

Experiment conduction & methods

The open-access toolkits all include a handbook explaining the different methods used in the workshop, printable and online templates for different exercises such as stakeholder mapping or brainwriting, as well as a cheat sheet to keep track of things during the workshop. All of the exercises build on activities we've run in our teaching and draw from our experiences with predominantly multidisciplinary master student teams and executive education.

Objectives & outcomes of the experiment

The ideation and experimentation planning toolkits were created during the pandemic, born from an acute need to support remote collaboration in a scalable manner. The need-finding and reframing toolkits were added in 2024, with a particular focus on promoting inclusivity and conversations among diverse teams to create a shared understanding of project goals and opportunities. The toolkits have been designed to be used either as support for the entire design process or for particular steps. The toolkits describe a few of the methods we love and use in various contexts, but we encourage everybody to customise their sessions with any other methods they would like to use depending on the people present, available time, and desired outcomes. All toolkit materials are licensed under the CC BY License, which means that anybody is free to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator.

Key learnings & conclusions

While the toolkits are available and free for everyone to use, we have noticed two added benefits: the toolkits have been a flexible support resource when force majeure conditions have shifted classes online on short notice and have also been helpful in onboarding new collaborators as a showcase of selected methods we use. In our own teaching, we have noticed we more often use individual templates and sections of the toolkits rather than the whole packages, and have developed templates for alternative methods in the same look and feel. One challenge with the open-access nature is ensuring variety - students may have already used the methods in other courses. A first step in addressing this has been increasing sharing across courses which methods we use to limit overlap and teach students a well-rounded variety of methods.

A” TOOLKITS FOR CO-CREATION

Aalto University
Design Factory

DF GN

Project-based courses and design sprints are becoming increasingly popular, growing the demand for supporting teams. Aalto Design Factory has developed four open-access toolkits to help students and other project teams run workshops. look at challenges from multiple angles, create diverse solution options through the ideation toolkit, and help plan how to bring initial ideas into something you can try out through the experimentation toolkit. You can use toolkits as are they are, or pick and choose different activities or adapt them to your own use.

The toolkits for needfinding, reframing, ideation, and planning experimentation all include

- **a handbook** explaining the different methods used in the workshop
- **printable and online templates** for different exercises
- **a cheat sheet** to keep track of things during the workshop

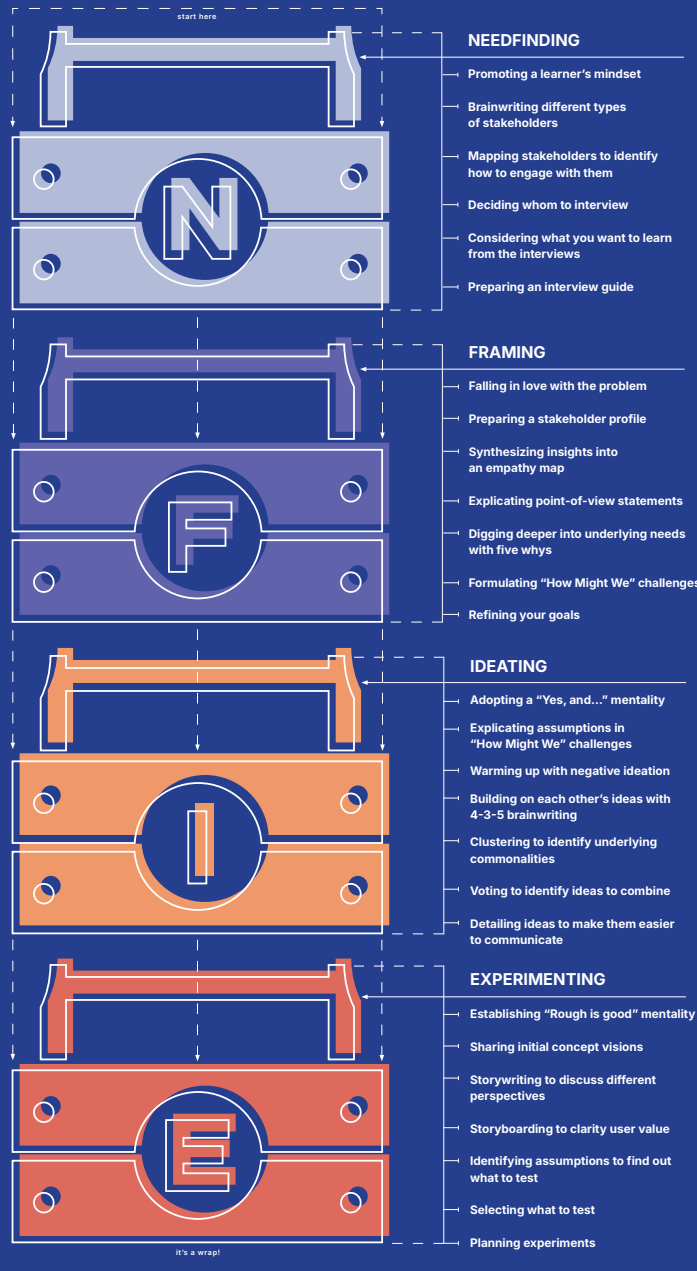
Needfinding provides a deeper understanding of stakeholders' needs and motivations, crucial for the success of new products, startups, and organizational changes. Empathizing with stakeholders' motivations helps understand their behaviors.

Framing the challenge is essential in design, as it questions assumptions about goals, audience, and purpose. By making assumptions explicit and exploring options, teams achieve clarity and shared understanding, setting the stage for successful solutions.

Ideation methods, in turn, help to move beyond easy and obvious solutions. Considering wild ideas can lead to smarter, more novel, and successful solutions. The ideation toolkit guides teams through steps to generate diverse ideas and is freely available for anyone aiming to develop better solutions.

Early experimentation aims to maximize learning about what works, what doesn't, and why. This low-cost, low-stakes approach allows for adaptations before major investments. The experimentation toolkit guides teams through steps to develop an experimentation plan.

designfactory.aalto.fi/toolkits/



NEEDFINDING
- Promoting a learner's mindset
- Brainwriting different types of stakeholders
- Mapping stakeholders to identify how to engage with them
- Deciding whom to interview
- Considering what you want to learn from the interviews
- Preparing an interview guide

FRAMING
- Falling in love with the problem
- Preparing a stakeholder profile
- Synthesizing insights into an empathy map
- Explicating point-of-view statements
- Digging deeper into underlying needs with five whys
- Formulating "How Might We" challenges
- Refining your goals

IDEATING
- Adopting a "Yes, and..." mentality
- Explicating assumptions in "How Might We" challenges
- Warming up with negative ideation
- Building on each other's ideas with 4-3-5 brainwriting
- Clustering to identify underlying commonalities
- Voting to identify ideas to combine
- Detailing ideas to make them easier to communicate

EXPERIMENTING
- Establishing "Rough is good" mentality
- Sharing initial concept visions
- Storywriting to discuss different perspectives
- Storyboarding to clarity user value
- Identifying assumptions to find out what to test
- Selecting what to test
- Planning experiments

Integrating new technologies into PBL

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Teaching & learning methodologies:
Integrating AI tools into Project-based learning & teaching

Multi-modal AI tools for design thinking

Summary

Our contribution presents a tailored methodology for introducing students and professionals to AI image-generation tools within the design thinking process. By demystifying these technologies and presenting them in a manner relevant to their fields, we acquaint participants with a basic understanding of their functionalities, enabling them to adapt and combine these tools into design thinking processes within their own scenarios and workflows (multimodal learning).

Context

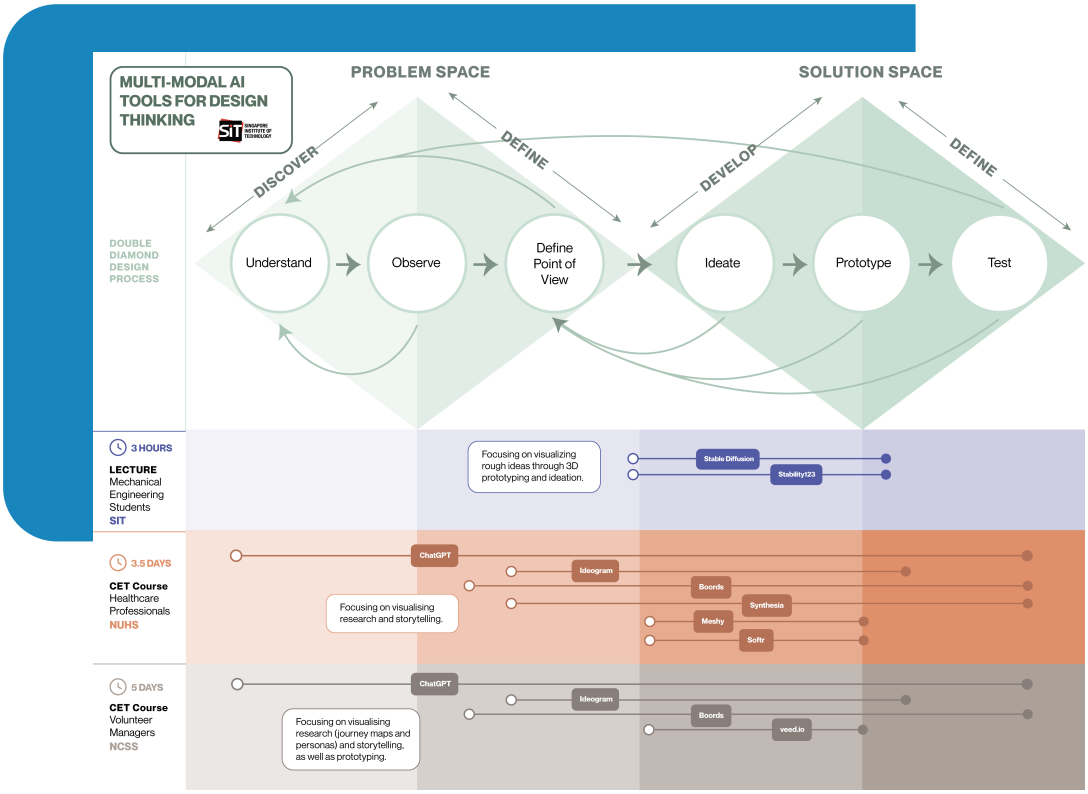
In February 2024, we piloted this as a lecture for 126 Mechanical Engineering students at SIT, focusing on using AI in ideation and pre-prototyping. In May 2024, it was adapted for a three-day CET course for Healthcare Professionals (HPs) and a five-day course for Volunteer Managers (VMs), both focusing on design thinking with an emphasis on AI in storytelling and crafting narratives.

Methodologies, techniques & implementation

The delivery of our methodologies varied according to participants' backgrounds and professional contexts. We did not collect data directly but adapted the course and software to target their workflows and fit their role requirements in their day-to-day lives. For the students, we focused on visualising rough ideas through 3D prototyping and ideation, while we concentrated on pitching solutions to address challenges within their social enterprises or hospitals for the VMs and HPs. The course was structured as follows: 1. A foundational overview of AI software was provided, including explanations of their operation, relevance, and simplified algorithms, supported by relevant case studies. 2. We conducted live demonstrations of multiple software used in tandem with each other, focusing on multi-modality. For Mechanical Engineering students, Stable Diffusion and Stability123 focused on ideation and 3D visuals, while Ideogram and Boords.ai (among others) were used for storytelling with the VMs and HPs. 3. Participants applied their learning through guided exercises in rapid prototyping, followed by discussions, reflection and questions that fostered collaborative learning.

The intended learning outcome of the methodologies

The intended learning outcome was to equip participants with a comprehensive understanding of AI image generation tools within the design thinking process. We aimed to demystify AI, enabling participants to use these tools for ideation, rapid prototyping, and adapting them to specific workflows, ultimately integrating AI as a creative and practical problem-solving tool. One challenge was the technical complexity and time constraints. To address this, we also sent out an installation guide with tips, tricks and helpful links for them to review in their own time. Additionally, due to participants' limited experience with AI and time constraints, ethical discussions were informal. Nevertheless, we focused on a 'human-in-the-Loop' approach, or subjective judgement, emphasising the creation of clear, precise prompts and the importance of reviewing and adjusting outputs to correct biases.



Feedback

Feedback was collected through a reflective sharing session (qualitative) and a post-course survey (quantitative). The students appreciated the live demonstrations and exposure to open-source AI but preferred more targeted case studies. The VMs and HPs were intrigued by the online AI resources and enjoyed the interactive exercises for generating storyboards. Future iterations of the course could place further emphasis on the application of specific AI tools within the fields, workflows and contexts of the participants, as well as dive into ethical challenges and considerations.

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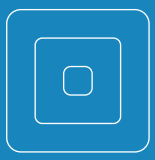
Teaching & learning methodologies:

Designing AI-powered applications

Summary



Integration of AI Tools in Project-Based Learning and Teaching: Strengthening the ideation stage for mobile app creation, allowing students to expand their ideas and projects with all the possibilities that AI tools can offer.

Context

The workshop was part of a project on UX/UI design. It was conducted over 12 weeks with nine hours of in-person sessions per week. The participants were primarily fourth-year industrial design students with varying levels of familiarity with AI. All the time, they worked with a design thinking methodology, and as a requisite, students were required to complete an introductory Google certification on generative AI to ensure they had a foundational understanding.

Methodologies, techniques & implementation

Parallel to UX/UI design concepts, students begin to explore the fundamentals of generative AI, present current world applications, and engage in short ideation exercises involving AI. Subsequently, each student proposes their own AI-enhanced project, comprehending and expressing the technology to be used with graphics. For example, one team worked on an AI-enhanced drumming app. They conceptualised an AI system that detects the hertz of sounds played by the user, identifies the specific drum being used, and generates additional related sounds. This process was expressed through detailed input and output diagrams, outlining the data fed into the AI and the expected results. The project culminated in a Figma prototype, showcasing the practical application of AI in enhancing the user experience.

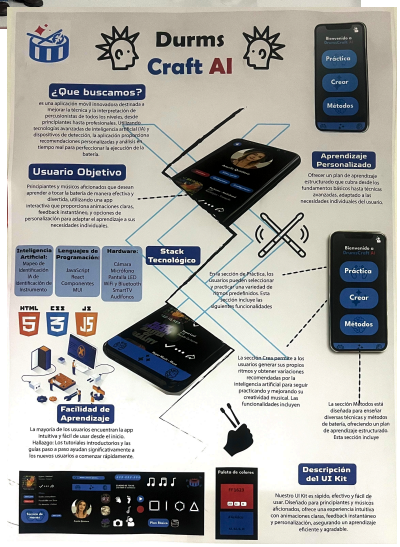
The intended learning outcome of the methodologies

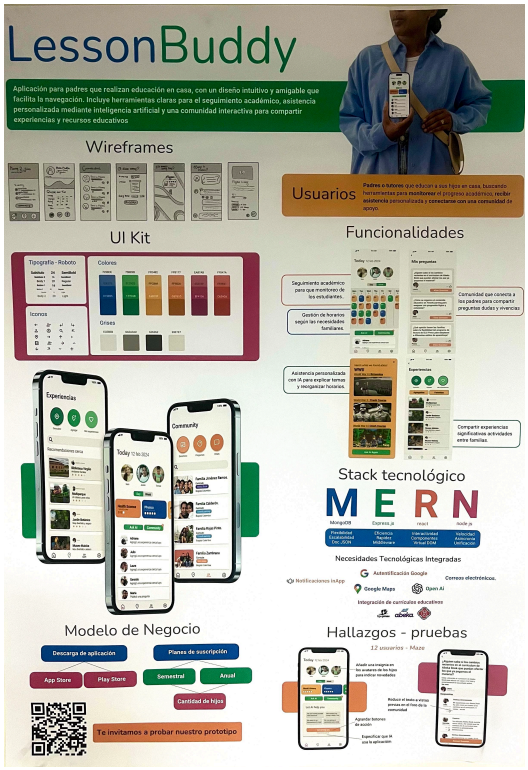
The workshop was directly aligned with the learning objective of enabling students to create standout mobile app projects. By incorporating AI, students explored new ways to add unique value to their applications. Although students were initially concerned about the technical aspects of back-end development, we guided them to focus on understanding the potential of AI and proposing how it could solve design challenges. Their primary task as designers was to clearly articulate the possibilities of AI and create comprehensive diagrams that mapped out how AI would interact with user inputs to produce specific outputs. This approach allowed them to maintain their focus on a design process while effectively leveraging AI's capabilities.

Feedback

Student feedback was collected at three points throughout the workshop, primarily through retrospectives. One key piece of feedback was that while students were initially excited about the possibilities of AI, they found the pace challenging, especially when trying to integrate AI tools into their design process. This feedback led to restructuring the workshop, slowing down the pace in later sessions to allow for deeper exploration of AI concepts. Students are more attracted to the digital world after the project and have ideas they want to pursue as their own ventures.

Integrating AI Tools in Project-Based Learning for Mobile App Design





LessonBuddy
Wireframes
WIREFRAMES

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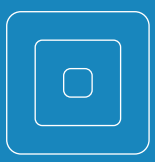
Teaching & learning methodologies:
Integrating AI tools into Project-based learning & teaching

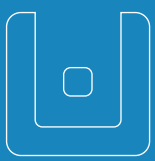
Critical Design Futures Thinking and GenAI in Interdisciplinary Design Innovation

Summary



This paper discusses our research on integrating a newly developed Critical Design Futures framework in a Design Innovation module for varied programmes and a Digital Media Production module for Hospitality Business. Students use practical foresight methods and GenAI tools to develop their critical competence, design dexterity and futures flexibility. This significantly bolsters students' capabilities, particularly when engaged in a Future of Hospitality-themed project.

Context



The first module is for Year Ones, with seminars every fortnight, while the second is for Year Twos, with 2-hour weekly seminars for 12 weeks. Students engaged stakeholders to address problem statements. The task involved envisioning and creating an "Artefact of the Future"

where the identified problem has been resolved. Students will work on scenario planning, trend analysis and signal scanning. Students will also create videos to demonstrate their digital prototypes.

Methodologies, techniques & implementation

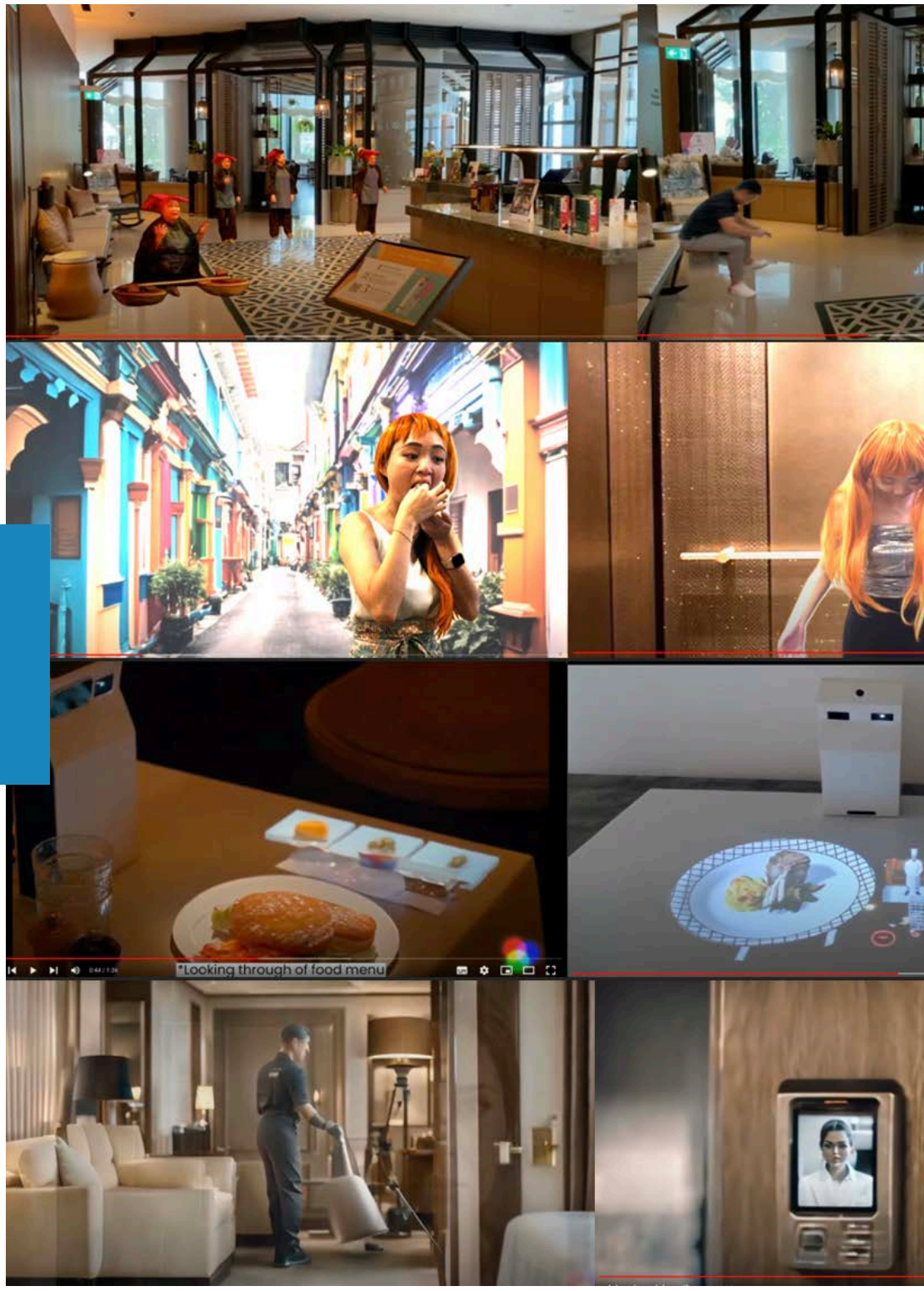
The module uses practical foresight methods and GenAI tools under the CDF framework to develop students' critical competence, design dexterity and future flexibility. The study hypotheses that participation in this module significantly bolsters students' capabilities in these areas, particularly when engaged in a Future of Discipline-themed project. Additionally, the strategic integration of GenAI tools within the CDF framework enhances students' intellectual agility, empowering them to innovate and design viable solutions for an industry client. Our methodology includes surveys and multimodal and thematic qualitative analyses to study the effectiveness of CDF and GenAI tools in cultivating future-ready graduates. Students were evaluated on the depth and relevance of research, CDF thinking applied in their prototypes/videos, the plausibility of a future scenario, creativity of concept and feasibility of the prototype features. Refer to the attached document for details of sub-tasks and assessment/grading criteria.

The intended learning outcome of the methodologies

The pedagogical strategy aims to elevate students' abilities to ideate and innovate, particularly in anticipating and designing solutions for industry-specific challenges.

Feedback

Many students felt they had embarked on a transformative journey, acquiring a rich set of skills ranging from thinking and digital literacy to technical proficiencies like coding and data analysis. Their reflections highlight the essence of adaptability and the continual learning cycle, especially as they navigated the evolving landscapes of technology and methodologies. More importantly, the students shared how they could venture beyond the present by leveraging critical, design and future thinking to anticipate and sculpt future trends and challenges.


*Looking through of food menu

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"Reality can be fun." Videogames research seedbed

Summary

In this presentation, we'll discuss our "research seedbed" in video game design, showcasing our interdisciplinary approach. We merge interactive experience design, character and environment design, 3D modelling, animation, and programming to craft high-quality game prototypes. Our emphasis lies in creating original narratives deeply influenced by our local culture, and raising awareness about social or environmental issues. In a gaming industry often lacking cultural diversity, we aim to spotlight Colombian identity through unique interactive experiences.

Reflections, insights, & paradoxes

From representing marginalised communities to reflecting on environmental conservation, our video games serve as a window to debate and reflect on these issues. As can be seen, video games can be powerful tools to encourage discussion about various aspects of our society. By adopting this perspective, our students have the opportunity to create experiences that not only entertain, but provoke conversations about

various topics from a local perspective. This initiative is integrated into the Industrial Design program at Universidad Javeriana, specifically with an emphasis on Digital Design. It is developed within an 18-week course, where students must design a video game that adopts a local and authentic perspective, breaking with the homogeneity that characterises the market, where most titles are created from a globalised and dominant perspective. This approach seeks to promote diversity in video game design, offering experiences that reflect the cultural richness and uniqueness of our region. Here are some outstanding examples:

Recolecta Moral: This game puts the player in the shoes of a farmer who grows coca, facing threats and challenges that reflect the reality of this activity. Through a simple mechanic of harvesting and stealth, the player experiences the tension and fear that these farmers live.
Darien: In this visually stunning platform game, the player adopts the perspective of a migrant crossing a dangerous jungle, symbolising the controversy surrounding this route. The simple but effective narrative allows the player to reflect on the plight of the migrants.
Hizca: This virtual reality project aims to raise awareness about the importance of caring for the páramo, a uniq

Personal relevance

Video games can be powerful tools to foster discussions about various aspects of our society. By adopting this perspective, our students have the opportunity to learn technical and artistic aspects of video game design while becoming aware of social challenges. Our approach is designed to foster a deeper understanding of social challenges and encourage them to discover their own distinctive voice. This experience also allows us to reflect on the almost non-existent representation of our culture in the video game market, largely dominated by a few studios from some first-world countries.

Showcasing an initiative from the author's institution

The participation of students begins with enrollment in the "Project" course of the Industrial Design program of the Universidad Javeriana, where the central concept of each video game is developed. In addition, students must take complementary subjects such as Concept Art and Character Design, 3D Modeling and Animation, and Programming. This curricular structure allows students to acquire specialised technical and artistic skills in video game design. The design methodology used in these projects is special, as this

approach allows students to develop creative and critical skills while addressing relevant social issues. Video game design can be an effective tool to address these issues in an entertaining way *https://www.semillerovideojuegos.org/*

Conclusions

The video games developed by the seedbed are much more than a simple form of entertainment, serving as valuable tools for promoting meaningful discussions about various aspects of Colombian society. They can educate and inform players about important topics, from social to environmental issues, generating empathy and understanding towards diverse perspectives. The inclusion of relevant themes in the video games can significantly contribute to raising awareness about important issues and fostering positive change in society, especially considering that designers are in the process of learning and can integrate these values into their future professional practice.

Discussion & questions

Impact and responsibility of video game design:

What is the role and responsibility of video game designers in representing cultural diversity in their works?

Balance between education and fun:

How can designers find a balance between education and entertainment in video games that address social and environmental issues?

Integrating sustainability into teaching

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Teaching & learning methodologies:

Critical design for thinking situated design practices

Summary

Critical design challenges design's foundational purposes by asking how seriously those purposes are considered in the design practice, often from a Eurocentric viewpoint. Yet, adapting critical design principles through Latin American critical thinking enhances its relevance in Colombia's complex context. This approach could aid in refining disciplinary practices and fostering regional autonomy, ensuring fair material conditions for existence.

Context

Design Thinking 5: Design Critique (Theoretical Class). Students who attend this class are usually around 20 years old and are coursing the 5th and 6th semester of their studies.

Methodologies, techniques & implementation

Devices for Historical and Political Situation:

Instruments for mapping the relational imaginary constructed from local design with respect to the current global geopolitical scenario.

Power-Oppression Matrices:

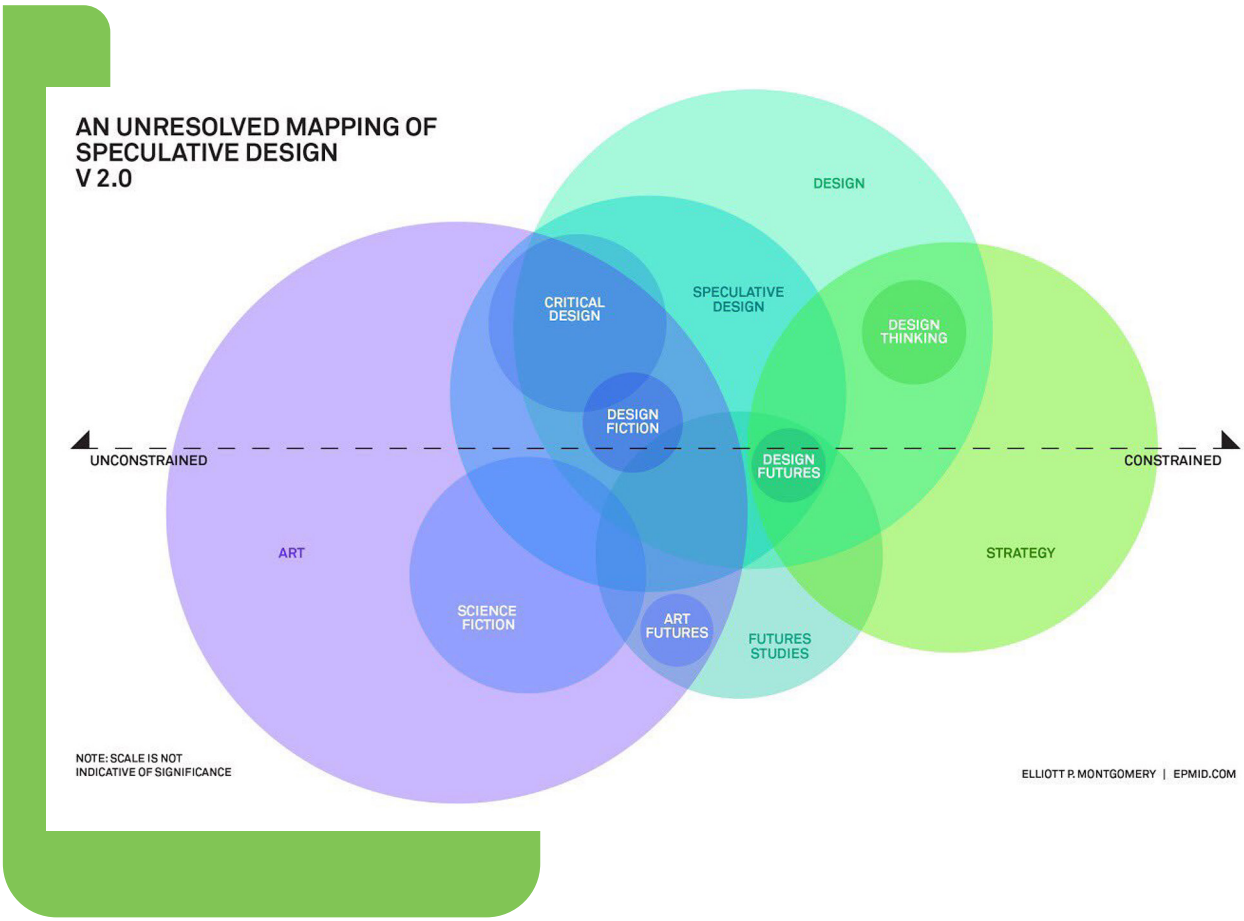
Instruments for sensitising students regarding the identification of power relations that permeate design practices, whether in productive or community organisations, to enable them to situate themselves and recognize themselves as part of the power structure.

Methodological Design:

Exercises to raise awareness about internalised and appropriated design processes juxtaposed with the design of methodologies to incorporate problematisation forms inherent to Latin American critical thinking.

The intended learning outcome of the methodologies

These methodologies were selected as they were designed and tested during the past 10 years on courses on critical thinking for design that were part of several graduate design programs I've been working for. They were born as tools for evaluating and situating sociological, anthropological, economic and political theories on specific local contexts through design. In the practice of critical education, I don't believe it's correct to expect predefined learning. I consider that critical practices can only aspire to generate "spaces of possibility," and in that sense, the expectation is related to constructing a safe space to inhabit the discomfort of uncertainty about unquestionable purposes of design, such as solving problems, addressing needs, satisfying desires, facilitating practices, improving quality of life, etc.



Feedback

We use the university-provided course/teacher evaluation tool, though limited in depth, it offers insight, creating a secure space in the final class and allowing students to express opinions without fear of reprisal. I ensure all evaluations are finalised to avoid bias. Most comments, positive or negative, centre around discomfort with course methodologies. I view this discomfort as crucial for critical reflection, fostering self-criticism among designers. When comments address obstacles to critical processes or my management of difficult conversations, I handle them tactfully, making adjustments.

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Teaching & learning methodologies:

Qualitative methodology for meaningful learning of sustainable systems

Summary

Critical design challenges design's foundational purposes by asking how seriously those purposes are considered in the design practice, often from a Eurocentric viewpoint. Yet, adapting critical design principles through Latin American critical thinking enhances its relevance in Colombia's complex context. This approach could aid in refining disciplinary practices and fostering regional autonomy, ensuring fair material conditions for existence.

Context

Students in the Sustainable Systems course are part of the Design and Sustainability emphasis within the Industrial Design program at the university. The course also includes students from other areas, such as Architecture, Business Administration, and exchange programs, providing a deep understanding of how design impacts the flows and relationships within natural ecosystems. It promotes the analysis and design of complex systems to develop effective sustainable projects.

Methodologies, techniques & implementation

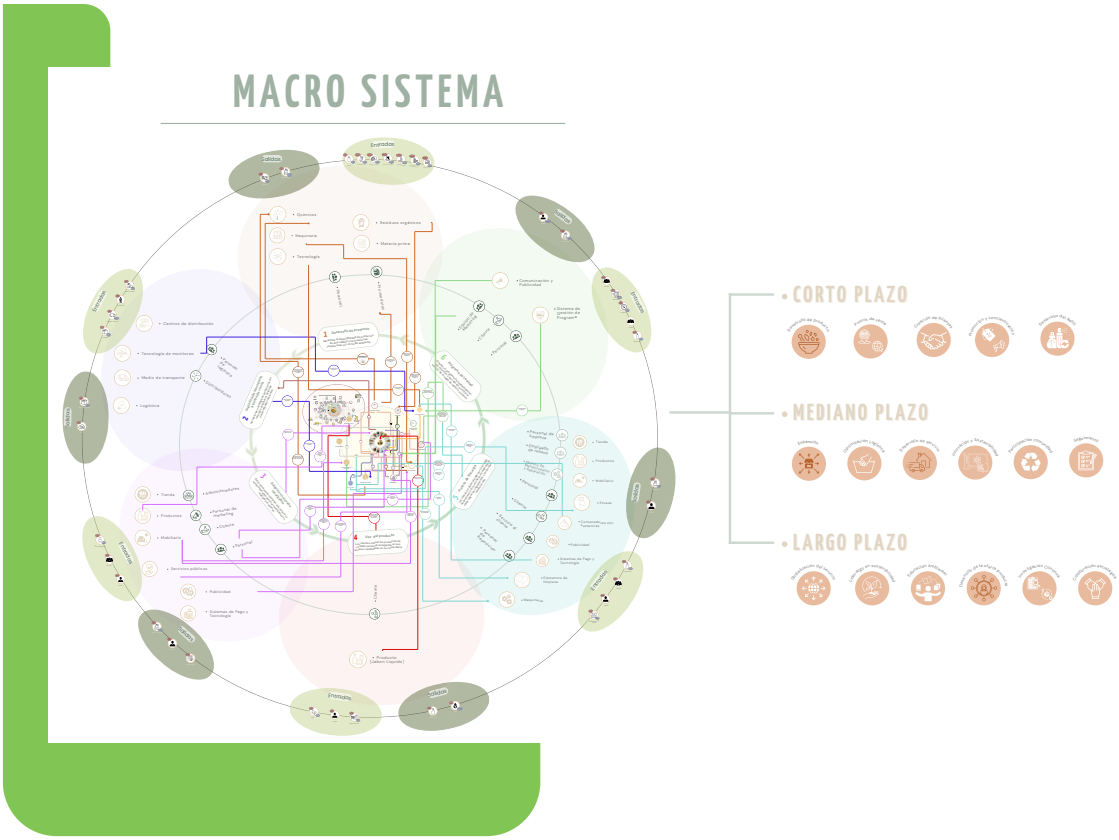
In teaching environmental sustainability, connecting with students' experiences to maintain their interest is a significant challenge. Simply explaining theoretical concepts using traditional methodologies is not enough; it is essential to identify what motivates students and present knowledge in a language they can understand and relate to. In the Sustainable Systems course, a novel approach was used to link area concepts with popular social media content. Although the contexts differ, entertaining content such as gossip and scandals shares key components with systems. This method aids in understanding complex concepts like open systems and the interactions between actors, materials, water, and energy. To implement this, trending and widely recognised content is selected, key actors are identified, and a system is created based on them. Gossip conventions are graphically constructed, and a parallel is drawn with complex systems. A diagram of a TikTok gossip is included as an example of the systems discussed at the end of the document.

The intended learning outcome of the methodologies

Through the implementation of the aforementioned teaching strategies, students are supported in configuring sustainable systems and designing relationships between actors intuitively, enabling them to apply them both in the subject project and in other academic and business spaces.

Feedback

Feedback highlights the need to develop a methodology that integrates theory, teaching experience, social media, and current trends. This methodology aims to facilitate the understanding of abstract concepts in an intuitive language tailored to new generations of students, as maintaining their interest in theoretical topics such as sustainable systems is increasingly challenging. It should be sequential and include case studies so that other educators can successfully replicate it, making the subject more accessible and easier to disseminate among future professionals.



Qualitative methodology for meaningful learning of sustainable systems

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Teaching & learning methodologies:

Designing for good

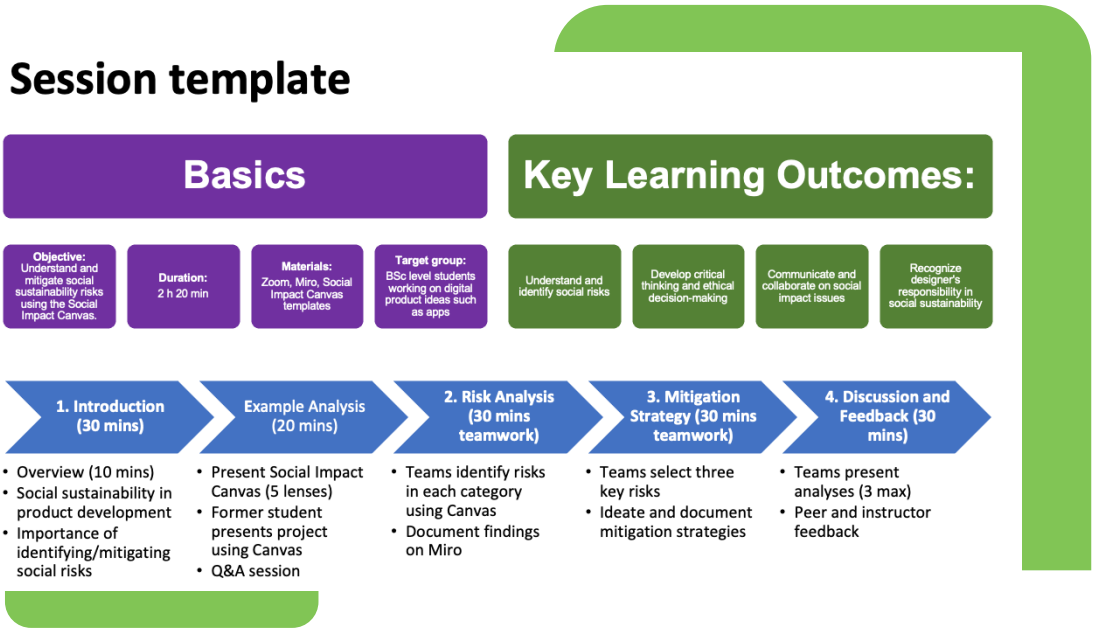
Helping students recognize ethical challenges in digital product design

Summary

Our contribution introduces the Social Impact Canvas, a tool designed to help students identify and mitigate social sustainability risks in digital product development, and a session plan for its use in an online classroom. Adapted from Hardenbolle et al.'s Digital Ethics Canvas, it focuses on beneficence, non-maleficence, privacy, fairness, and empowerment. The Canvas helps students recognise potential social risks and develop strategies to address them.

Context

We applied the Social Impact Canvas in a large introductory course on user-centric product development for bachelor students of engineering at Aalto University School of Science. The canvas was tested in two remote teaching sessions (3 hours each) using a Miro template. The autumn 2023 session included 21 teams of 8 students each, while the spring 2024 session included 23 teams. The student teams had been working on their own digital products for the previous 10 weeks.



Methodologies, techniques & implementation

The Canvas categorises potential social impact risks into empowerment, non-maleficence, privacy, and fairness, with 3-4 guiding questions per category to help teams identify potential negative impacts on users or stakeholders. Unlike broader ethics frameworks, it's specifically tailored to digital products. In the session, teams were briefed via Zoom, where a former participant demonstrated the tool with the instructor. The introduction was split into two parts: the first part before the risk analysis and the second part before the mitigation strategy development. After the briefing, teams analysed their concepts and documented their findings on a Miro canvas.

The exercise was divided into three 30-minute parts:

Risk Analysis: Teams identified risks related to each of the four categories.

Mitigation Strategy Development: Teams selected three key risks and ideated ways to address or alleviate these risks.

Discussion and Feedback: Instructors selected three teams to share their findings with the whole group, facilitating a discussion and providing feedback. This structured approach helped students systematically address social risks in their projects.

Social Impact Canvas

Expected benefits
What are the expected benefits of the solution?

Empowerement risks	Mitigation	Non-maleficence risks	Mitigation
1. How can users understand how the solution works and what its limits are? *2. How does the solution affect users' autonomy and agency?* *3. What choices (e.g., consent, settings) can users make in using the solution and how?* *4. What choices should they be able to make?*		*1. Could the solution be used harmfully, especially concerning vulnerable groups?* *2. What kind of impacts can mistakes made by the product cause?* *3. What protective measures does the solution offer against attacks?*	
Privacy risks	**Mitigation**	**Fairness risks**	**Mitigation**
1. What kind of data does the solution collect? *2. What sensitive/personal information can be inferred from this data?* *3. Who can directly or indirectly collect and compile personal/sensitive information of certain users or user groups?* *4. To what extent does the solution protect against privacy-related misuse?*		*1. Are there biases in the assumptions of the solution, or does it create biases itself?* *2. To what extent can the results of the solution be different for different users or groups?* *3. How accessible is the solution?*	

Adapted from: Hardebolle, Cécile, et al. "Digital Ethics Canvas: A Guide For Ethical Risk Assessment And Mitigation In The Digital Domain." 51st Annual Conference of the European Society for Engineering Education (SEFI), 2023.

The intended learning outcome of the methodologies

The intended learning outcomes were to help students: 1) Identify social risks in digital solutions and their potential negative impacts on individuals and communities. 2) Develop critical thinking and ethical decision-making skills to address societal implications in design. 3) Communicate and collaborate effectively on social impact issues, engaging in dialogue to mitigate risks. 4) Recognise the designer's role in promoting social sustainability and prioritising societal well-being in digital product development. The course aimed to equip students with a framework for evaluating and addressing the social implications of new product ideas.

Feedback

After the exercise, instructors met with each team to discuss their insights. Most teams found the exercise valuable for seeing their concepts from a new perspective and recognizing potential public impacts. Some focused on technical aspects like data privacy, while others prioritised social issues such as inclusivity. Although a few teams had already considered ethical risks, a key takeaway was that students felt social impact should be integrated earlier in the course. To address this, we plan to introduce sustainability-related topics earlier in future iterations of the course.

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Teaching & learning methodologies:

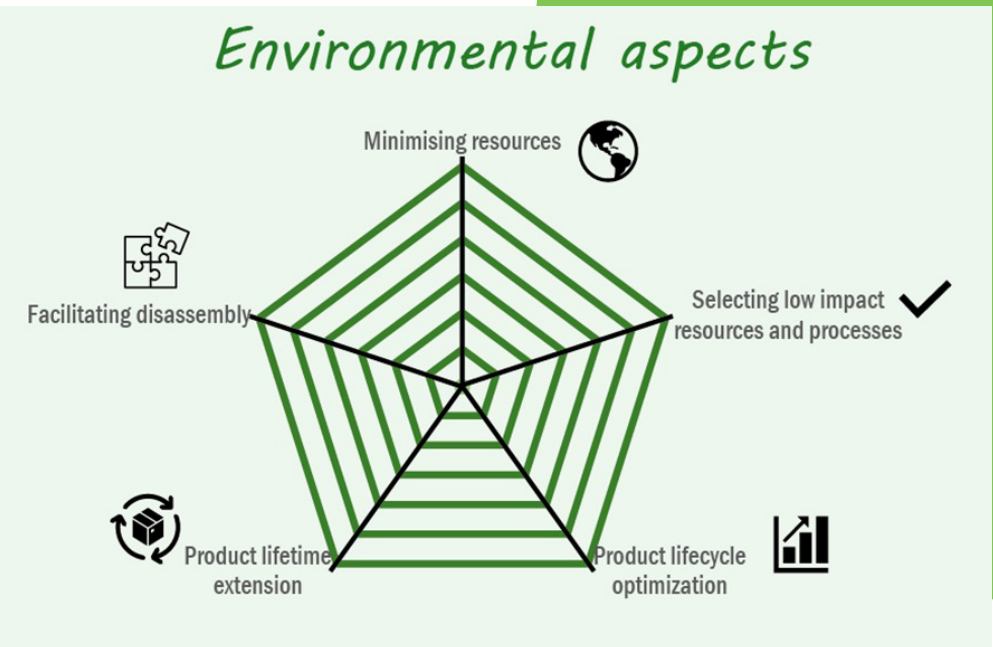
Incorporation of environmental aspects into the product process development

Summary

This work deals with the application of a methodology for the sustainable development of products, where all stages of the project process are associated with environmental requirements and evaluated quantitatively to determine the level of incorporation of these requirements. For this, the concepts of sustainable development proposed by Vezzoli and Manzini (2008), composed of five (5) macro stages, were used.

Context

This method was applied in the undergraduate program of Industrial Design, of the Faculty of Architecture and Design at the Pontificia Javeriana University of Bogotá, in the subject of Production 9 - Environmental Responsibility of Design, where students should develop a product, applying to the project methodology that best suits them, for later incorporation of the macro stages of sustainable development.

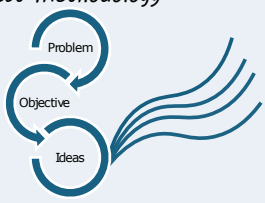


Methodologies, techniques & implementation

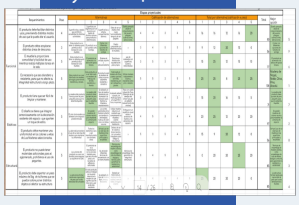
First, the students chose the design methodology already worked on in other opportunities; with product planning, they carried out the informational, conceptual and detailed design stages, creating a model and then the final product. With the product developed, the analysis of environmental aspects begins, related to each macro concept proposed by Manzini & Vezzoli (2008), which are: resource minimisation; selection of resources and processes with low environmental impact; optimisation of product useful life; extension of the useful life of materials and ease of disassembly. Using an Excel spreadsheet (Windows), composed of questions about each concept, a positive or negative answer could be chosen (predetermined formula), generating a radar graph,

Incorporation of environment aspects into the product process development

Project Methodology

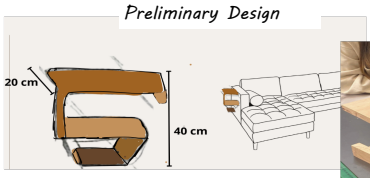


Project Requiriments



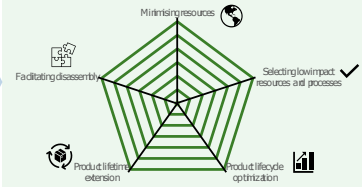
Sketchs

Preliminary Design



Final Design

Environmental aspects



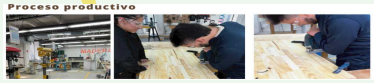
Product lifecycle

Pre-production → Production → Distribution → Use → End of life

Material purchase

Tipo de madera	Dónde se consigue	Presentación comercial	Cantidad aproximada	Contacto
Madera de Cedro	Los cedros Bogotá	CEDRO PUERTO ASIS 2X2D Pulgadas 3.2 mts	50	https://www.centraldemaderas.com/
Madera de Cedro	Home Center Bogotá	1X10 Pulgadas 3.2 mts Cepillado 1.8X23 cm Cedro Blanco	1	https://www.homecenter.com.co/homecenter-co/product/176035/pino-1x10-pulgadas-32-mts-cepillado-2lx23-cm/176035/
Madera de pino	Home Center Bogotá	Pino 1X10 Pulgadas 3.2 mts Cepillado 1.8X23 cm	1	https://www.homecenter.com.co/homecenter-co/product/176035/pino-1x10-pulgadas-32-mts-cepillado-2lx23-cm/176035/
Madera pino	Los cedros Bogotá	PINO CIPRES 2X2D Pulgadas 3.2 mts	50	https://www.centraldemaderas.com/

Proceso productivo



Tipo de madera	Dónde se consigue		
Madera de Cedro,Madera pino	Los cedros Bogotá		22m 6.2 km 20.000
Madera de Cedro, Madera de pino	Home Center Bogotá		15m 4.5km 15.000

Results

Data documentation

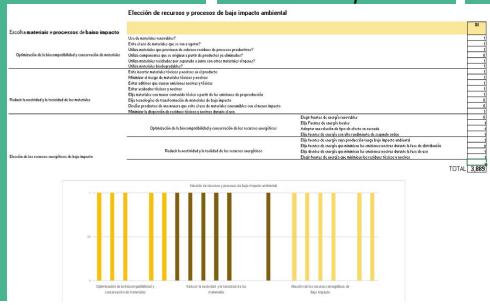
All information collected is used for the evaluation

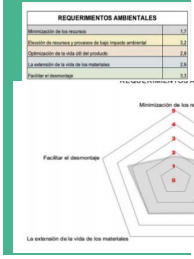
Data analysis - excel

Specific questions are asked for each environmental macro aspect, which generate scores. With this scores points,the excel functions generate bar graphs for each macro aspect.

Graph

At the end of all the evaluations of each environmental aspect, the program generates a radar graph. Presents the strongest and weakest aspects





Final Design

Design based on environmental improvement

which allowed identification of the level of incorporation of environmental aspects in each stage of product development (pre-production, production, distribution, use and disposal). This allows the student to check at what stage their product generates negative impacts on the environment and seeks to make important decisions to mitigate the environmental problem, from the acquisition of raw materials transformation to production processes.

The intended learning outcome of the methodologies

With the application of the promoted methodology, it was possible to generate a learning process that allowed students to incorporate the concepts of environmental sustainability into any product development method, enabling ease of application and verification of the efficiency of the method for less impactful and more beneficial processes for society. The students presented a product made by them in the workshop of the Faculty of Architecture and Design of the PUJ, in addition to the results of the evaluations, determining the level of sustainability of the product by a radar graph, which can be identified within the stages two concepts of sustainability, which is the weakest, and which can be intervened to improve environmental aspects.

Feedback

In the end, a brief questionnaire was carried out to determine the practicality of applying the method and the efficiency of making less impactful decisions in product design. The result was the unanimous approval of the students, who believed in the ease of incorporating environmental requirements into all stages of the product development methodology.

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Curriculum development:

Future Thinking, how to teach the students to look into the future

Summary

The Future Design Factory is part of the Communication & Multimedia bachelor program. In this education innovation platform, we experiment and innovate in education. We use the design-based Education framework as a foundation for experiential learning. One of the experiments we are exploring is the use of Future Thinking in our framework, a way to teach students foresight, flexibility, and a learning mindset to cope with the future.

Curriculum development context

Future thinking is inspired by the Futures Literacy concept of UNESCO and developed for the minor (30 RCTS) Future Design Playground. Within the minor students work on real challenges or wicked problems from real clients, always with a focus on the future. The collaboration

with the industry lies within the strategic direction of the University. The overarching theme called “broad prosperity” gives inspiration for collaboration.

Skills and competencies fostered by the curriculum

The students use the Future Thinking Methodology, a six-step iterative model, that provides the student with theory and methodology to find skills and knowledge to design a future. Future Thinking is one of the themes in the University Strategic Education Policy. We teach the students how to research: e.g. they learn wicked problem mapping, understand the complexity of the problem, and find a direction to solve (a part of) that problem. Students learn to work in interdisciplinary teams, learning to collaborate. Design is an important part of learning creativity in order to visualize ideas and solutions. Those lead to prototyping, being able to build prototypes to show the meaning and working of an idea. Value creation by understanding the value of the solution for a company by learning business models. The future part is where students learn methodologies to get a grip on the future.

Field-specific learning outcomes

The learning outcomes are tailor-made by our students themselves. They are informed about our model, they join a project and together with the coaches they create learning outcomes that fit their learning curve and minor/program competencies. With 5 competencies, for example: learning or research, students create their own learning model with a description of diverse learning outcomes. In the midterm assessments (assessments for learning) students are tested on the way they’ve learned. We give them feedback to learn/produce even more, which will be tested in the final assessment (assessment of learning). This way of teaching showcases the Design Based Education philosophy of our University. We do not have one curriculum, but every student has his/her own.

Curriculum structure

With 3 main iterations in a 20-week program, students deliver their prototype and learning portfolio at the end of the iteration. This is discussed in the classroom via a Design Market, where students give feedback. Within their team, smaller iterations are encouraged. The students organize their team structure themselves; parallel iterations are possible. Every week there are lectures provided. Students can ask for specific knowledge, and the teacher will provide this or find a way to inform the students. Coaches are available for teams or students to talk about their own learning model/outcomes or

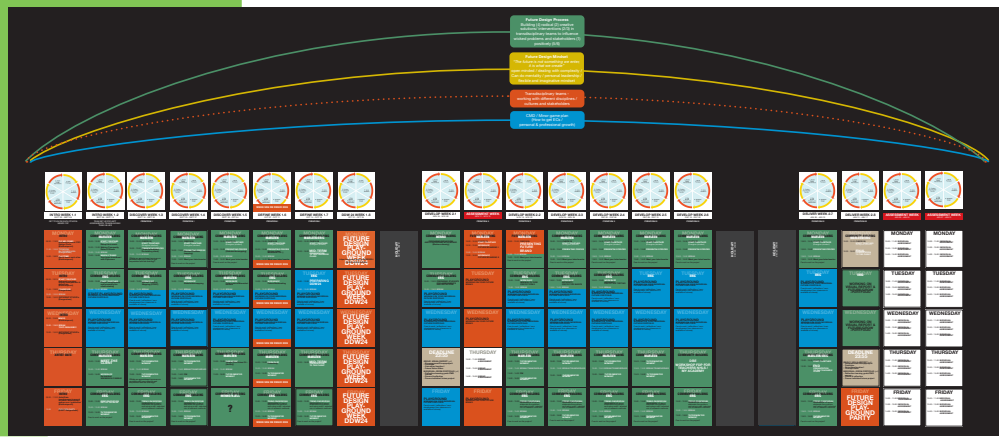
struggles they encounter in the team. Every 3 weeks clients are invited to see the development and to discuss the solutions.

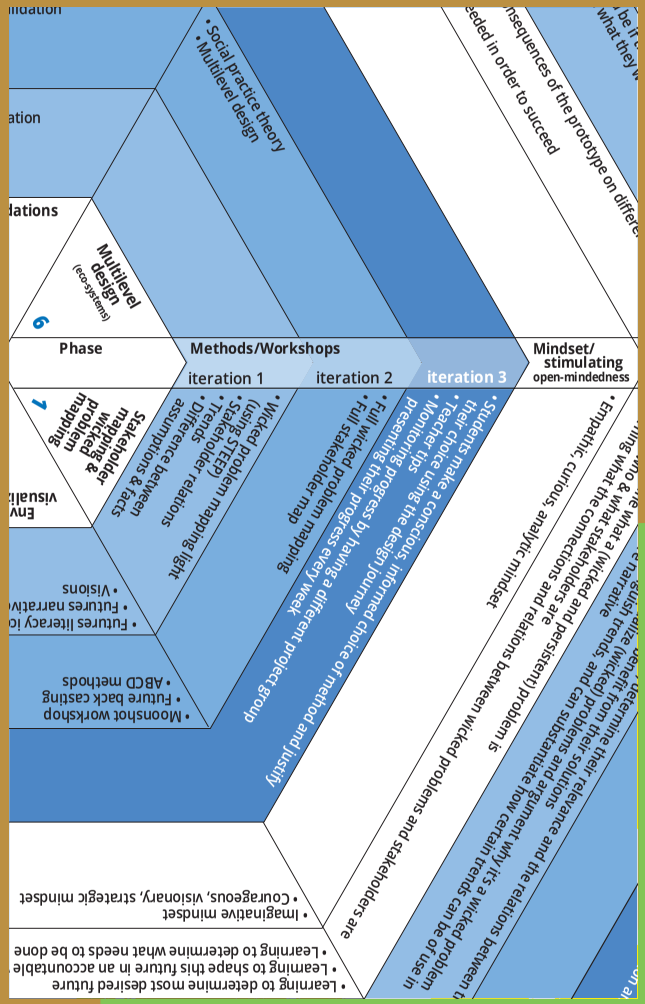
Curriculum implementation challenges

Convincing the management that Future Thinking could be an asset to the development of students and giving new insights to industry partners took time. With Future Thinking students becoming more T-shaped, we had some discussions with Industry partners about what kind of employees they would like to see: the specialists or the generalists. As we learned the challenges the students encounter need both.

Conclusions

We interviewed our students to understand if and what they liked about our minor. One question was: If you were in an elevator, and you had 37 seconds to explain why another student should participate in FDP what would you say? Some of the answers: - You learn skills that you can use in your everyday life - A open minded, playfully place where you can translate ideas into concepts into tangible things - It's an open and fun place to work and learn, yet very professional. Everyone is both a teacher and a student which provides access to an amazing amount of expertise. Besides that, you also have access to an amazing global network with opportunites to go abroad. You'll be guaranteed to come out of it, having learnt valuable things you never expected to learn. We hope we can connect to professors of scenario thinking, futurists, DF's and trend watchers to find new methods and knowledge.




Phase
Methods/Workshops
iteration 1
iteration 2
iteration 3
Mindset/ stimulating open-mindedness
Multilevel design (eco-systems)
Stakeholder mapping & wicked problem mapping
Moonshot workshop
Future back casting
ABCD methods
Futures literacy
Futures narratives
Visions
Wicked problem mapping light (using STEEP)
Stakeholder relations
Trends
Difference between assumptions & facts
Full wicked problem mapping
Full stakeholder map
Monitoring their progress by having a different project group present their progress every week
Teacher tips
Structure using the design journey
Students make a conclusive, informed choice of method and justify their choice
Social practice theory
Multilevel design
Learning to determine most desired future
Learning to shape this future in an accountable
Learning to determine what needs to be done
Imaginative mindset
Courageous, visionary, strategic mindset
Empathic, curious, analytic mindset
Learning what a (wicked and persistent) problem is
Learning what the connections and relations between wicked problems and stakeholders are
Learning to determine their relevance and the relations between
Learning to determine their relevance and the relations between wicked problems and stakeholders are

Supporting student teamwork competencies

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Teaching & learning methodologies:

Developmental reflection

Summary

We have introduced the "developmental reflection" as a pedagogical tool to enhance students' integrated learning and critical thinking. Through personal diaries, letters for the future, surveys, coaching, and practical experience analysis, students develop a profound reflection on their professional growth, becoming conscious agents of change. This learning process prepares future designers to contribute to global challenges, actively becoming aware of their potential.

Context

We implement this process in all our courses, involving roughly 1500+ students and 200+ projects. At the beginning, each student writes a letter to their future self. During the project, we encourage students to keep a learning diary where they log the time spent on the project and all their insights, emotions, and feelings. At the end of each program, students are given a few days to reflect on their learning journey and to write and share their developmental reflections.

Methodologies, techniques & implementation

The reflection is designed to engage students in self-discussion about their learning and insights, reflecting on professional and personal growth, and identifying ways to improve future learning. It is inspired by Kolb's (1984) and Dewey's (1938) experiential learning pedagogy, and it was designed to support the Assimilate phase, where learners observe and think about their own learning journey. This exercise must draw upon both practical and theoretical knowledge gained, integrating the personal observations that students collected in their learning diary with references from mandatory, optional, and additional readings, books, and literature that facilitated the learning journey. The paper allows for a flexible format, and in our case, it should be about 1500 words, not counting references and appendixes. The choice of format, tools, and styles is open, and including visual content like photos and images is encouraged. The students have to review their experience and reflect upon it while thinking about how to use what they have learned in the future through the 4F model dimensions (Fact, Feelings, Findings, Future) by Roger Greenaway.

The intended learning outcome of the methodologies

The "developmental reflection" is designed as a cutting-edge educational method to improve students' integrated learning and critical thinking. Recognised for fostering metacognition and self-awareness, it prepares students to handle complex situations through deep reflection on their growth as professionals, encouraging critical thinking, adaptability, and empathy. It's aimed at developing students who are not just technically skilled but also capable of critical reflection and active contribution to multidisciplinary challenges. Encouraging students to become adaptable, empathetic, and reflective thinkers, the paper is a significant step in their journey toward becoming well-rounded professionals. This approach transforms students into technically adept individuals while being critically aware and engaged in societal and organisational changes.

Feedback

We collected feedback from students, both in the reflection itself and with semi structured interviews. This is an extract from one of the answers:

"We are so used to thinking about this kind of task in a cold, formal way that the moment when you have to combine your personal experience involving your emotions and feelings with your university experience, your brain crashes. Precisely, that is exactly what happened to mine. That's why I've refreshed my neurons, and I've started thinking as Marta and not as id#123456"
(F,23)

Student Reflection on the Experience
SUGAR Kick Off - 2023

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Juanita González Tobón

Teaching & learning methodologies:

Product dissection design: competitiveness, design & technology

Summary

Design and redesign of products involve analysing market trends, user dynamics, and technological advancements to enhance functionality. This approach, coupled with teamwork, helps create innovative products. The workshop guides students in establishing criteria and methods for their design proposals, while the course covers object form analysis, conceptual patterns, and user-context interactions. It also assesses manufacturing feasibility within specific environments.

Overview of student project

This academic proposal is part of an 18-week Design Project in the 2nd cycle of the Industrial Design degree at Pontificia Universidad Javeriana in Bogotá, titled "Product Development Based on New Technologies and Their Appropriation." The project involves 9 hours per week across three class sessions and includes up to 15 students. It features a 3-hour session with a committee of advisor professors from various fields.

Methodologies, techniques & implementation

In groups of 3 to 4 students, they select a recent household appliance to bring to class for disassembly, whether it works or not. They begin by analysing the brand's values, the product line, and the appliance's functional, formal, and technological aspects, and define both a Product and Design Concept. They then benchmark similar products from other brands, evaluating features such as price and added value, and create a mind map to organise their findings. Students conduct an activity analysis with users to identify needs and opportunities, first individually and then in group discussions. They disassemble the appliance into its components, with each student focusing on a subsystem to analyse, describe, and define its functions. They explore technological innovations and map out subsystem dependencies and relationships. Finally, they design new components, creating 3D models that integrate with the existing parts to form a new product design. Professors support this process, reviewing second-hand or unused appliances, and providing interdisciplinary feedback in a workshop setting, guiding students through analysis and design challenges.

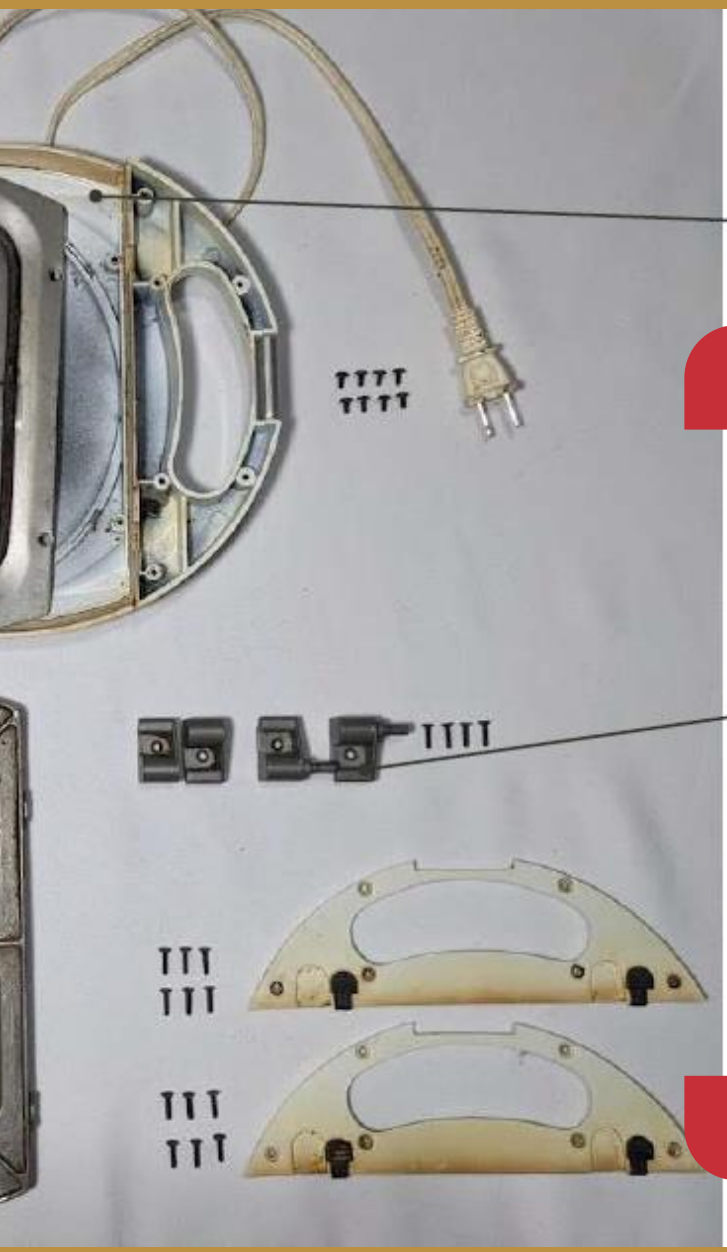
The intended learning outcome of the methodologies

Formulate a design proposal oriented towards technological innovation within the framework of social and environmental responsibility. b. Identify the technological resources needed for the design and development of a new product according to market and production conditions. c. Generate specifications for a new product, emphasising its production feasibility based on the conditions and potential of a productive organisation. d. Evaluate, based on prototypes and testing protocols, the manufacturability and usability of the new product.

Feedback

A collegial committee of professors guides the project from research to final design, each specialising in technology and production, human and social aspects, or design management and market. Student groups mirror these roles, with a 'manager' coordinating the process. Evaluation and adjustments occur throughout, involving both professors and students. Social and environmental responsibilities are emphasised, with specific focus on societal impacts by one professor and environmental effects by another, covering both manufacturing and end-of-life stages.

Aluminio
Aleación con recubrimiento de teflón


Polipropileno
Aleación

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Pontificia Universidad Javeriana
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Teaching & learning methodologies:

Collective Project Lab

Fostering co-responsible learning and spontaneous skills generation in design

Summary

The "Collective Project Laboratory" at PUJ's Arquidesign Lab, where the monitoring team promotes student-led collaborative learning in a close-knit, autonomous, and responsible environment, integrating commitment, creativity, and experimentation. This initiative extends beyond the design program's curriculum. The method emphasises co-responsible learning, autonomy, and respect, while students apply their knowledge to real projects and collaborate with external partners

Context

PUJ's Arquidesign laboratories are interconnected spaces for the ideation, prototyping, and validation of design projects. They support teaching, research, and service across various courses. Each lab has a unique focus: Industrial Approaches, Automated Processes, Self-

Production and FabLab, Interactive Experiences, Electronics and Interaction, and User Testing, which are crucial for project development.

Methodologies, techniques & implementation

The methods focus on autonomous, distributed design and the formative nature of teaching as a key tool. Autonomous design allows students to take an active role, fostering independence and informed decision-making. Distributed design promotes collaboration, leveraging diverse perspectives to enrich outcomes. The formative aspect of teaching integrates education with real-world practice, enhancing students' understanding and retention of design processes. This approach aims to develop students' autonomy, respect, and proper use of equipment, while improving their technical skills. Expected learning outcomes include increased student independence, respect for teamwork, effective equipment usage, and enhanced technical knowledge. The approach is also designed to positively influence other students' training, fostering a collaborative and responsible learning environment. By cultivating a culture of cooperation and respect, the project enhances both individual educational experiences and the overall academic atmosphere.

The intended learning outcome of the methodologies

To enhance both professional and personal growth. They aim to develop essential skills such as teamwork, leadership, and autonomous learning in design. By integrating real-world problem-solving and project management, students gain practical experience that improves technical proficiency and effective resource use. This approach fosters a collaborative and responsible learning environment, preparing students for entrepreneurial ventures and diverse professional settings. The focus is on equipping students with the skills needed to excel in various career paths, promoting both their individual development and their ability to contribute effectively to team-based projects.

Feedback

Feedback is primarily gathered through ongoing dialogue with students and assessments of their knowledge and skills at the end of each period. This evaluation process helps refine teaching methods and criteria for new groups of monitors, ensuring that progress is clearly understood and measured from entry to exit. Continuous adjustments based on this feedback enhance the training process, ensuring that learning objectives are effectively met and that the educational experience is continuously improved.

DESIGN
DESIGN
for love
do it your
WAY
GREAT
TRUST YOUR CURIOSITY
Soy Diseño
PASOS PARA DISEÑAR
RESUMIR Y SELECCIONAR

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Curriculum development:

Testing the i2Planet methodology in a Space and Technology course

Summary

The IdeaSquare I2Planet sprint was transformed into a 12-week program for Swinburne's Space and Technology Bachelor's co-major. This novel teaching approach uses space-related challenges to develop collaboration, critical thinking, and systems thinking skills in multidisciplinary students. The program includes two phases: exploring the technical and societal aspects of sustainable human settlement on an exoplanet and applying those insights to real-world challenges.

Context

This curriculum was developed after Swinbune's engineering faculty asked DFM to create a class to develop teamwork, entrepreneurship and innovation skills for interdisciplinary Space and Technology co-major students. Given the I2Planet methodology is set in a space context, its content was adapted to pay more attention to the technicalities of space travel in prolonged, in-depth and research-driven activities. Students were in their second and third years.

Skills &competencies fostered by the curriculum

This program, aligned with Swinburne's strengths in space science, aims to develop creativity and teamwork skills in highly technical multidisciplinary student cohorts (mainly engineering and science backgrounds), where students are used to well-defined problems and step-by-step instructions. Using systems and speculative thinking in an interplanetary challenge, students consider the effects of multiple scenarios while focusing on cultural and social aspects that significantly affect each decision. Students must challenge assumptions and justify their choices while dealing with limited information and high levels of uncertainty. For example, students designed a selection process for a crew of 100 people, presented a spaceship design, and developed a water management system for their settlement. Coming back to a real-life problem, students developed solutions for Australian floods.

Field-specific learning outcomes

The novelty of the program is using a future-based complex space challenge as a tool to develop empathy towards other discipline's roles and contributions in society, maintaining technical rigour. Although trialled one semester with a single team of three students, it is intended to be delivered in classes for a maximum of 24 people and teams between 3 and 5 students from 2025. Through reflections, students use what they learned from this activity to solve real societal needs through frugal innovation.

The unit learning outcomes are:

- *Assess and appraise relevant considerations and systems to support a space technology/research application to be manufactured and launched.*
- *Assess ethical and sustainable issues in environmentally responsible and sustainable space tech application design and manufacture.*
- *Identify a range of stakeholders involved in the implementation of space tech*

Curriculum structure

Week 1: Introduction to the program, Ideasquare and Design Factory Melbourne culture Week 2: Stage 1 Who and what to bring to Planet X. A mission is provided, including boundaries such as planet distance, travel conditions, arrival and area of focus. Students define crew expertise and selection. Week 3-4: Stage 2 Travelling to Planet X. Travel risks and mitigation strategies. Consideration of required technology systems and spaceship design – architecture, layouts, safety protocols, and equipment. Week 5: Stage 3 Constitution of the First Settlement. Consideration of rules, values, beliefs,

i2Planet Methodology

W 1-2

Who and What to Bring?

- Professions of the 100
- What's your role?
- Recruitment process
- Ethical considerations
- Age, gender, skills, psychological assessment, political associations, nationality, language

W 3-4

Travelling to Planet X

- Critical systems
- Subsystem and equipment
- Key design criteria
- Emergency protocols
- Navigation cycles
- Spaceship layout
- Crew management

W 5

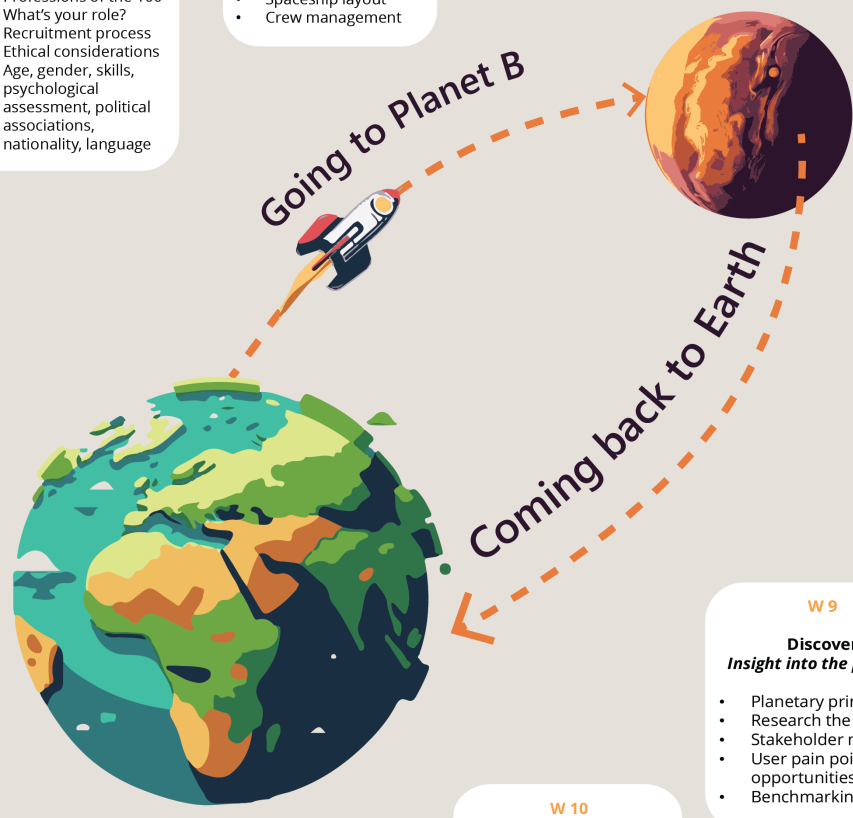
First Constitution

- Rules
- Government
- Authority
- Penalties
- Values
- Rights
- Currency
- Language

W 6-7

First Mission

- User needs
- Order of magnitude calculations
- Extraction
- Distribution
- Circularity
- Maintenance
- Ecosystem impact



W 9

Discover
Insight into the problem

- Planetary principles
- Research the problem
- Stakeholder mapping
- User pain points and opportunities
- Benchmarking

W 10

Define
The area of focus

- Journey maps
- Problem statement
- Design drivers/ evaluation criteria

W 11

Develop
Potential solutions

- Solution concepts
- Order of magnitude calculations
- Prototypes
- Evaluation

W 12

Deliver
Solutions that work

- Final concept
- Presentation
- Workbook

CERN IdeaSquare

SWINBURNE UNIVERSITY OF TECHNOLOGY

DESIGN FACTORY MELBOURNE

currency, job distribution, language and distribution of authority. Week 6-7: Stage 4 Mission of the First Settlement. Students design a system to achieve the given mission related to human settlement. Week 8: Phase 1 Presentation Week 9 to 12: Back to Earth. Tech in a social challenge.

Curriculum implementation challenges

Yes, the usual challenges that occur in undergraduate teamwork activities were also present in this course. Some collaboration issues were mainly associated with different quality and expectations of working ethics. Given the size of the cohort, it was challenging for the team to cover all aspects of each phase. Although the team did a fabulous amount of work, the workload was most likely a pressure point for the students. This also comes with the fact that in this experiment, we included all phases of the IdeaSquare Planet methodology instead of focusing only on one of them. There is a trade-off between the breadth and the depth of the research and creative work.

Conclusions

This was the first time the IdeaSquare Planet methodology was adapted to a 12-week program. Despite the common challenges in student teamwork, the outcomes were impressive. The collaboration was fruitful and enriching for both Design Factories. The time zones often made the co-creation of materials challenging, although the trust and collaboration spirit of both DFs made the experience smoother. For future iterations, it would be meaningful to test this curriculum with a larger cohort of even more diversified participants, as well as adapt and reframe the missions and expected deliverables. Based on student feedback, prototyping should be more omnipresent and embedded in the approach, as it was a valuable and fun tool for the participants to ideate and communicate their concepts. This first experience was enlightening and a great opportunity for both Design Factories to collaborate.

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Mireia Sierra

Teaching & learning methodologies:

Hex-a-Thon

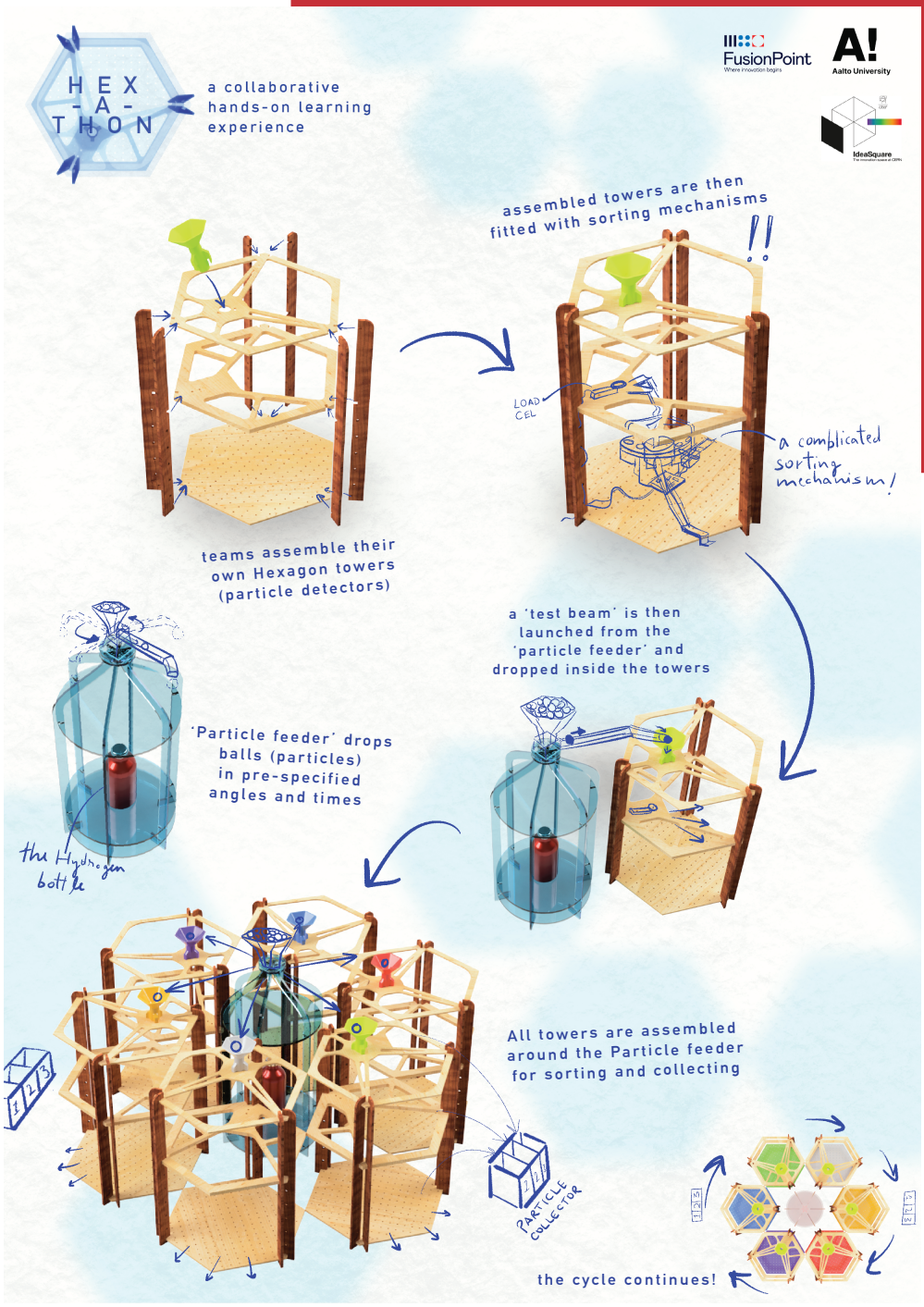
Collaborative and creative learning experience for Interdisciplinary Students based on hands-on innovation

Summary

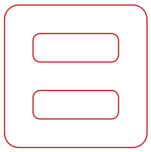
Fusion Point, IdeaSquare, and Aalto DF created a collaborative learning experience for interdisciplinary students to build "particle detectors" using various materials. This exercise fostered creativity, teamwork, and playful imagination while introducing particle physics. It emphasized the importance of collaboration in science and, through student feedback, highlighted the development of both hard and soft skills, particularly in teamwork.

Context

The experiment involved two courses: TeSi students used Arduino, a servo, and a mass sensor to segregate materials by impact force, while CBI4AI students used Raspberry Pi and a camera to sort particles by colour. Students collaborated in teams linked to CERN experiments CMS and Atlas, each with unique classification points, requiring them to devise ways to transport particles to distant particle collectors.


HEX
-A-
THON
a collaborative
hands-on learning
experience
FusionPoint
Where innovation begins
Aalto University
IdeaSquare
assembled towers are then
fitted with sorting mechanisms
!!
LOAD CEL
a complicated
sorting
mechanism!
teams assemble their
own Hexagon towers
(particle detectors)
a 'test beam' is then
launched from the
'particle feeder' and
dropped inside the towers
'Particle feeder' drops
balls (particles)
in pre-specified
angles and times
the Hydrogen
bottle
All towers are assembled
around the Particle feeder
for sorting and collecting
PARTICLE
COLLECTOR
the cycle continues!

Methodologies, techniques & implementation



Students participated in a 2-hour workshop covering laser cutting, electronics (Arduino and Raspberry Pi), and 3D modelling basics. The teaching team emphasised the importance of collaboration and coordination for the exercise.

The methodologies and techniques included:

Experiential and Passion-Based Learning:

Students applied technical knowledge creatively, embracing failure as part of the process. Tasks involved iterative development and low to medium-fidelity prototyping, fostering learning through doing.

Interdisciplinary Collaboration and Peer Learning:

The make-a-thon format required students to work both independently and in teams, necessitating planning, communication, and coordination. This approach merged diverse expertise and facilitated mutual learning.

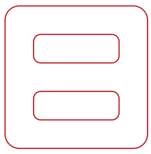
Learning Through Play and Technology Integration:

The project incorporated coding, programming, and machine learning, encouraging experimentation and learning from failure. Continuous feedback and peer learning were integrally supported by coaches. These techniques created a high-pressure, imaginative environment that embraced failure, promoting innovation and teamwork.

The intended learning outcome of the methodologies

The learning outcomes aimed to enhance students' ability to work under pressure, build effective team dynamics, and break down disciplinary silos through interdisciplinary collaboration and peer learning. The exercise encouraged embracing creativity, learning from mistakes, and being willing to "kill their darlings" by discarding initial ideas. Students gained fundamental skills in coding, particle physics, laser cutting, and 3D printing. Hosting the make-a-thon at ID2 provided access to experts, simulating real-world scenarios and encouraging external collaboration. These outcomes prepared students for real-world problem-solving and innovation, fostering resilience and collaboration.

Feedback



Feedback was gathered through student reflections, focusing on successes, areas for improvement, interdisciplinarity, individual contributions, and overall learnings. Most teams did not complete the task, but this was an expected part of the learning process. The exercise revealed key teamwork challenges like balancing ideation and prototyping, planning, delegation, working under pressure, and collaborative effort. It emphasised

the value of embracing failure, learning through play, and developing both hard and soft skills essential for success in final projects.

Hex-a-Thon: Collaborative and creative learning experience for interdisciplinary students based on hands-on innovation

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Scarlett Spiegeler Castañeda
Clemens Ackermann

Design Factory Task Force

Agile student teams co-create with industry

Summary

Design Factory Task Forces complement the opportunities for collaboration between students and industry in problem-based learning. In essence, agile student teams work side by side with industry in R&D projects on the ARENA2036 Research Campus. The Design Factory Stuttgart employs 3-4 students according to the project requirements and supports the teams methodically in their development into a self-managed team. A Scrum Master coaches both industry and student teams in setting up an agile project according to the official Scrum guidelines. The projects typically run for 4-6 months.

Experiment conduction & methods

Design Factory Stuttgart and industry partners jointly define a project that can be carried out by a team of students. DF Stuttgart takes care of the application process, uses the existing network at local universities and recruits the students. Students are selected based on their profiles to match the industry requirements and to form an interdisciplinary and diverse team. While DF takes care of all team-related aspects, including coaching in agile project management, the industry acts as product owner, defines the backlog and is the contact for subject-specific questions.

The concept is centred around three pillars:

Transparency:

The resulting process and work is visible to all participants. The industry partners can participate in the regular meetings in the sprint - Scrum Sprint Planning and Review - and may attend the weekly Scrum of the developers.

Inspection:

The Scrum artefacts and progress towards the agreed goals are reviewed frequently. The regular 5 Scrum events are implemented to meet the needs of a working student team.

Adaption:

If any aspect of the process or resulting work falls outside acceptable boundaries, we adapt as quickly as possible.

DESIGN FACTORY TASK FORCE

AGILE STUDENT TEAMS CO-CREATE WITH INDUSTRY

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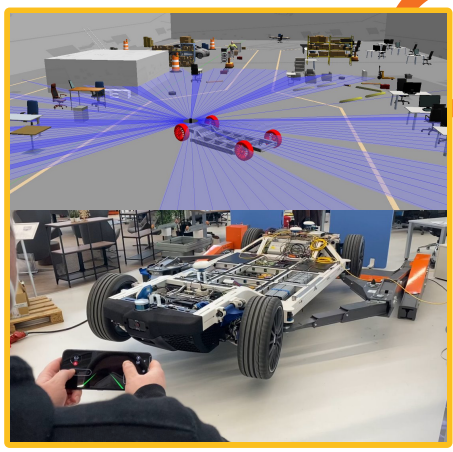
KEY FACTS

Design Factory Task Forces are agile student teams working side-by-side with industry in R&D projects at the Research Campus ARENA2036.

- Expanding students' learning opportunities from lectures to a more flexible format with high value for industry
- 3-4 students are accompanied methodically to develop into a self-managing team
- A Scrum Master (PSM1) coaches both industry and the student teams in setting up an agile project according to Scrum
- Projects run for a predefined time chosen by the partner, typically 4-6 months

COACHING IN AGILE PROJECT MANAGEMENT IS HANDS-ON WITH A SCRUM BOARD



RESULT OF A TASK FORCE: SLAM ALGORITHM FOR INDOOR NAVIGATION

BENEFITS

- Design Factory learning experience for students decoupled from lecture format
- Industry benefits from the innovative student mindset, the hands-on Scrum training and the work packages accomplished.
- Students learn how to work within an agile Scrum team, can develop their teamwork and professional skills and get into contact with partners from industry.

SCRUM FRAMEWORK

TRANSPARENCY

Industry partners are in exchange with the teams as Product Owners and join the regular meetings in the sprint – Scrum sprint planning and review – and may attend the weekly Scrum of the developers.

INSPECTION

The Scrum artifacts and the progress toward the agreed goals is inspected frequently. The regular 5 Scrum events are implemented in a way adjusted to match the requirements of a working student team.

ADAPTION

If any aspect of the process or resulting work deviates outside acceptable limits, we adapt as soon as possible, making use of the benefits of small, self-managing teams in an agile working environment.

Objectives & outcomes of the experiment

The format allows us to offer a learning experience for students decoupled from a lecture format. This creates more value for both our partners and students by tailoring the format to their needs. Additionally, adjustments are possible without going through administrative hurdles at universities. The industry partners benefit from the young and innovative mindset and the new perspectives of the students, the practical Scrum training and the work packages that are carried out. The students learn how to work in an agile Scrum team, can further develop their skills and come into contact with partners from industry. Last year, we held two Design Factory Task Forces with ARENA2036 members Mercedes-Benz and SPIE. The Mercedes-Benz team implemented a radar sensor for autonomous driving applications in the ARENA2036 project FlexCAR and worked on trust models for humans in autonomous vehicles, resulting in two internal invention disclosures. The SPIE working group integrated various sensors installed in ARENA2036 from different manufacturers for predictive maintenance applications into an InfluxDB database management system and created a dashboard using Grafana.

Key learnings & conclusions

The format combines the development of teamwork skills in the context of problem-based learning with an environment that allows students to gain work experience and helps them finance their studies. It expands students' learning opportunities from lectures to a flexible format with high value for industry. Agile project management and working in self-managing teams are important skills to acquire, which is why teams of 3-4 students are a core concept of the format. Industry, in turn, benefits from working students without administrative hurdles of employment. With a decreasing number of students, it is becoming increasingly difficult to find suitable students. Design Factories can often close this gap as they have excellent networks with industry and universities. The feedback from the students was overwhelming and the format stands out from other offerings in their studies.

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Matteo Vignoli

Facilitation Fire Starters

Summary

Facilitation Fire Starters are activities designed to start a session on a positive note. Oper.space focuses on team dynamics and building positive interactions through emotional intelligence, mindfulness, and theatre. The goal is to create a safe and comfortable space for students, talents, employees, and corporate teams, fostering happiness and emotional awareness for effective teamwork. Facilitators play a crucial role in understanding team limits and selecting appropriate tools to enhance dynamics and start the fire (or break the ice).

Reflections, insights & paradoxes

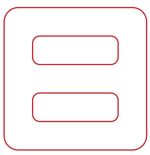
This toolbox is suggested for creating a supportive environment where participants feel safe and free to express themselves. Focusing on emotions can be a barrier for those who believe that a work meeting should just aim at results and productivity, wrongly thinking that spending time on these moments does not benefit this goal. In particular, a question that often arises in response to such a proposal might be: "Can't we just work?" This behaviour is tied to the notion that working means producing, and producing means

fatigue and boredom; thus, to be truly productive and achieve the goal, there is no room for fun and for the self. We believe that one of the greatest challenges in this area is precisely convincing even the most sceptical of the value of fire starters or team dynamics activities, which are also useful in preventing potential conflicts that may arise later. Another important challenge is dealing with different personalities: How can we engage introverts and alleviate the sense of shame that may arise in those who do not feel comfortable sharing their emotions and seeing those of others? The focus on emotional intelligence and mindfulness might clash with environments where these concepts are undervalued or misunderstood. Facilitators are the central pivot in bridging this gap sensitively, ensuring participants recognise the relevance and benefits of these approaches. Warm-ups go very well with design thinking because they support many of its attributes, such as being curious and having an open mindset, as well as being mindful of and collaborating with other people. It's time to shift from the old concept of "team" as a noun to "team" as a verb: "teaming" is an indispensable ability for people working in today's continuously changing organisations.

Personal relevance

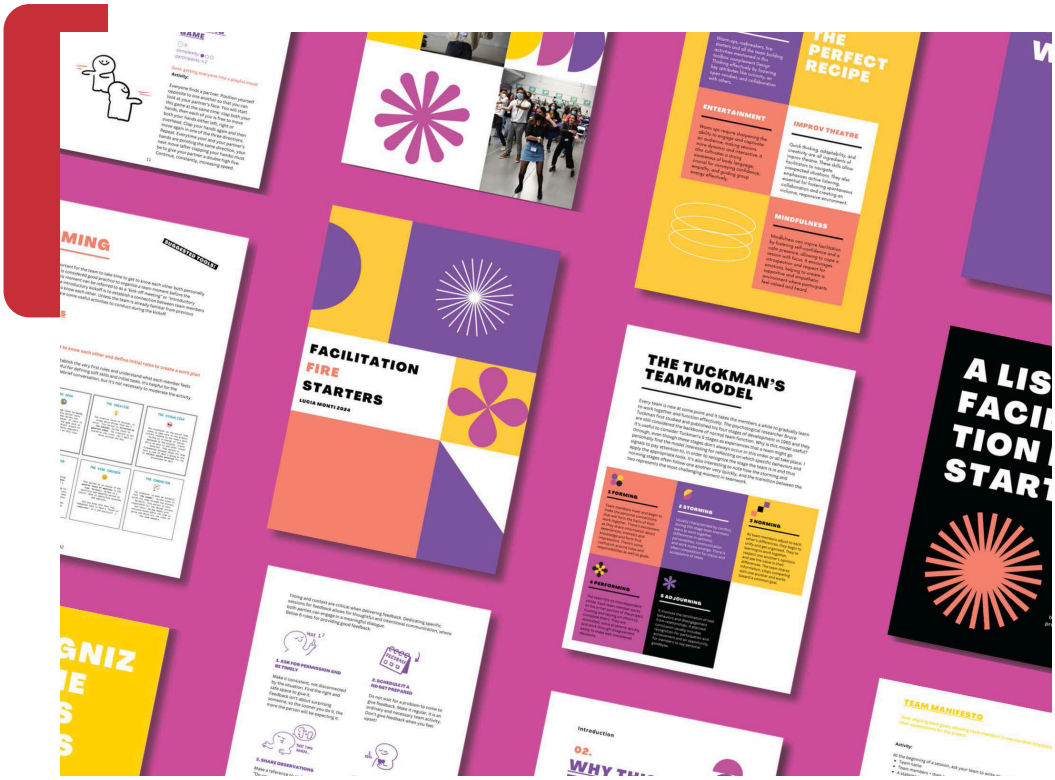
This set of activities is relevant to me because it perfectly represents the meeting point between my creative and rational sides: being more mindful of the moment allows me to be myself 100%. Creating a situation of sharing and a safe space allows me to put others in a comfort zone and thus put myself at ease. I believe it is essential to invite people to remove their masks and their professional roles, giving the right space to the worker and more space to the person. This is the essence of innovation: not pre-packaged answers and cold performances, but a collection of lives and personal experiences, of characters and emotions, of people who work together at the same table without filters and without prejudices, having fun.

Showcasing an initiative from the author's institution



Oper.space has designed a Toolbox for facilitators. It includes guidelines on which exercises to use in different situations and types of sessions, considering the specific design phase and also giving some advice on how to conduct the activity, and how much it will take, with the aim to integrate Team Building good habits and Design processes. The toolbox is also structured based on the 5 stages of the Team Dynamics Model by Bruce Tuckman: forming, storming, norming, performing, and adjourning. Additionally, mindfulness and meditation sessions are periodically guided for:

(1) participants in the programs (e.g. students, corporates..), (2) corporate projects, and (3) members of the teaching team. Over the past 5 years, we have collaborated with local experts in personal coaching and emotional intelligence, incorporating both structured moments and targeted interventions to resolve conflicts.



Conclusions

In conclusion, we can say that the most urgent need regarding this issue is to work on coaches and facilitators to train this ability, which is not innate. Creating positive team dynamics and effective sessions requires a conducive environment within the team, and it is the coach's responsibility to create this environment. However, to do so, it is necessary to develop skills rather than rely on individual sensitivities. We believe that this toolbox can be a starting point for facilitators to make their sessions more enjoyable and effective and to identify the right tools for specific contexts in order to put the team in the best conditions to work and prevent potential burnouts, tensions and imbalances. These exercises not only helped us create a good working atmosphere but also supported us in conveying values and methods consistent with the Design Thinking process.

Discussion & questions

Discussion points:

1) Empowering the Facilitator:

How to promote proper training so that the facilitators develop skills and acquire more knowledge and sensitivity in emotional intelligence. Facilitating a session effectively requires more than just expertise in the subject matter; it demands skill in creating the right atmosphere and energy. To empower facilitators, it's essential to focus on developing their character and behaviour, particularly if they exhibit introverted tendencies. More introverted facilitators may struggle with energizing a room or engaging participants. Training programs can incorporate techniques to enhance their presence, such as voice modulation, body language, and active listening skills. Additionally, providing support and encouragement can help introverted facilitators feel more confident in their role, allowing them to lead authentically and effectively.

2) Empowering the Team:

How to help the team be more self-sufficient without relying on the facilitator's leadership. It is crucial for the team to achieve a certain level of skills and for the facilitator to transfer this mindset and empower the designers to lead their own sessions. The coach's role is to enable people to feel like the main owners and responsible parties and to facilitate their own dynamics autonomously.

Questions:

1) Are team dynamics a topic in your Design Factory? What tools do you use?

2) How would you react in a case of emotional background in a team? Do you have a story to share?

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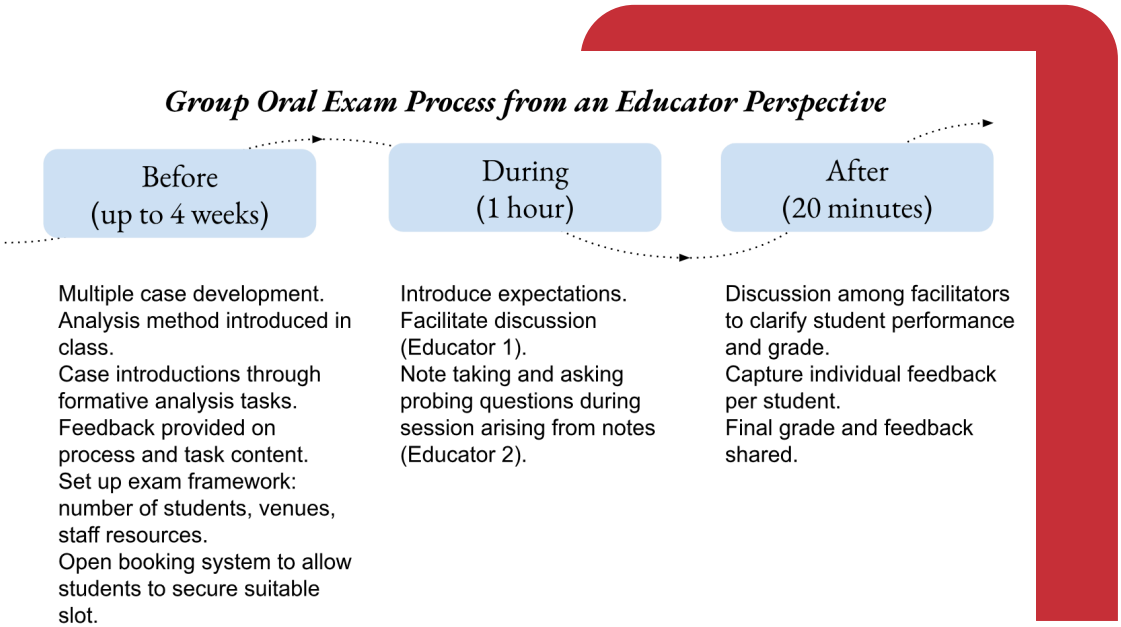
Scaling innovation teaching: Oral case-based assessment in MEC-E1001

Summary

In response to the challenges posed by larger student groups and the impact of AI on writing tasks, we developed Oral Case-Based Assessments in teaching engineering innovation. This method scales efficiently by organising group discussions around real-world cases provided prior to assessment, fostering collaboration and critical thinking. Oral assessments ensure authenticity, mitigating concerns over AI-authored written tasks by allowing instructors to directly gauge individual understanding. This dynamic assessment fosters meaningful engagement and dialogue at scale.



Reflections, insights & paradoxes

The Oral Case-Based Assessment responds to a call for more integrated communication skill assessment, fostering critical thinking and the ability to articulate and defend ideas in navigating complex global challenges (Riemer, 2001; Idrus, Salleh & Lim Abdullah, 2011). With AI tools increasingly capable of generating written content, ensuring the development of 'own voice' and student communication skills, as well as establishing the authenticity of student submissions, has become challenging. Oral assessments effectively address this by allowing instructors to directly engage with students, verifying their understanding and authorship. We combined a written task with the students using generative AI as a reviewer with an oral discussion based on an engineering innovation. To offer scalable assessment to handle larger student cohorts, we organised the oral assessments as group discussions with two educators - one educator leading the discussion and the other taking notes on student activity and responses, with immediate grading after each session.

Idrus, H., Salleh, R., & Lim Abdullah, M. R. T. (2011). Oral Communication ABility in English: An essential skill for Engineering graduates. Journal of Educators & Education/Jurnal Pendidik dan Pendidikan, 26.

Riemer, M. J. (2001). Integrating oral communication skills in engineering education. In Proc. 5th Baltic Region Seminar on Engng. Educ (pp. 148-151).

Personal relevance

Large class sizes present significant challenges for engineering education at universities. Individual attention, crucial for grasping complex concepts and developing practical skills, is limited when instructors manage large groups, hindering student progress. Real-world application, bridging the gap between theoretical knowledge and practical scenarios, is crucial for preparing students for today's job markets. It's a hallmark in all Design Factory teaching, and at Aalto, is combined with scalable interaction to create a dynamic learning environment that promotes active participation and deeper understanding even with larger class sizes.

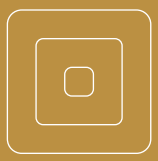
Showcasing an initiative from the author's institution

The oral case-based assessment was piloted in the Mechanical Engineering in Society course in 2023. With 120-150 students annually, oral case-based assessment was used as a summative assessment of student ability to identify and critically discuss influences and criteria that impact society in engineering innovation industry projects. The oral assessments were conducted in groups of up to 6 students. To prepare for the oral exam, students were encouraged to conduct background research to analyse how these dimensions may have influenced the development of the case product or organisation, as well as how the case topic may have influenced these factors.

Conclusions

Assessing students' understanding of their impact and responsibility towards society becomes challenging, particularly with assignments requiring detailed feedback. Maintaining engagement can be challenging, as interactive teaching methods and active learning techniques are harder to implement, leading to passive learning and decreased motivation. Group discussions around case studies enable efficient management of large classes while maintaining quality interactions and exploring real-world applications of engineering innovation practices. Additionally, oral assessments enhance students' verbal communication skills, vital for fostering multidisciplinary collaboration and effectively navigating a VUCA (Volatile, Uncertain, Complex, and Ambiguous) world. By promoting critical thinking and articulating and debating ideas, students are better prepared for professional environments.

Discussion & questions



Discussion Point 1:

Address the challenge of providing meaningful and timely feedback in large classes. This discussion would explore methods for scalable yet effective assessment, such as peer reviews, group projects, and the use of AI tools for grading and feedback. Additionally, it would consider how to balance standardised testing with assessments that capture a fuller range of student abilities, ensuring that the learning outcomes for engineering students are met comprehensively.

Discussion Point 2:

Examine the potential of oral case-based assessments to develop essential multi-disciplinary skills and prepare students for a VUCA (Volatile, Uncertain, Complex, and Ambiguous) world. This discussion would focus on how oral assessments can foster critical thinking, adaptability, and effective communication across different fields. Participants would share best practices for creating case studies that reflect real-world challenges and encourage students to think and collaborate across disciplines. How can oral assessments be structured to equip students with the skills needed to thrive in a rapidly changing, complex global environment?

Fishbowl question 1:

How can we promote student engagement with real-life cases outside of project-based courses and integrate this into learning outcomes?

Fishbowl question 2:

How can fostering student-led discussions on real-world challenges prepare students for active engagement in addressing societal issues?

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