

The background of the cover is a photograph of a modern building's glass facade. A white line-art map is overlaid on the image, showing a complex network of streets and building footprints. The map is oriented diagonally, matching the perspective of the building's facade. A small, rectangular, white, grid-like object is visible on the glass surface, possibly a sensor or a small display. The overall color scheme is dominated by the blue of the sky and the white of the map lines.

Applying Education in a Complex World

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Applying Education in a Complex World: Teaching and Learning

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INTRODUCTION

Applying Education in a Complex World: Teaching and Learning

Complexity theory, complex systems, complex strategies and a complex world. The range of concepts, practices, scenarios and metaphors through which we consider intricate, interconnected and changing phenomena is vast. The impact of this world view on how we operate is equally large. The education sector, like all those that make up the tapestry of contemporary societies and economies is not – and cannot be – immune.

The argument that the world in which today's students will eventually work, will be different and more complicated than the one they currently know, has become a truism. It guides our thinking in multiple ways. In this scenario, education is becoming equally fluid. We not only prepare students to face the changes we see occurring today, but shifts and developments no one expects, or predicts. We are obliged to think outside disciplinary boundaries. We adapt constantly to changing methods of teaching. We address new and emerging professions. We negotiate the demands of learners, parents, industries and business.

While this scenario may be contested by some, it is also welcomed by others. These proceedings, and the conference from which they come, reflect on its implications from various disciplinary standpoints.

TABLE OF CONTENTS

Chapter 1	
POST-PANDEMIC DESIGN STUDIO PEDAGOGY: A FOCUS GROUP (FGS) STUDY	1
Lama Khashab, Kellie Morrissey, Marc Oriain, Adam Deeyto	
Chapter 2	
EUROVALUES: RESEARCH, EDUCATION, AND ART – RESHAPING EU CITIZENSHIP	11
Sérgio Neto, Clara Isabel Serrano	
Chapter 3	
THE IMMERSIVE GAZE – EDUCATING FOR THE DESIGN OF LIGHTSCAPES THAT CONSIDER WELLBEING	19
Yael Erel	
Chapter 4	
MAKING SPACE AND ACKNOWLEDGING PLACE: REIMAGINING A COMMUNICATION DESIGN EDUCATION	29
Jon Hannan, Cameron Neat, Leo Vicenti, Ramon Tejada	
Chapter 5	
TEACHING CLIMATE RESPONSIVE ARCHITECTURE AND URBANISM	40
Santosh Kumar Ketham	
Chapter 6	
EDUCATION BACK: DECOLONIZING LEARNING FOR INDIGENOUS PEOPLES OF TURTLE ISLAND	53
Keshia De Freece Lawrence, Maria Ellen De Freece Lawrence	
Chapter 7	
COMPARISON OF PRESCHOOL PROGRAMS IN SWEDEN AND BOSNIA AND HERZEGOVINA IN THE CONTEXT OF THEIR SUSTAINABILITY IN RISK TIMES	61
Marica Travar, Mirjana Samardzic Jelcic	
Chapter 8	
THE WELCOMED PROBLEM: CENTERING THE ENDS TO DEVELOP THE MEANS IN ART EDUCATION	70
Breanna Shanahan, David Lerue, Jeannie Kyunjin Kim, Nancy Long	
Chapter 9	
ENABLING OWNER-OCCUPIERS TO RETROFIT: A PRACTICE-BASED STUDY OF ARCHITECTS' EDUCATIVE ROLE	79
Habib Ghasemi, Tara Hipwood, Peter Holgate	
Chapter 10	
PROPOSAL OF WORKSHOPS TO PROMOTE EDUCATIONAL INNOVATION IN HIGHER MATHEMATICS COURSES	90
Elton Barrantes Requejo, Haydee Azabache Caracciolo	
Chapter 11	
INTERPROFESSIONAL INITIATIVES: AT HOME IN MORE THAN ONE DISCIPLINE	99
Theo Lorenz, Tanja Siems	

Chapter 12	
DEVELOPING FUTURE-SCAFFOLDING SKILLS THROUGH COMPLEX SYSTEMS EDUCATION	111
Eleonora Barelli, Olivia Levrini	
Chapter 13	
INTERCULTURAL METHODOLOGY IN VIRTUAL SPACE	120
César Soria-Morales, Paola Banderas Quirola	
Chapter 14	
LEARNING LENSES: FOUR THEORIES FOR INTERPRETING EXPERIENCE DESIGN SCENES	131
Dennis Cheatham	
Chapter 15	
INSPIRATION AND PURPOSE: LESSONS FOR SUCCESSFUL ADULT EDUCATION	142
Pamela E. Ransom, David J. Rosner	
Chapter 16	
WHEN CULTURE FIGHTS EDUCATIONAL POVERTY, ENHANCING MUSEUM EXPERIENCE	150
Monica Amadini	
Chapter 17	
MIXED REALITY ENVIRONMENTS: AN EMERGING TOOL IN INTERIOR DESIGN EDUCATION	157
Jason Shields	
Chapter 18	
HOW DO PARTNERSHIPS BETWEEN ACADEMIA, COMMUNITIES, AND ORGANISATIONS FOSTER “REAL WORLD” LEARNING	167
Patrick Harte, Zuberia Hosanoo, Sarah Borthwick Saddler, Emma Hill, Ana Paula Fonseca	
Chapter 19	
EDUCATION POLICY, DIGITAL LEARNING AND (INVISIBLE) ENERGY USE IN UK SCHOOLS	179
Joshua Lait	
Chapter 20	
TOWARDS SUSTAINABLE TEACHING METHODS IN DESIGN STUDIOS	188
Tamadher Alfahal, Noor Aldoy	
Chapter 21	
ADAPTIVE REMIX: LAYERED COLLABORATION THROUGH ADAPTIVE REUSE	200
Michael Putman	
Chapter 22	
INTEGRATED MULTI-DISCIPLINARY APPROACHES IN HIGHER EDUCATION TO CONCEIVE FUTURE MOBILITY AND TRANSPORT DESIGN PRACTICE IN EXTREME SCENARIOS	206
Marco Zilvetti, Matteo Conti, Fausto Brevi, Richard Kotter	
Chapter 23	
TOWARDS A PROCESS-BASED MODEL THAT INCORPORATES PROFESSIONAL PRACTICE IN THE TEACHING OF ARCHITECTURAL DESIGN, WITH REFERENCE TO DESIGN STUDIO SIX	219
Amany Khalil, Samir Sadek Hosny, Dalia Anis, Sameh Emam, Basma Muhamed, Salma Elgendy, Nouran Ashraf, Randa Khalil	

Chapter 24

A SHIFT IN TEACHING ARCHITECTURAL DESIGN STUDIO: ADAPTATIVE REUSE AND RETROFIT AS THE MAIN FOCUS TO PREPARE STUDENTS FOR COMPLEX CHALLENGES OF A CHANGING PROFESSION 230

Luigi Pintacuda, Nenpin Dimka, Thomas Trail, Monica Cherry, Beniamino Polimeni

Chapter 25

CHANGING THE WAYS OF TEACHING ARCHITECTURE TO PREVENT PLACELESSNESS ARCHITECTURE TYPE, IN OUR COPY-PASTE GENERATION 241

Ana Luisa Rodrigues

Chapter 26

COMPLEX THINKING CHOREOGRAPHIES AND TRANSFORMATIVE PROCESSES 247

Ana Teixeira De Melo, Letícia Renault

Chapter 27

USING TEXT-TO-IMAGE ARTIFICIAL INTELLIGENCE PLATFORMS AND REPERTORY GRID TECHNIQUES TO GENERATE VISUAL BRANDING SCENARIOS 259

Ala' Albdour, Ahmed Agiel

Chapter 28

DESIGN FOR CHANGE: AN INTERDISCIPLINARY CRITICAL REFLECTION OF EQUITY IN DESIGN IN THE DIGITAL AGE 268

Ashton Margarete Moseley, Kimberly Bediako

Chapter 29

EXPLORING THE COMPLEX, EMERGENT CHOREOGRAPHY OF CLASSROOM TEACHING AND LEARNING. 278

Ben Knight

Chapter 30

COMPLEXIFYING THE SELF: THE BREAKING THROUGH OF THEATRE IN PSYCHOLOGICAL EDUCATION 288

José Eduardo Silva

Chapter 31

INTERNATIONAL VIRTUAL EXCHANGE AND THE PEDAGOGY OF GRIT 296

E. Blaise Depaolo, Sue Langford

Chapter 32

HOW ARCHITECTURAL EDUCATION CAN RESPOND TO AND LEARN LESSONS FROM THE FUSION OF TWO DIVERSE CULTURES INTEGRATING INTO ONE SYSTEM OF INTERNATIONAL EDUCATION 303

Jack Dunne

Chapter 33

WHAT IS ONLINE LEARNING IN THE CONTEXT OF THE 4TH INDUSTRIAL REVOLUTION? THE CASE OF A CONNECTIVIST MODULE INTO A TEACHER EDUCATION ONLINE COURSE 310

Emmanuel Dupl  a, B  atrice Crettenand Pecorini, Jonathan Weber, Mario Blouin

Chapter 34

TEACHING AND LEARNING IN THE FACE OF COVID-19: CHALLENGES AND REWARDS IN UNDERGRADUATE MATH CLASSES IN TUNISIA. 323

Rim Gouia Zarrad, Cindy Gunn, Meriem Salhi

Chapter 35	
FROM SENSE TO MEANING: APPROACHING A COMPLEX WORLD THROUGH STORYTELLING AND IMAGINATION	333
Leo Falcão	
Chapter 36	
MEDIA LITERACY – A VACCINE AGAINST FAKE NEWS?	342
Manfred Becker	
Chapter 37	
MAKING THE CASE FOR A MORE INCLUSIVE APPROACH TO SOFT SKILLS PROGRAMMING IN CANADIAN HIGHER LEARNING	352
Michel Shah	
Chapter 38	
AN VIRTUAL HYBRIDITY: A NEW PLACE TO DESIGN?	360
Rod Adams, Stuart English, Andy Frith, Craig Green, Emily Kirwan	

POST-PANDEMIC DESIGN STUDIO PEDAGOGY: A FOCUS GROUP (FGS) STUDY

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INTRODUCTION

The COVID-19 pandemic affected over 94% of the student population across the globe; the sudden, unexpected change forced academic institutions to navigate new approaches to cope with the negative impact of school closure.¹ For such institutions, online learning has become pivotal during the pandemic, facilitating the communication and learning process.² Over time, e-learning platforms have played increasingly an important role in online learning, providing a convenient way to access learning materials and facilitating interaction between teachers and students.³ However, the impact of this massive shift in teaching methodology during COVID-19 is still evident in the post-pandemic world, and it is quite challenging to understand the adequate online pedagogy needed for higher education.

One aspect of higher education that was particularly challenging during the pandemic were design studios, themselves built into the architectural fabric of an institution.⁴ The design studio education concept is built around the idea of providing an equipped, creative, open workspace that encourages students to develop authentic projects and expertise. This approach is used in a variety of educational disciplines – for instance, industrial and product design, fashion design, UX design, and architecture. Those studios usually adopt project-based learning concepts as the core of their pedagogical strategy.⁵ Despite the prevalence of emergency remote teaching ERT during the pandemic and concomitant digital advancements in the design field, the traditional studio approach is still favoured, even now.⁶ According to Fleischmann 2020,⁷ this has slowed down the widespread adoption of virtual studio practice. Moreover, in the past decade, many researchers and scholars have argued that digital design studios will not be able to fully replace traditional design studios in the future.⁸ However, with the rise of distance learning opportunities, remote working, and ‘digital nomads’, it is crucial for education providers to have a well-developed pedagogical strategy for design studios that make the best use of the technological achievements of design and offer a flexible educational environment.

DESIGN PROBLEM

Many Architecture and Design education studios incorporated virtual learning methods into the structure of their curriculum prior to the pandemic. Despite that, conventional educational methods, which require in-person participation, remained the dominant pedagogical approach. As a result, both

teachers and students encountered various difficulties in transitioning to a virtual design studio during lockdowns.⁹

MOTIVATION

The motivation behind this research is to understand how sudden social life circumstances, in this case, the COVID-19 pandemic, can change the traditional stances on education, as well as their method of delivery. The pandemic has highlighted how online education varies from the traditional pedagogical strategies typically followed by educational systems around the world. Various institutions were forced to re-evaluate and reshape their pedagogical approach to keep up with the changes.¹⁰

According to the England Office for National Statistics, data collected from 2020-2021¹¹ suggest that the educational material covered through digital learning in the field of arts and design was comparatively less comprehensive compared to other subjects. Due to the fact that other disciplines were able to adapt to the challenges posed by the pandemic and show improvements in their teaching and learning methods, while art and design subjects continued to face difficulties in maintaining consistency and effectively delivering content to students during the lockdown as shown in the following Figure 1.¹²

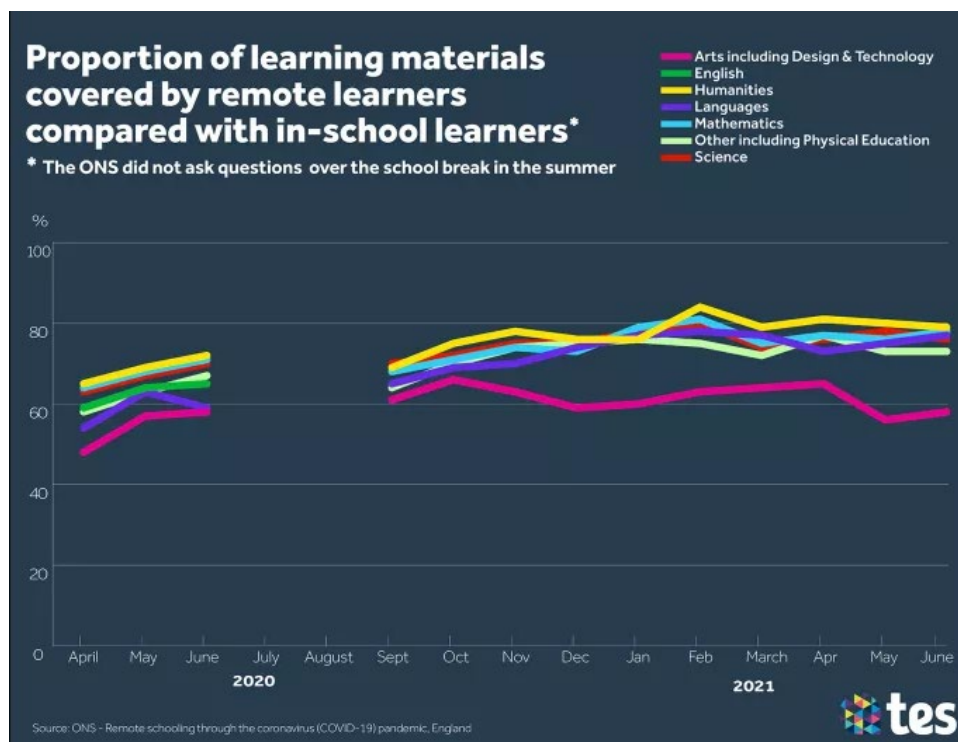


Figure 1. The proportion of learning materials covered by remote learners compared with in-school learners¹³

AIM

During the COVID-19 pandemic, the traditional pedagogical approach of design studios underwent significant disruptions, necessitating a shift from in-person instruction to online learning environments.¹⁴ Recognising the challenges posed by this transition, the present research aims to explore innovative approaches to enhance the online learning experience for both students and educators and this may be achieved through the following:

- Developing and restructuring the model of digital transformation in the design studios.

- Having a flexible/balanced educational structure that could withstand fast-paced changes.

OBJECTIVES

One key objective of this study is to understand the background of design studio pedagogy and its evolution over time. This will be determined through a comprehensive literature review. This review will critically examine previous studies carried out on the impact of COVID-19 on design studio education in terms of benefits, disadvantages, and restrictions. It aims to identify previous use and experience of blended learning and teaching methods in design studio pedagogy. Another key objective of this research is to understand theories underpinning transformative learning/teaching in the design studios, as well as to explore the characteristics of that transformation, in order to further develop approaches to transformative studio pedagogies. My research will uncover stakeholders' perceptions regarding online versus offline teaching/learning during and after the COVID-19 pandemic through focus groups. Moreover, this research aims to analyse the findings of the FGs and discuss those in detail with a smaller group of stakeholders (educators) via semi-structured interviews.

RESEARCH QUESTION

This research aims to answer the following key question:

How has the COVID-19 pandemic and its associated digitalisation of design studio education changed the practice, experience and planning of design education?

To answer this research question, the following sub-questions will be explored:

- How has COVID-19 changed the way that design is taught?
- How can web-based studios support students' development as designers?
- How could online learning tools be integrated to improve design pedagogy?
- How can design be best taught via distance education programmes?
- What are the benefits, disadvantages, and constraints of traditional/online design studio education?

RESEARCH METHODOLOGY

Approach

This design problem requires a pragmatic research approach to obtain a broader context and an adequate understanding of the subject matter. According to Saunders et al,¹⁵ “pragmatists recognise that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities.” This approach does not imply the necessity of using multiple methods; rather, it encourages the freedom and flexibility in identifying a method or more to be used to advance the research process without favouring one specific method over the other.

Secondary Research

This research is based on a review of related literature collected from books, articles, academic journals, websites, and other sources. Those sources were utilised to understand better the pedagogical strategy of design studios, to review case studies related to the impact of the pandemic on design studios, and to identify previously utilised blended teaching/learning methods. The data collected through this secondary research phase was collected and articulated into a narrative literature review, and the findings were used in structuring the primary research process and selecting the stakeholders.

Primary Research and Data Collection:

This study uses qualitative methods, with the primary research constituted by focus groups as the main method. Thematic analysis will be conducted to analyse the data. According to Braun &

Clarke,¹⁶ “thematic analysis is a method for systematically identifying, organising, and offering insight into patterns of meaning (themes) across a data set”

Focus group methodologies are well-recognised as a method that generates a different type of evidence than is possible from one-to-one interviews.¹⁷ Focus group methodologies are particularly relevant for this project due to their capacity to address both processes (e.g., how and why) as well as content (i.e., what) questions. In particular, they are noted for the possibility of cultivating natural conversation and discussion through 'synergy, snowballing, stimulation and spontaneity'.¹⁸

Focus groups are used in this research as the primary way to explore participants' feelings and thoughts without requiring them to reach conclusions or participate in a decision-making process. It also offers opportunities for diverse discussion and articulation of varying perspectives, allowing a collaborative and in-depth understanding of the topic in ways not always possible through more common data collection.¹⁹ Moreover, stakeholder interaction in informal atmospheres allows the flow of ideas and can be utilised as a brainstorming mechanism for the improvement of a particular product or concept.²⁰

In the future, this research will incorporate semi-structured interviews with educators in order to develop an understanding of their first-hand experience teaching design studios prior to, during and post-pandemic.

Ethical Issues and Considerations

This study involved interacting with human participants and therefore, it was necessary to obtain ethical approval prior to data collection. Ethical approval for this study was obtained on September 28, 2022, from the UL ethics committee. It ensured that relevant and appropriate research ethics protocols were to be followed and the Data Protection Act was given due consideration. The consent of participants was sought in advance, and they were informed about the details of participation in the study.

Focus group discussions carry the same ethical considerations as any other social research method.²¹

The prominent ethical issue with FGs is the confidentiality and handling of information, especially as there are multiple people involved in the discussions at any one time.²² Participants should be encouraged to maintain confidentiality regarding what is heard during the discussion. Following data collection, the researchers should anonymise data before it is finally stored and analysed.²³

Furthermore, prior to conducting the FGs, applying for and obtaining the approval of a relevant ethical committee approval is crucial to ensure that the methodological approach and questions are suitable and will not harm nor exploit the participants. Before data collection took place, all participants in the research were provided with information regarding their participation and signed the participant consent form.

Focus Groups

Five FGs were conducted and lasted for one hour each. These were held in private spaces at three Irish Higher Education Institutions: The University of Limerick UL, Limerick School of Art and Design LSAD, and Munster Technological University TUS. The rooms selected for the FGs were spacious, quiet, and free from any disturbances, and they were accessible by the research team and participants only. We gathered through a convenience sampling process. One faculty member from each of the aforementioned universities was responsible for forming one or two focus groups and inviting students willing to partake in the FGs. Not only were the focus groups composed of students from various fields of design, but they also consisted of students from varying levels of education and experience, allowing for all-inclusive, comprehensive data to be gathered for the study.

Data Collection Process

At the beginning of conducting this study, my supervisors' and I advertised it via email to current students and alumni in relevant design programmes at three Irish higher education institutions HEIs, Limerick University, Limerick School of Art and Design TUS, and Munster Technological University. The lead researcher's email address was given in the advertisement, and those interested in taking part contacted me via email. The interested candidates were contacted to seek their consent before participating in this research. Upon confirming their participation, they were informed about the process involved in obtaining their consent, which included signing on the participants' rights, i.e., that non-participation will not affect their grades, and they may withdraw from the study at any point. Participants were informed that arrangements to handle their data in a sensitive and confidential manner have been made, and their data will be processed only to achieve research objectives without causing damage or distress to them. Furthermore, the FGs were audio and video recorded after seeking consent from the participants. Then, their information was carefully managed, transcribed and analysed using the NVivo software.

The registration links were sent out to participants prior to the discussion, which revolved around the overarching research question of this study as follows: How has the COVID-19 pandemic and its associated digitalisation of design studio education changed the practise, experience and planning of design education? The following figure2 outlines the methodological steps through which the FGs were conducted:

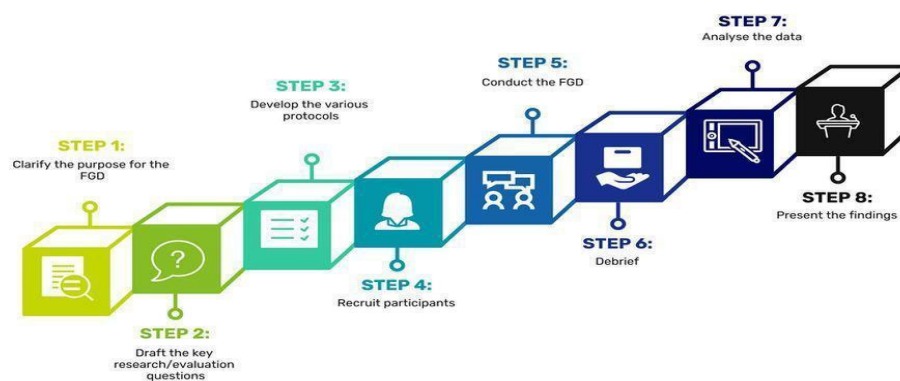


Figure 2. Steps To Conduct Focus Group Discussions: (Brown, N/A)

ELIGIBILITY CRITERIA FOR PARTICIPATION

Participants in these FGs were selected if they met all of the following criteria for participation in the study:

1. Experience of education disruption due to COVID-19: The study specifically targeted students who are, or were previously, enrolled in design education in an Irish institution and had encountered design education disruption during the COVID-19 pandemic.
2. Variation in educational levels: Participants at different levels of education, including Bachelor, Master, and PhD students, were sought for inclusion.
3. Diversity in design fields: Participants with diverse backgrounds in design fields, such as interior design, architecture design, product design, and others, were considered to ensure the inclusion of participants with different areas of expertise.

PARTICIPANTS' DEMOGRAPHIC DATA

This study comprised 16 students at Irish universities from different countries with varying design discipline backgrounds and experience. The participants of these FGs all took part in online design studio education during COVID-19 and had prior and subsequent in-person studio education experiences.

DATA ANALYSIS

After the data collection process was completed, the data were analysed carefully, and this section explains the steps of the thematic data analysis that were followed for this study. The software NVivo was used to code the qualitative data.

Coding Strategy

The data collected from the FGs went through different steps of thematic analysis. Data was entered into the NVivo software for qualitative analysis. In the first stage, major open codes were defined through listening to audio recordings, watching video recordings, transcribing data, and finally, by reading and coding line by line. This generated a large list of initial codes.

Then, codes were relabelled based on identified patterns; they were also organised from their current flat structure into a more hierarchical structure. This was done by linking similar codes, merging the codes, and deleting the repeated ones. In the next stage, the codes were structured via timeframe before, during, and after COVID to better understand their temporal meaning. Below are the main key codes that emerged from the data.

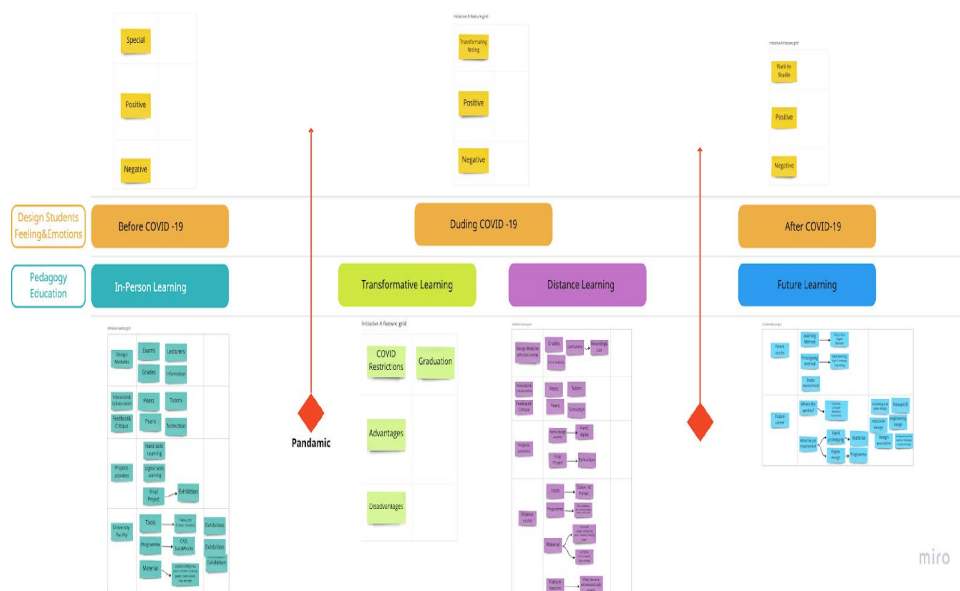


Figure 3. Thematic Coding of the data in NVivo by author.

In the final stage, codes were classified into two major themes and associated subthemes as follows:

-Personal feelings and emotions

•Before COVID-19

•During COVID-19

•After COVID-19

- Design Studio Education
- In-person learning design studio
- Digital learning design studio
- Future of learning design studio

The first theme concerns personal feelings and emotions, divided according to the time frame, i.e. before, during, and after COVID-19. The second theme follows a similar chronological structure but is more generally about the design studio pedagogy. It is split into three sub-categories according to teaching and learning methods, i.e. In-person design studio, digital design studio, and future design studio.

Focus Group Outcomes

As a result of an in-depth thematic analysis of the data collected through FGs, the following are the outcomes:

- Reached an understanding of the impact of COVID-19 disruption on usual face-to-face learning.
- Articulating of the efficacy of blended teaching and learning processes from a stakeholders' perspective.
- Defining stakeholders' future vision about the design studio education.

SUMMARY OF FINDINGS

After compiling the information gathered from all FGs conducted for this study and analysing the information by thematic analysis in NVivo software, it was noted that most participants had similar experiences and feedback. Below is a breakdown of the key similarities:

- All participants agreed that the recording and retrieving features in digital studios were the most beneficial aspect of the move from physical to digital environments. This allowed re-watching lectures, revising, and following content step-by-step at any time, which was impossible in the past.
- Many students were excited to study remotely at the start of the pandemic; however, soon, those feelings were replaced with disconnection, demotivation, uncertainty, loneliness and, in some cases a feelings of depression.
- The majority of focus group participants stated that the lecturers' online feedback process was tedious and time-consuming. In contrast, some participants found online communication more efficient than face-to-face interactions.
- Having to present work to everyone in an online setting enhanced the presentation skills of many students. Despite that, communication between peers seemed to involve an element of struggle.
- A large number of participants reported missing the in-person interactive environment of the physical studio during the university closure. Traditionally, studio work has a highly interactive atmosphere, and working in the same space alongside peers ensures everyone is on the correct and productive track. When education moved online, students fell behind the deadlines and lost motivation and confidence regarding their projects.
- Almost all participants agreed on the importance of practical skills that can only be obtained in a design lab or workshop. Virtual studies fall short of teaching essential technical prototyping and model-making skills, which can only be gained by practice in a physically equipped space, such as a design studio.
- Some participants expressed that not just them but also their friends did not feel confident going to job interviews as they felt that online learning did not provide them with the necessary skills to secure employment in the future.

- According to some participants, students who did not experience online learning due to COVID-19 are more fortunate, as they would have the opportunity to experience appropriate design studio learning.

CONCLUSION

Our data analysis indicates several strong links between the lockdown and students' experience of digital learning. It is evident that there are some negative connotations associated with online learning, such as the sense of depression and loneliness experienced, which can be traced back to the challenging circumstances of the COVID-19 lockdowns. Being confined to their homes and separated from their peers and traditional learning environments, students faced unique emotional struggles that contributed to their overall experience. However, students also indicated several positive aspects of online learning.

The findings of these FGs reflect the significant potential of incorporating a blended pedagogical strategy into the foundation of design studio education. Further primary research is necessary in order to explore different pedagogical approaches to design studio development. It may be useful to conduct semi-structured interviews with a smaller group of stakeholders for instance, educators to obtain a fuller picture of the situation. Collecting data from both ends of the spectrum would be beneficial, as the students and educators are involved in the same educational system and learning process, allowing us to build a multifaceted picture of all stakeholders' experiences, as well as hopes for the future of digital design studios.

NOTES

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EUROVALUES: RESEARCH, EDUCATION, AND ART – RESHAPING EU CITIZENSHIP*

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INTRODUCTION

The European Union (EU) is one of the greatest development projects of the 20th century. In the last decade, however, the EU has seen a rise in populist discourse and exclusionary politics within its internal borders. This trend has implications for the future of the European project, challenging the functioning of its institutions and the development and implementation of Community policy, and posing a threat to its very founding values. In this challenging context, a team of researchers from the University of Coimbra (UC) launched the EUROVALUES project. Based on the methodological premise of the co-construction of knowledge, the aim of the project is to stimulate analysis, debate and artistic creation around the values shared by all Member States, on two levels:

- 1) with secondary school groups, using various interactive methodologies.
- 2) with teacher training courses aimed at supporting the creation and management of open learning environments to promote the full participation of the youngest in civic life.

Based on the dialogue between science, culture, and art, EUROVALUES focuses on the dissemination of research and knowledge produced at UC, in school communities and in outreach to civil society. The aim of this paper is to present this project, to reflect on it, and to discuss the first results obtained.

Context and background

The creation of the European Economic Community (EEC) in 1957 was the result of a long political and economic process in the aftermath of the Second World War and in the context of the Cold War. The main aim of the project was to create a free trade area to put an end to the long-standing Franco-German rivalry. Portugal's accession in 1986 was decisive for the country. After having experienced the longest (far-right) dictatorship in Western Europe (1926-1974), Portugal fought a costly colonial war in Africa (1961-1974), which only ended with a hectic revolutionary process (1974-1976). Restricted to its European borders, Portugal lagged behind the economic and social development of its future European partners and suffered from a high illiteracy rate. Thus, as some historians have pointed out, the EEC/EU played an important role in stabilizing democracy, economic growth and development, and education.¹

Despite significant progress, especially in the 1980s and 1990s, recent decades have been marked by a certain degree of scepticism of the Portuguese towards the EU. According to some authors, the “lost decade” of 2000 and the financial intervention of the Troika (IMF, European Central Bank and

European Commission) following the sovereign debt crisis are probably among the events that most contributed to increasing this mistrust.² For their part, several researchers have sought to examine the educational context in order to make the analysis more comprehensive. In this sense, school textbooks, especially history textbooks, have provided some interesting answers, highlighting the lack of Europeanist content and even a certain degree of “moderate Euroscepticism”.³ It is also important to bear in mind that, unlike in other countries where the 2019 European Parliament elections saw the highest turnout in the last twenty years, largely thanks to the youth vote, Portugal saw the highest abstention rate ever (68,6%).⁴

How do we explain all these findings and perceptions? Is Portugal drifting away from Europe? And what about the resurgence of the populist discourse in Europe? In fact, until 2019, Portugal did not have a single far-right MP in its national parliament, while in 2021 this political force reached 7.2% of votes. On the other hand, the country’s demographic ageing, the post-pandemic economic crisis and the outbreak of the war in Ukraine, as well as the increasing numbers of immigrants, have contributed to a certain deterioration of public debate, with a simplistic and extremist approach to these issues becoming widespread. As we approach the 50th anniversary of the commemorations of 25 April 1974, the “Carnation Revolution” that ushered in the democratic regime in Portugal, it is therefore important to deepen the debate.⁵

TEAM AND METHODOLOGY

The first phase of the EUROVALUES project was based on a case study developed with three classes of the Estarreja Secondary School. Estarreja is a Portuguese town located in the district of Aveiro, close to Porto (the second largest city in the country), integrated into the Centre Region (NUT II). This municipality, with markedly rural characteristics, “very quickly became an industrial municipality, with the working population moving from the primary to the secondary sector” starting in the 1950s.⁶ Due to its accessibility by road and rail, Estarreja Secondary School is attended by students from the five parishes that make up the municipality, as well as from neighbouring parishes: Ovar, Oliveira de Azeméis, Albergaria-a-Velha and Murtosa. The school has a particular tradition in the teaching of humanities, and in the current academic year, it is the top public school in Portugal with the highest average in the national history exam (a score of 17 on a 20-point grading scale).⁷

This first phase of the project, which ran from October 2022 to June 2023, involved 60 students from two Year 11 classes and one Year 12 class in the Languages and Humanities course in mainstream secondary education.⁸ This case study followed a qualitative methodology,⁹ within an interpretive research paradigm, using open-ended and closed-ended questionnaires, semi-structured group interviews and observation. The data collected were analysed using descriptive statistics.

The following steps were taken to implement the project: 1) presenting the project to the school director and requesting permission to carry it out; 2) requesting informed consent from the student’s legal guardians through the classroom teachers; 3) all students were informed about the objectives, tasks and duration of the project, the survey, and the semi-structured interviews. Participation in the project was entirely voluntary. The report on the information collection is available to all legal guardians of participating students, teachers, and the school community.

The survey had the approval of the Ethics and Deontology Commission (CEDI) of the Faculty of Psychology and Education Sciences of the University of Coimbra (FPCEUC). Anonymity was guaranteed by the UC Data Protection Officer. The socio-demographic data requested were age, gender, year of study, and location. No unnecessary personal or institutional information was asked to ensure protection and privacy. To ensure anonymity, alphanumeric codes were used to identify the subjects.

In order to create an interdisciplinary project, the research team includes two historians (PI & Co-PI) with strong experience in research on topics related to Contemporary History, European Studies, Didactics of History and Education Sciences, with a particular interest in civic education, contemporary political systems and democratic transitions; a specialist in European Studies, with research experience in EU policy and politics, Europeanisation processes, and governance and democracy; a political scientist with research experience in various fields of Social Sciences and Humanities, with a focus on Identity Studies; a Social Services specialist who has worked with secondary school students, teachers and parents/guardians; a specialist in collections management, science communication and interpretation, museography and exhibition development; two designers who have been working at the intersection of history and art, raising questions, mostly on social and political issues.

DESCRIPTION

The first phase of the project consisted of four sessions, preceded by visits to the school by the team to meet with the school board and the History, Philosophy, Geography, Citizenship and Development and Physical Education teachers. The team also visited the school facilities. The school has been recently renovated as part of the work carried out by Parque Escolar and provides excellent conditions for the educational community.

All the students gathered in the Estarreja Secondary School auditorium for the first two sessions. In the first session, in October 2022, the team members promoted a critical and analytical dialogue on European values, their determinants and historical roots, using the photovoice methodology. In the second session, in December 2022, the questionnaire was used to collect data and textual elements (keywords, sentences, topics and viewpoints), which then made it possible to draw up a sentimental “mapping” (mapping/tracing) of European values in writing. These sentences served as the basis for the subsequent creation and production of an art installation. In the third session, held in February 2023, group interviews (semi-structured) were conducted to deepen the data collected from the questionnaires. The fourth visit to the Estarreja Secondary School in March 2023 focused on the development of the art installation. This consisted of producing an interactive multimedia artefact presenting the different textual elements produced by the students and collected during the second session. This artefact was designed in such a way that each “voice” was given its own visual expression (through a differentiated plastic treatment regarding the choice of typography, colour, shapes and other visual elements), allowing for a polysemic visual result.

In other words, the idea was that the different sentences produced for the installation (one for each student) would reveal each student’s own way of relating to the concept of European values, producing different visual compositions. These compositions were arranged in the school library in May 2023, forming an interactive installation that allowed each visitor to interact with each of the sentences. The installation used a motion-sensitive device to detect the presence and/or movement of the public in front of it, thus stimulating the public’s relationship with the sentences. Later, in June 2023, the Estarreja Secondary School students travelled to Coimbra to exhibit the art installation in the Paço das Escolas of the UC.

In a second phase – which is not yet implemented – the EUROVALUES team will develop content for short training courses aimed at primary and secondary school teachers. The aim will be to support teachers in promoting the full participation of young people in civic life by creating an open learning culture and environment in their classrooms. The ultimate aim is to fight against threats to Europe’s integrity and promote the defence of its rights and values, without losing sight of security and the defence of democracy.

FIRST RESULTS AND DISCUSSION

Photovoice is a method that uses an extremely powerful communication tool – the visual image. The reason for choosing this method was that it has the potential to enhance and capture the perceptions and experiences of the participants. Iconography and photography provoke reactions, evoke memories, make the invisible visible, and thus help to understand experiences or phenomena. In addition, they broaden sensory awareness and enhance the process of reflection.¹⁰ In this sense, the first two sessions used some iconic works of art, such as *La Liberté guidant le Peuple* [Liberty guiding the People], painted by Eugène Delacroix in 1830, or *Guernica*, by Pablo Picasso (1937). These works were then compared with some of their contemporary reproductions: the poster by Céline Lentz and Pierre Gaudouin, which appeared on the occasion of the 2015 Paris Climate Summit, “updating” Delacroix; and the cartoon *Guernica by Sea*, by Javcho Savov, also from 2015, that transposes the themes and figures of the destruction of the Basque town to the drama of refugees on the Mediterranean.

Other images juxtaposed refugees from different historical periods, including recent and contemporary, i.e., refugees from the war in Ukraine and African refugees arriving in the EU after crossing the Sahel and Mediterranean. The aim was to assess whether these people would be welcomed differently, in particular, whether refugees from Eastern Europe would elicit more empathy from the students.¹¹

The “Cassandra myth” was also discussed, considering how this episode from Greco-Latin mythology has been used to discuss the famous axiom of philosopher George Santayana, “those who cannot remember the past are condemned to repeat it”. Karl Popper’s “paradox of intolerance” was also discussed. It should be noted that less than half of the students were able to establish a connection between Cassandra’s myth and the recent past (of European history) and the present but only described the myth in more or less detail. With regard to the Popper exercise, most students understood the implications and the difficulties of giving an answer, but 17 considered the option of “being intolerant of the intolerant”, with 10 of these students giving reasons for their choice. The fact that students had already studied this paradox in Philosophy, using a well-known cartoon of Nazism, probably contributed to their response.

The questionnaire consisted of eight questions. Here are some examples. With regard to Question 1 (open question; five students did not answer), “Which value best characterizes the EU”, the results are shown in Figure 1. Students identified two of the values of the revolutionary triad of 1789 as the most important, with “freedom” being the most significant. It is noteworthy to bear in mind the different “freedoms” mentioned by the students during the sessions: the “freedom” that their grandparents did not enjoy during the 48 years of dictatorship in Portugal; but also, the “freedom” that the students, at an average age of almost 16, begin to see as a fundamental value of adulthood (18 years old in Portugal). As regards “tolerance”, it is important to stress the many campaigns carried out by the Member States and the EU for the integration of refugees and migrants. In this sense, this sample does not differ from the results of the *Special Eurobarometer 508* (fieldwork: October-November 2020) published in 2021, which showed that “more than six in ten EU citizens place a high value on tolerance. On average, respondents in Europe are very likely (64%) to indicate placing importance on listening to others and understanding those who are different from them (value of tolerance), with 29% agreeing somewhat”.¹² For the Estarreja students, however, this value elicited more responses than “democracy” or even “human rights”. It is therefore important to reflect more deeply on the multiple aspects of the problem. After all, we should do more than just accept the “Others” – we should understand them.

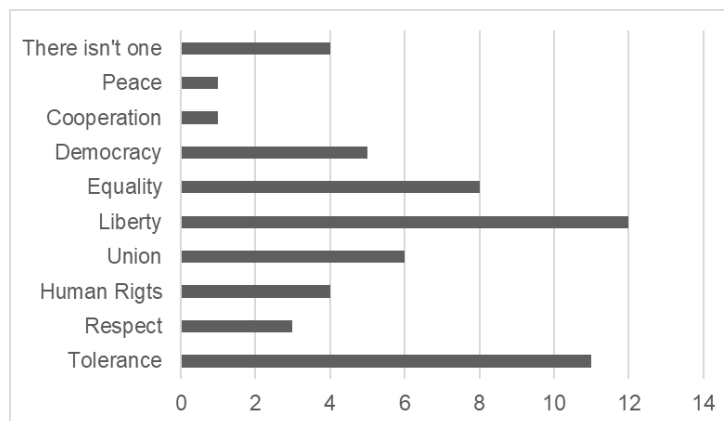


Figure 1. Values that define the EU

With regard to Question 2 “How do you see the start of the European project”, the results were as shown in Figure 2. It is understandable that the answer with the highest percentage was “peace project responding to the world wars” (67%) since the effects of the conflict in Ukraine itself overlapped with the other elements (economic, social). While the results of Figure 1 highlighted “freedom” as a key European value, the results of Figure 2 underline the importance of the need for peace for the life and cohesion of peoples at a time when Europeans are confronted with a new war on the continent. In any case, according to a Eurobarometer survey of Portuguese adults, in the autumn of 2022, “rising cost of living, for example, increasing food and energy prices” (98%), “poverty and social exclusion” (95%), “climate changes” (92%) and “the spread of the war in Ukraine to other countries” (91%) were among the top concerns.¹³

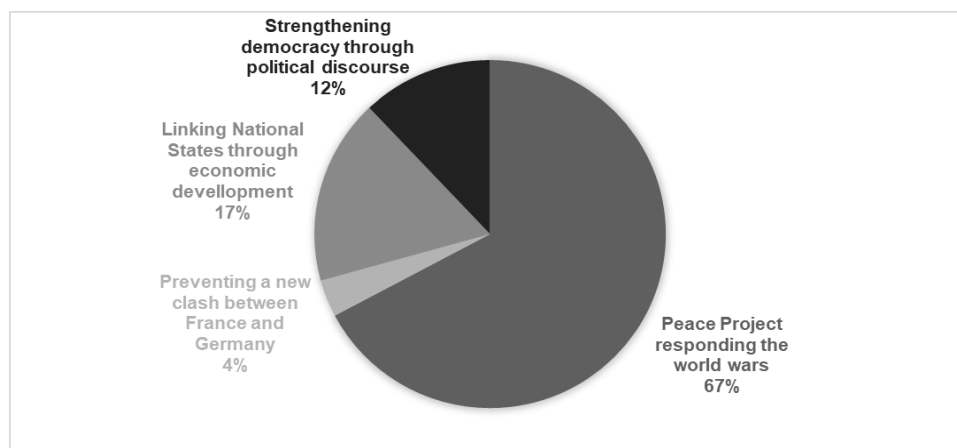


Figure 2. Approach to the beginning of the European Project

In response to Question 3, “How do you rate the EU’s action to combat racism and discrimination?”, the majority of students answered “fair”. The second most popular answer was “good”. Given the debate around the *Guernica by Sea* cartoon, these results may be surprising. However, students respond to EU policies rather than to individual and social attitudes. On the other hand, it is important to keep in mind how the issue of racism is perceived by Portuguese society, and in particular its generally positive relationship with its former empire. This sympathetic view of the Portuguese as a non-racist people is certainly an echo of the well-known ideology of the Estado Novo regime, lusotropicalism. This issue needs to be deepened and compared with the analyses around the

“imperial” content that history curricula and textbooks continue to present, and which some authors have proposed to effectively decolonize.¹⁴

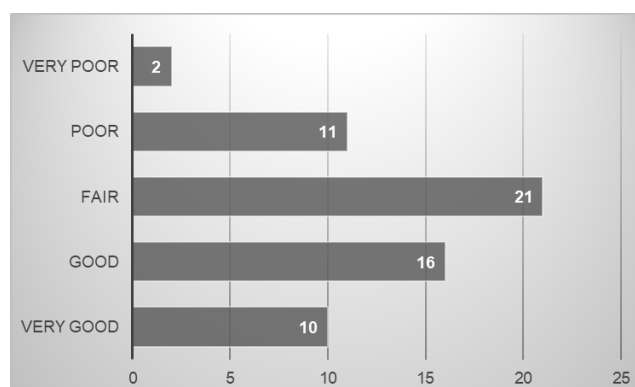


Figure 3. Evaluation of the EU's role regarding racism and discrimination

CONCLUSION

It should be taken into consideration that this study has some limitations. First of all, the data is still provisional. They need to be expanded by carrying out similar projects in other educational institutions in the country, and then to be compared with studies conducted in other European countries. On the other hand, only one school has been approached and short training courses for teachers have not yet been carried out. In any case, these first data can already be compared with other information regularly collected by the EU. The analysis of these proceedings included three questions/answers, and the proposed article should make use of the eight questions/answers. It should be added that, based on these results, an art installation was designed and inaugurated at the Estarreja Secondary School on 18 May 2023.

Preliminary results suggest that students are not always able to make links between the past and the present. They relate the EU to the world wars, but most of them fail to draw the full consequences of the “Cassandra myth”. While they question the “Popper paradox” with reasoned arguments, the truth is that they highlight “tolerance” as the fundamental value of the EU. Is this an abstract understanding of this value? Like “freedom”?

Expanding this project in Portugal and replicating it in other European countries can actively contribute to overcoming economic, social, and cultural inequalities, developing personalities and the spirit of tolerance, mutual understanding, solidarity and responsibility, social progress, and democratic participation in collective life. This means promoting active citizenship, civic participation and building resilient societies and stronger democracies (Sustainable Development Goals #4 and #16). These analyses could serve as a basis for policy recommendations and teacher training activities in order to explain and understand how education can be a driving force in fostering feelings of belonging or, on the contrary, differences towards the EU and its institutions. They will also contribute to understanding the role of history teaching in developing (non-)identification processes.

NOTES

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⁴ "2019 European elections: Record turnout driven by young people" *News European Parliament*, accessed June 16, 2023, <https://www.europarl.europa.eu/news/en/press-room/20190923IPR61602/2019-european-elections-record-turnout-driven-by-young-people>.

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⁸ Characterisation of the target group of this case study: 18 boys | 42 girls; average age: 15.97 years.

⁹ Sharon M. Ravitch and Nicole Mittenfelner Carl, *Qualitative research: bridging the conceptual, theoretical, and methodological* (Thousand Oaks, CA: SAGE Publications, 2016).

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THE IMMERSIVE GAZE – EDUCATING FOR THE DESIGN OF LIGHTSCAPES THAT CONSIDER WELLBEING

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INTRODUCTION

Can we design dynamic lighting environments that consider wellbeing? How can educators frame teaching immersive light art in this context? In this paper I will explore the potential of dynamic light art to impact our wellbeing through reviewing Jefferson University's 2022 Immersive Arts for Health Student Design Competition. As an architect and light artist I have been teaching an immersive light art seminar that studies the construction of atmospheres with light for the last eight years. In response to the competition, I worked with a group of undergraduate architecture students to develop a competition proposal, merging aspects of my lighting seminar studies with light and health research. I will discuss top awarded proposals in the competition as well as my students' work that was awarded an honorable mention.¹ In addition I will investigate how different educators, whose students also participated, approached teaching toward developing dynamic light art proposals for waiting rooms with wellbeing in mind.

The 2022 Immersive Arts for Health Student Design Competition was a global competition that challenged students to apply their skills and creativity using evidence-based research in order to design light installations that could have a positive impact on patient health. The competition was sponsored by the Jefferson Center of Immersive Arts for Health.²

As noted by Jefferson University's 2022 Immersive Arts for Health Student Design Competition Brief,³ research has shown that being exposed to art in health care settings may positively impact human health.⁴ Most existing research noting such impact has focused on static art – i.e. painting, prints and sculptures. More recently, there have also been studies that show that Virtual Reality (VR) also shows positive effects in pain management and lowering anxiety.⁵ VR creates an immersive environment that engages the user, and as such, utilizes Distractive Therapy. Ulrich notes that positive distraction implies "certain types of environmental elements are especially important in reducing patient stress and promoting wellness."⁶ Ulrich states that positive distractions can include "certain types of music, companion animals such as dogs or cats, laughter or comedy, certain art, and especially nature."⁷

The competition brief hypothesizes that an immersive environment with a dynamic light component in real space may show similar effects to VR through drawing the viewer's gaze and attention while still connected to a real world setting, which may create a positive distraction. The Center for Immersive Art for Health has collected data on viewer response in the WAITING ROOM exhibition,

which featured six light artists, as well as works by top student entries. The results of this research will be presented later this year.

The competition brief tasks students with designing a proposal for dynamic lighting that would promote an engaging environment in a healthcare setting with the intention to immerse the viewer in a self-reflective or calming experience.⁸ Proposals needed to be backed up by peer-reviewed research regarding the proposed effect, and had to assume a healthcare site without interrupting its overall activities. Students needed to consider requirements of a healthcare setting, as well as installation, setup maintenance, energy, and control. Lastly students were asked to develop a prototype within a budget of \$500 for material costs and hardware so that the three top ranked winning proposals could be constructed and exhibited in HOTBED gallery in Philadelphia together with six selected artists.⁹

I will highlight the four institutions linked to four winning submissions in addition to two honorable mentions. In order to analyze pedagogical strategies for teaching immersive light art, I conducted a series of interviews with the faculty in each of these programs and have compiled some observations and insights. In each program, I note student background, the nature of the program, the structure of the course which culminated in the competition submission, and general insights from the educators.

As an overall observation, it was fascinating to discover we each came from a variety of backgrounds and there was no homogeneous way of approaching this type of education. We all were looking for the balance between academic research on the fields of art, light and wellbeing, and the experimental approach that is necessary when working with light as a medium.

METHOD - PEDAGOGICAL APPROACHES TO IMMERSIVE LIGHT FOR HEALTH

Institution: Jefferson University

Course: Health and the Art Experience Interdisciplinary Seminar

Educators: Prof. Lyn Godley, Prof. Rachel Brandoff

To begin, I would like to acknowledge the driving force of this competition, Prof. Lyn Godley, Director of the Jefferson Center of Immersive Arts for Health. Prof. Godley is a light artist who curated and participated in the WAITING ROOM exhibition. Godley's research is at the intersection of light, art and health. She has received multiple grants to develop curricula to this end, including a grant supporting this exhibition, which was sponsored by the Jefferson Center of Immersive Arts for Health. Godley also received a grant to develop the course Health and the Art Experience at Jefferson University, which was co-taught with Dr. Rachel Brandoff, Arts Therapist, and Dr. Wendy Ross, Director of the Jefferson Center for Autism and Neurodiversity. Professors Godley, Brandoff, and Ross approached the course from two perspectives—design and art therapy—to create an interdisciplinary course targeted at students from design, medical and science backgrounds.¹⁰

Health and the Art Experience is a University-wide elective seminar. In Spring 2022, the course had an even distribution between students with design and medical/science backgrounds. The seminar covers research on the effect of art on health. Throughout the course, students research, design, and create immersive experiences that could benefit patients and caregivers. Students developed proposals based on research, to provide a theoretical and academic foundation for their hypotheses. Student teams were interdisciplinary, linking science and design skills within each team. This team composition led to proficiency in both science and design research. Throughout the course, students also conducted material experiments. In an interview, Prof. Godley observed that experimentation is essential in the process and allows students to establish and define the experience they are looking for rather than be attached to an external, pre-defined idea.¹¹

Institution: Parsons, School of Design

Course: Light-Space Art (L-S A) Graduate Seminar

Educators: Prof. Glenn Shrum, Nic Herrera

Entries by Parsons School of Design students received both First and Third Place awards. Both entries were a product of a graduate elective course titled Light-Space Art (L-S A) led by Glenn Shrum and supported by Nic Herrera. The Light-Space Art course format combines seminar and studio methods to introduce L-S A through precedent research, field visits, technology workshops, and development of an L-S A installation as a proposal for submission to the student design competition. The class was interdisciplinary in its composition: half of the students were second year Master of Fine Arts and Lighting students, while the other half had no lighting background.¹²

The structure of the course focused on three learning domains as shown in Table 1.

Domain Name	Description	Specific Aspects
Topic Areas	Light-Space Art affects viewers in physiological and psychological ways	Form - Space/Time - Mechanics - Physiological Response - Psychological Response - Concept
Lighting Technologies	Select techniques and tools that enable dynamic Light-Space Art outcomes	Projection Mapping - DMX Lighting Control
Application Premise	Introduce the physiological and psychological effects of L-S A on the viewer in a healthcare setting	Emotional Impacts - Biological Impacts - Outcomes in Health Care Contexts

Table 1. Structure of L-S A Course at Parson's School of Design

Students were given select readings relating to three fields: the use of art in health care environments, light and health, and natural patterns and fractals.

The semester was split into two parts – the first was composed of analyzing case studies through the lens of Topic Areas to unpack the aspects of different case studies. In the second part of the semester, students developed an L-S A installation as a proposal for the 2022 Immersive Arts for Health Student Design Competition.¹³

School: New York University, Interactive Telecommunications Program

Course: Light and Interactivity

Educator: Prof. Tom Igoe

The second entry tied for first place was connected to New York University's (NYU) Interactive Telecommunications Program (ITP). The proposal was a final phase for the graduate seminar Light and Interactivity taught by Tom Igoe. The seminar teaches students various controls and systems for interactivity that engage light and environment through multiple fronts. Through physical observations, students learn about the subtleties of lighting conditions and learn how to recreate similar conditions using tools in the class. Similar to the L-S A seminar from Parson's, the semester was split into two, where the first part is focused on developing tools and observations, and identifying the health care problem through interviews and research. The second half of the semester was used as a workshop to finalize a working prototype that was entered into the competition.

Institute: KTH Royal Institute of Technology

Course: Master's Thesis Architectural Lighting

Educator: Lecturer Foteini Kyriakidou

Second place was awarded to a student at KTH Royal Institute of Technology in Sweden. The submission was part of the student's final thesis for a master's in architectural lighting design. The thesis semester is 10 weeks long, where the student meets with a thesis tutor for six hour increments and concentrates all their time on this single project. In this context, the student had the benefit of participating in a lighting program, and therefore has been immersed in the field of light, its relationship to health and spatial design. As a thesis project, there was a focus on intent and clarity which was reflected in the student's personal investment. In an interview with Foteini Kyriakidou, she stated "I think their [students'] personal experience becomes quite crucial, so the subjectivity is a factor that affects this." Kyriakidou sees the necessity for intent and clarity as having an impact on how the work is seen because "if the artist has a very clear scope, somehow you perceive it."¹⁴

Institute: Rensselaer Polytechnic institute, School of Architecture

Course: Undergraduate Research Program

Educator: Prof. Yael Erel

Lastly, I led a group of five students in an undergraduate research seminar which was titled Immersive Art for Health. Students conducted academic literature reviews parallel to brief spatial experiments in light. In the second part of the semester, students were working toward completing a proposal for the competition. Students had access to previous virtual lighting seminar lectures as well as lectures and resources on the Light4Health consortium website. Throughout the semester we had a number of reviews with external critics who provided us insight towards the final submission.

CASE STUDIES - PROPOSAL ENTRIES

First Place (Tied): *Windowscape*

Institution: Parsons, School of Design

Student Team: An Hsu, Renee Peng, Tzu Hsin Lu

In this entry, Hsu, Peng, and Lu wanted to address physical restriction of the space inside of a hospital, where waiting rooms can often be disconnected from the outside world. The piece shows the dynamic yet subtle change of the shadow of a tree. Through this window, one gets a sense there is a space beyond the wall. The students were inspired by research that links natural landscape imagery to reduction in stress.¹⁵ *Windowscape* was structured so that the light source was in the back, motorized swaying opaque objects were in the center, and a translucent paper covered the mechanism. This setup created a sense of a living, natural scenery taking place behind the picture plane.

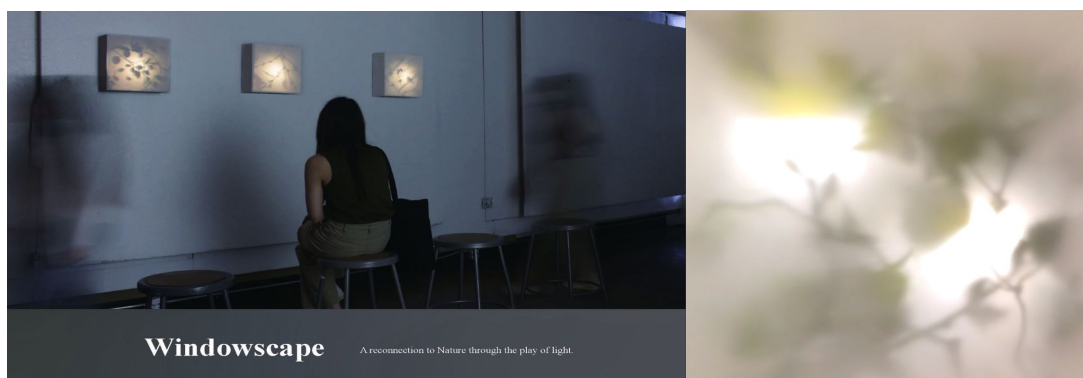


Figure 1. 1A. Image from *Windowscape* Proposal 1B. Image of *Windowscape*, as constructed (photo by Author)

First Place (Tied) Dune

Institution: New York University, Interactive Telecommunications Program

Student Team: Jason Gao, Marcel Wang

The proposal *Dune* was created for a massage therapy waiting room. In the piece, Gao and Wang designed the shadows of a 3D printed fabricated landscape to change through a slow transition. Their fabricated landscape was inspired by Zen gardens in an attempt to create space for a meditative gaze. Students referred to research that linked natural landscape with patient wellbeing.¹⁶ In the proposal, the students developed and specified lights, controls, scripts, 3D files, and materials lists. These elements were assembled as the final light object.

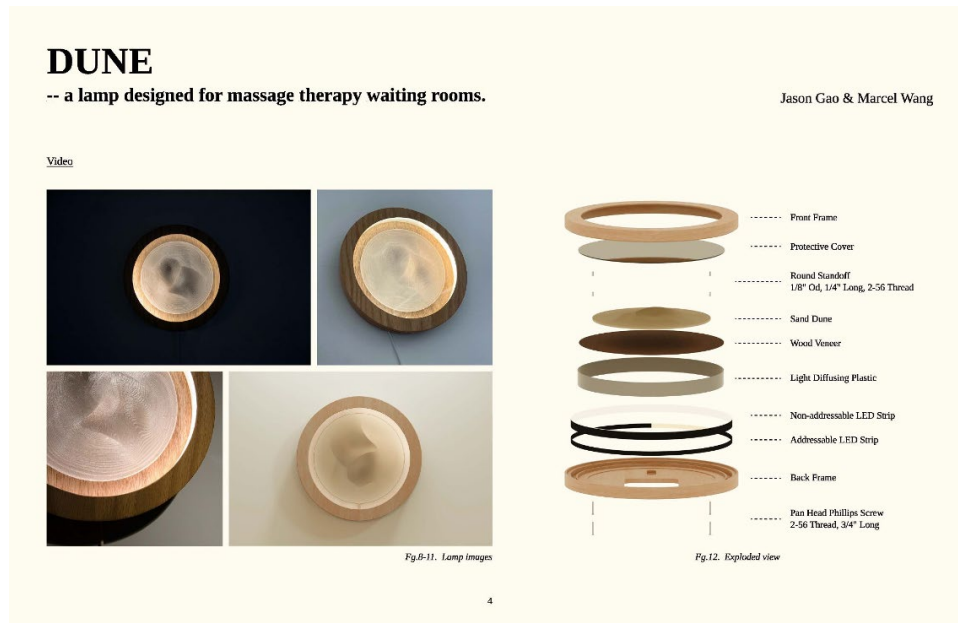


Figure 2. Image from *Dune Proposal*

Second Place: *Lightpulse*

Institute: KTH Royal Institute of Technology

Student: Alejandro Lizarralde

Lightpulse is meant to promote a state of relaxation through an art piece that changes its illumination through time. Based on personal experiences and interviews, Lizarralde focused on waiting rooms in cancer facilities. *Lightpulse* provides an external tool to focus one's breathing in a stressful time when anticipating test results based on research that shows that relaxation and imagery are useful mechanisms to cope with stress and pain.¹⁷ The student framed and researched their project at the interdisciplinary center of art, light and health. *Lightpulse* was conceived as an integration of dynamic light and breathing techniques. The physical properties of the piece stemmed from deep observation of different lighting conditions such as color palette and color changing pace during summer dusk in the long Nordic sunset. The light is combining a dynamic projection with a static backlit source.

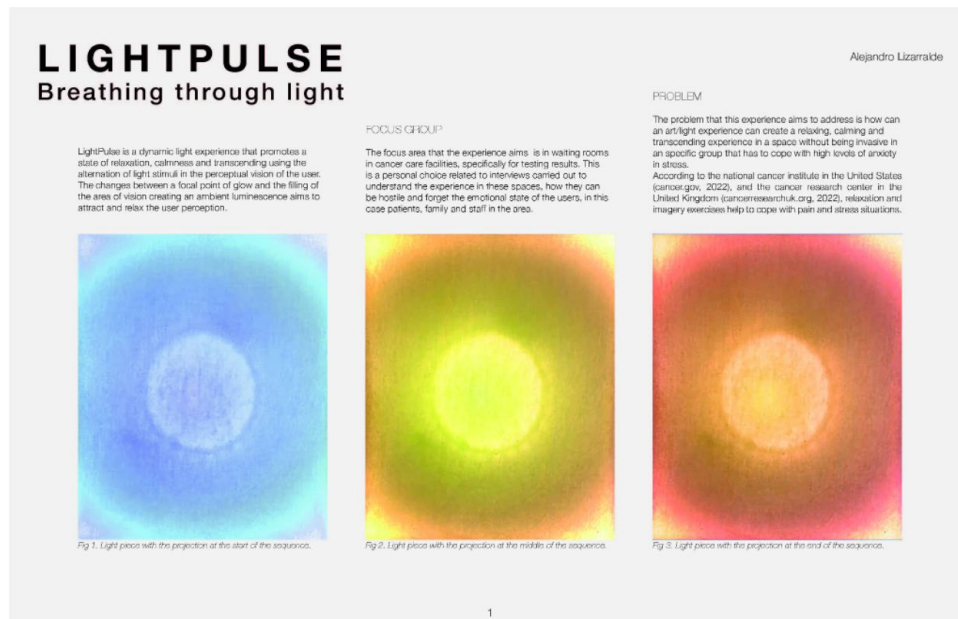


Figure 3. Image from Lightpulse Proposal

Third Place: *Moon in Color*

Institution: Parsons, School of Design

Student Team: Ashley Chan, Yeonsoo Cha, Ajin Cho

In *Moon in Color*, Chan, Cha, and Cho identified the problem that waiting rooms often do not have access to daylight or relation to the outside. To bring the outside in, the team created a cycling color object inspired by the moon's phases. This effect was created through a combination of reflective mylar sheets and dichroic film to create a complex set of reflections and refractions stemming from changing light sources within the enclosure. The team related the fractal form to research linking biophilia (a human tendency to connect with nature) to improved overall health.¹⁸



Figure 4. Image from Moon In Color Proposal

Honorable Mention: Memory Lens

Institution: Rensselaer Polytechnic Institute

Student Team: Andrew Martin, Daniel Blanco, Kara Nedvar, Amber Reich, Amatullah Kose

The entry *Memory Lens* won an honorable mention in the competition. Martin, Blanco, Nedvar, Reich, and Kose created a dynamically changing lightscape that transforms from urban to natural scenes using backlit silhouettes to induce positive memories in the viewer. Throughout the process, the students developed prototypes and experiments, testing multiple mechanisms and materials to produce the desired dynamic lightscape. Students cited research that linked art to psychological and physiological benefits in patients.

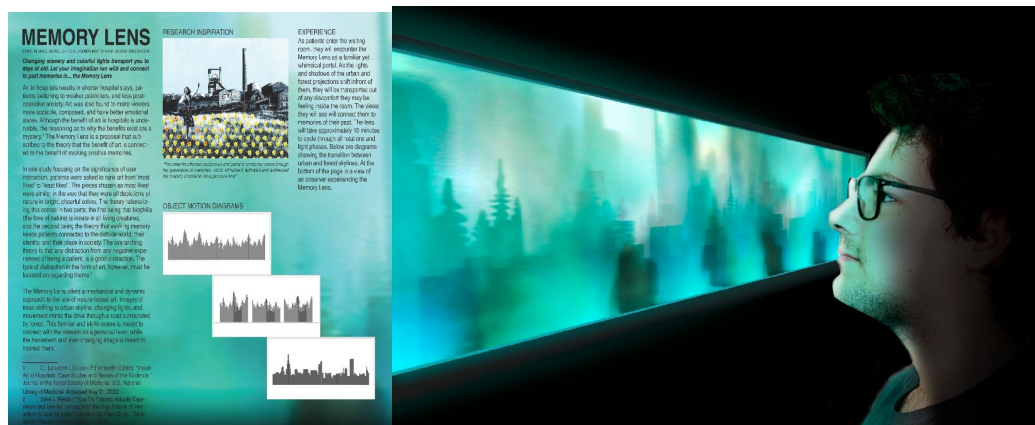


Figure 5. Image from Memory Lens Proposal

DISCUSSION

When educators' different pedagogical approaches are compared, a base structure of research leading into a proposal emerges as a common structure. However, it is important to note how research is defined in these different contexts. In some cases, the research was based in art as much as it was in medicine or science. I believe that integrating the artistic and experiential dimensions throughout the research fosters a generative environment. When Olafur Eliasson speaks of teaching materials like light, he essentializes the experimental approach. In speaking to my fellow educators, I was inspired by some of their observational approaches, such as the inquiry of a candle flame: its qualities of light, intensity and rhythm, and then reconstructing them as an experiment. Such an exercise changes the way the students see light, and therefore, how they design with it. The pedagogical sequence, and the amount of complexity and restriction students are introduced to at the beginning of such a process may determine how closed or open students may be to exploration. Creating art in this context requires managing programmatic constraints in addition to the best healthcare practice requirements. Art in this context must negotiate all these levels. This negotiation seems like a fairly specific undertaking, but there is a community of educators all wrestling with the same questions. The exposure to the Waiting Room exhibition, as both artist and educator, has introduced me to a community of like-minded educators that may provide each other with important insights.

The proposals developed in the context of this competition were aimed at creating a real-world solution for a dynamic light art within a waiting room and the many activities that typically take place in one. As such it had very strict design guidelines for the students to respond to, which limited student proposals to object-scale elements that could be added to a minimally lit environment. This scale most closely responds to the brief, and therefore more likely to be applied in an existing waiting

room. The scale also interrogated if a more fully immersive environment would be productive in such settings.¹⁹

CONCLUSION

This analysis only touches the surface in assessing what we need to teach immersive art for well-being, as light art and health is a deep field. Its pedagogy must combine a hands-on component in which students understand how light functions as a material grounded in academic research. Prof. Godley suggests that the structure of a light art and health course may be more appropriate as a graduate program rather than a single course to take on the immensity of knowledge and scope.

Each of the educators introduced a different lens into the research, but all stated the importance of calibration and observation, and most importantly testing. The critical component of working toward submissions for this competition was how to introduce the brief without drowning the students in research that could close them off. Rather, students should be given room for play and exploration side-by-side with research, precision, and focus. This may be a question of the order of things: The most successful course structures seemed to create an initiation into experimentation and play and only then introduced curated academic research and competition requirements in the second phase with testing and experimenting throughout.

ACKNOWLEDGEMENTS

Thanks to Lyn Godley, Tom Igoe, Foteini Kyriakidou and Glen Shrum for their generosity in sharing their work and thoughts with me. Thank you Lorelei Wagner for the thoughtful editing and discussions.

NOTES

¹ “The 2022 Immersive Arts for Health Student Design Competition”, The Jefferson Center of Immersive Arts for Health, accessed June 15 2023, <https://www.jefferson.edu/academics/colleges-schools-institutes/kanbar-college-of-design-engineering-commerce/jefferson-center-of-immersive-arts-for-health/competition.htm>

² “The 2022 Immersive Arts for Health Student Design Competition”, The Jefferson Center of Immersive Arts for Health

³ “The 2022 Immersive Arts for Health Student Design Competition Brief”, The Jefferson Center of Immersive Arts for Health, accessed June 15 2023, https://www.jefferson.edu/content/dam/academic/kanbar/immersive-arts-center/competition/BRIEF_Immersive%20Art%20for%20Health%20Design%20Competition.pdf

⁴ Judy Rollins has created a through book that surveys different aspects of art that affect wellness in hospitals: Judy Rollins, “‘Purpose-Built’ Art in Hospitals: Art with Intent.”, *‘Purpose-Built’ Art in Hospitals: Art with Intent.*, 2021, xvii, 238–xvii, 238, <https://doi.org/10.1108/9781839096808>.

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⁶ Roger S Ulrich. “Effects of interior design on wellness: theory and recent scientific research”. *Journal of health care interior design : proceedings from the ... Symposium on Health Care Interior Design. Symposium on Health Care Interior Design*, 3 (1991): 97–109. <https://europepmc.org/article/med/10123973>

⁷ Ulrich “Effects of interior design on wellness”

⁸ The Jefferson Center of Immersive Arts for Health, The 2022 Immersive Arts for Health Student Design Competition, accessed June 15 2023, <https://www.jefferson.edu/academics/colleges-schools-institutes/kanbar>

⁹ I was one of the six artists to participate in the exhibition WAITING ROOM. My involvement with the exhibition and being an active light educator led to the creation of an undergraduate research group at Rensselaer Polytechnic Institute (RPI) that responded to the competition brief during the spring 2022 semester.

¹⁰ An entry from this course was awarded an honorable mention, which I will not analyze here

¹¹ Virtual Interview, Dec 22, 2022

¹² Students who entered the course without any lighting background were provided pre-recorded prior class materials

¹³ Virtual Interview, Feb 1, 2023

¹⁴ Virtual Interview, Jan 19, 2023

¹⁵ Franco Trevisani et al., “Art in the Hospital: Its Impact on the Feelings and Emotional State of Patients Admitted to an Internal Medicine Unit,” *Journal of Alternative and Complementary Medicine (New York, N.Y.)* 16 (August 1, 2010): 853–59, <https://doi.org/10.1089/acm.2009.0490>.

¹⁶ Jo H, Song C, Miyazaki Y. Physiological Benefits of Viewing Nature: A Systematic Review of Indoor Experiments. *Int J Environ Res Public Health*. 2019 Nov 27;16(23):4739. doi: 10.3390/ijerph16234739. PMID: 31783531; PMCID: PMC6926748.

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¹⁸ Alexander Coburn et al., “Psychological Responses to Natural Patterns in Architecture,” *Journal of Environmental Psychology* 62 (April 1, 2019): 133–45, <https://doi.org/10.1016/j.jenvp.2019.02.007>.

¹⁹ Some of the six invited artists developed full-scale works in the *Waiting Room* exhibition that met the lighting standards for room function. Those rooms garnered some positive responses, though they may be more complex to spatially execute in a normative waiting room environment.

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MAKING SPACE AND ACKNOWLEDGING PLACE: REIMAGINING A COMMUNICATION DESIGN EDUCATION

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INTRODUCTION

2020 was a year of considerable change for the Communication Design Program at Emily Carr University of Art + Design, Vancouver, BC. Faced with the uncertainty of pivoting to online teaching and the complexity of developing an engaging online studio learning environment for our students, we set about reconsidering our program values as we entered a process of Program Review at the University.

In the Spring, a small team of faculty were tasked with the development of new program-level learning outcomes for our undergraduate core studios, while simultaneously reflecting on unfolding world events such as the murder of George Floyd in the United States and the ongoing discoveries of atrocities committed at Canada's residential school system. The nature of these events, coupled with a student-led petition demanding a more equitable and anti-racist curriculum at the University,¹ made clear that we must acknowledge our own biases and radically rethink our approaches to practice; make space for a more diverse range of voices within our program; and consider how we might develop an anti-oppressive pedagogy.

VALUES, LEARNING OUTCOMES & ANTI OPPRESSIVE PEDAGOGY

Entering the task of reconsidering our program values and developing new learning outcomes as a team of faculty composed entirely of settler-Canadians, we were aware of our limitations. We understood the importance of reaching out and diversifying the voices within this conversation to best represent the diverse student community at the University. Zooming out and looking at the program across entire year groups and considering the arc of the student journey, rather than a class-by-class review, enabled us to engage a broader range of faculty in the activity. This brought greater diversity and range of lived experiences to the discussions through the addition of indigenous and BIPOC perspectives.

Following multiple sessions that spanned several months, five core areas of a student growth were identified that ran across the entire three years of the program: Research & Finding, Process & Practice, Realization & Presentation, Agency & Criticality, and Community & Ecological Perspectives. The core areas were then mapped to each year group, emphasizing the increasing expectation within each area on students progressing through the program. Discussions between faculty highlighted the need for a flexible framework of ideas that could aid in the task of developing

anti-oppressive pedagogy within Design disciplines. Stemming from this rich dialogue on our values arose the *Anti Oppressive Pedagogy Framework*, a research project lead by faculty Bonne Zabolotney and Cameron Neat. The resulting framework and summary were instrumental in our curriculum development and has since been shared as an open resource publication through BC Campus.²

SECOND YEAR DESIGN STUDIO

As we began to reflect on the nature of our second-year curriculum (the first year of the Design program following Foundation), we looked to introduce a project schedule and project themes that both reflected our new learning outcomes and embodied many of the anti-oppressive pedagogical ideas that were beginning to emerge. This task was complicated by the switch to online teaching, and we were committed to give greater space and time for both faculty and students to adjust to the change. Taking these factors into consideration, we made the decision to shift from our traditional three project model to a two project model that would allow for a slower pacing (see fig. 1), while creating space for guest workshops that would challenge and disrupt our ways of making.

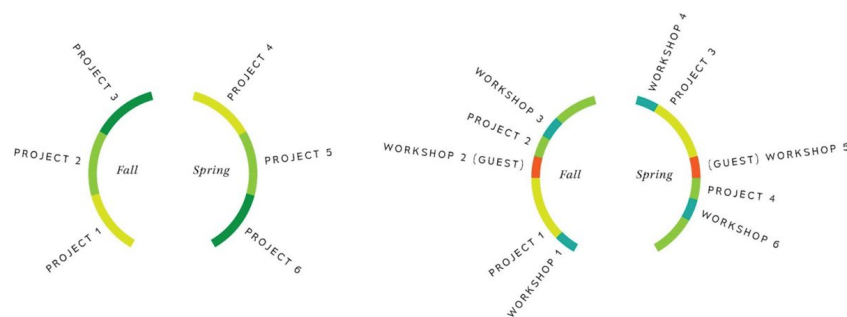


Figure 1. Previous three project semester model (left) and the revised two project semester model (right).

While developing new projects grounded in our program values and learning outcomes certain themes emerged: what it means to study design in Vancouver; how we might develop a curriculum that emphasized the importance of “place” and “community”,³ and what it means to come together virtually during a time of social isolation. These themes were used to inform and guide faculty on the direction of redevelopment of the program. While our approach to the embedding of technical skills within projects remained largely the same, the contextual framing was dramatically restructured.

An example of this is the first student project, *Movie Poster Design*, in which students are asked to watch a series of movies, before choosing one movie to design a poster for. Over several weeks they follow an iterative process of meaning-making through experimentation, conceptual development and draft making, before realizing one idea in a final poster. In previous iterations of the project, we had asked students to broadly engage with different genres of cinema such as drama, science fiction or horror. During this project, we instead asked students to choose from a carefully curated selection of movies that engaged with specific topics such as social justice, marginalization, or indigenous histories and perspectives. By engaging with this content, students were able to develop their visual communication skills while simultaneously engaging in conversations on topics like appropriation, stereotyping and misrepresentation (see fig. 2).



Figure 2. A selection of second year outcomes for the Movie Poster Design project.

The *Place-based Zine* project starts the spring semester and is intended to focus the student's attention on the place in which they are currently situated, to allow them to gain a greater understanding of their environment and consider their position within their community. They are introduced to multiple methods of design research through a brief that encourages them to collect a series of 50 objects within their community, before learning the principles of editorial design through the iterative development of a publication featuring the materials (see fig. 3). The final stage of the project asks them to create multiple copies of the publication to share back with the community, distributing them at locations they have identified through their research as being of local importance.



Figure 3. A selection of Place-based Zines created by second year students.

GUEST WORKSHOPS

While engaging with these projects students were also participating in a series of guest workshops with educators from across North America that could challenge and disrupt our ways of making through one-week workshops that emphasized BIPOC, indigenous and queer perspectives in design. The visits were a tremendous success and had a dramatic impact on our program, faculty and students. With the support of our Dean, we reached out through our professional networks and invited several educators from across North America including: Ramon Tejada, Associate Professor at Rhode Island School of Design; Silas Munro, Assistant Professor at Otis College of Art; Sadie Red Wing, Assistant Professor of Graphic Design at Ontario College of Art & Design University; Nicole Killian, Associate Professor at Virginia Commonwealth University; and Briar Levit, Associate Professor of Graphic Design at Portland State University.

The first of these workshops, and the one which undoubtedly had the biggest impact on our program by enabling us to develop a framework for future workshop interactions, was the visit of Ramon Tejada. Having discovered Ramon's work through his contribution to the *Decolonizing Design Reader*, we invited him to disrupt and challenge our second year curriculum through his process of “puncturing” that makes space for non-western perspectives.⁴

The *Throw the Bauhaus Under the Bus* workshop acts as an interrogation of the Bauhaus framework that has defined much of Graphic Design education over the past century,⁵ and questions what is interpreted as the “good” or “correct” process of making. Reveling in being messy and exploring new and uncomfortable methods, Ramon led both students and faculty through a series of intensive online making and ideation sessions (see fig. 4). Participants were asked to bring an object that reminds them of an important person in their lives, then take that object through 2D, 3D and virtual modalities, interacting with a range of physical and digital tools while critically reflecting and sharing their ways of making. The final stage of the workshop asked individuals to turn their creations into an animated GIF that could be sent as a gift to whoever inspired the original object.



Figure 4. Ramon Tejada leads faculty and students through the *Throw the Bauhaus Under the Bus* virtual workshop.

The process proved transformational for many of the students, helping them to explore and develop confidence and a personal way of making that went on to define the remainder of their studies and thesis projects. Following the completion of the workshop, several students applied for funding to create a publication that documented the workshop and could be broadly shared with the second year students the following year, further sharing the learnings from the sessions and continuing the conversation started by Ramon⁶ (see fig. 5).



Figure 5. *Design as Play* publication by Aily Nishioka and Hayley Ng.

Further workshops included: empathy mapping with Silas Munro where students explored various community issues before considering how designers can be more thoughtful in how they approach community-centered work by asking “how may we?” contribute to the situational context as designers,⁷ An exploration of indigenous representation with Sadie Red Wing through object-based storytelling (see fig. 6); an exercise in “queering” design with Nicole Killian through the composition of scores that students then acted out through their bodies,⁸ and participating in re-making the canon of design history with Briar Levit by contributing to the *People’s Graphic Design Archive*.⁹ Each of the guests had a lasting impact on not only the students involved, but also on the faculty. They brought an energy and fresh perspective, leaving us with new ideas and approaches to studio-based teaching that inspired us to think how other parts of our program could reflect the approaches spearheaded in second year.

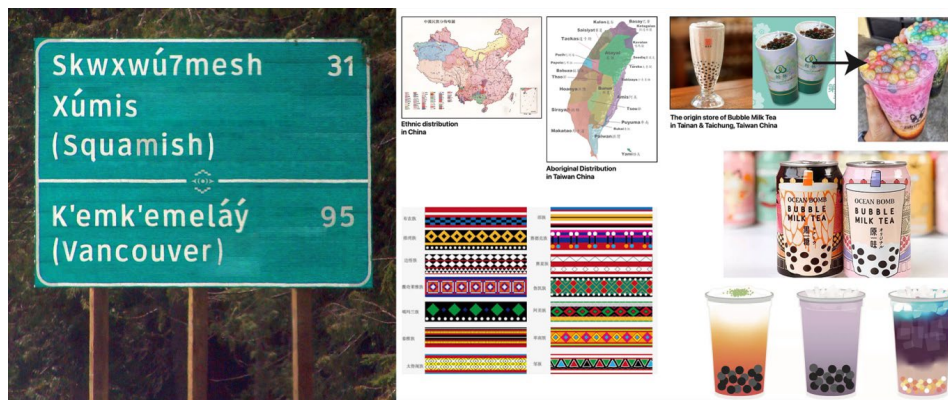


Figure 6. Examples of student outcomes generated in a workshop on indigenous representation with Sadie Red Wing.

FOURTH YEAR DESIGN STUDIO

As several years have passed since we introduced the revised structure to the second year curriculum, we have seen many of the students who were part of the second year cohort progress into the fourth and final year of the program. Traditionally built around the development of a capstone thesis project, fourth year Communication Design studio had previously centered around the development of a single project that would be showcased in the University’s Grad Show event. Structured as a self-directed class, students were expected to take their project through several explicitly stated research and development stages, punctuated by critique and presentation with their peers and faculty mentors, and culminating in the formal presentation of works in the Grad Show.

Anecdotal feedback from students indicated that while the Grad Show was an important milestone for them to celebrate with their peers, it was not necessarily the most useful exercise in preparing them for a career as a practitioner. Faculty therefore took the decision to intentionally uncouple the learning outcomes of the class from the Grad Show and instead asked the students to determine the criteria of success. This started with conversations with the students as to what their ambitions were for their project and post-graduation, and how we might best use the class time to develop a body of work that best serves those interests. Where previously we may have assumed that many students would aspire to an entry-level job in the creative industries, we discovered that there were a varied range of expectations and ambitions. Students provided varied responses including: interest in further study; working as a sole-practitioner; and working within the non-profit sector amongst others.

Keen to bring the learnings from the second year curriculum into the class, while still allowing the students agency to determine the focus of the class, faculty adjusted the fourth year of the program to reflect our new collective values. In many cases the changes were more subtle, but there were palpable shifts in language and emphasis. Shifting the perception of the class from being the final part of an art school journey and encouraging students to, instead, consider it as the first step in a life-long career as a creative practitioner (see fig. 7). This included moving away from the emphasis of students identifying a “problem space” that their project intended to solve through problem/solution thinking. We instead encouraged the nurturing of a “practice space”, a broad area of overlapping communities of practice they can work through and become contributing members of that would have a life beyond the end of the class.

COMD-400/410
Assignment: Summer Prep

Reflect on your practice and identify two potential project themes or practice spaces you could explore in 4th year studio.¹ Create two research proposals to share in the first class.²

400/410 Overview

4th year is often framed as the last chapter in the story of your Design School education. It can instead be more helpful to think of it as a new chapter in the story of your career-long development as a designer. 400 & 410 studios present the opportunity to bring together your knowledge, skills and interests to shape a practice space and portfolio that best prepares you for your next chapter, be that working as a practitioner in the field, further education, or another self-determined pursuit.

The working relationship with faculty shifts in 4th year, with faculty acting as guides and resources. You are expected to engage with faculty by preparing materials and questions for meetings on a regular basis. You are expected to manage your own project(s) in relation to key semester deadlines and deliverables, engaging with the processes of assessment, self-assessment and critical reflection that support your learning and growth across both semesters.

There is an expectation that you situate yourself in the COMD studio and maintain the pace of your own practice, taking the lead on your project(s) and not waiting for faculty instruction on next steps or methodologies. 4th year core studio is self-managed and you are expected to choose an area of investigation, select appropriate working methods and determine the criteria for success.

Resources

Grad Show 2022
2021 Visual Communication Design Grad Shows

1. Summer is a time to think broadly about your practice and interests. Choose themes or practice spaces in which you have a genuine interest and are passionate about, rather than ones you think are impressive. You are asked to identify areas to investigate through studio practice, rather than a specific artifact, campaign, or system to design. Looking at the current Grad Show website can give you a sense of the expectations of 4th year studio.
2. 500 words and accompanied by images (PDF, max 10 pages x2). You should consider including background information and considerations such as: cultural, historical, contextual, geographical, semantic, aesthetic and/or technological factors. Give each proposal document a title and include a potential reading list and things you have already read/seen/experienced that you think relevant to your proposal.

Figure 7. Sample of capstone project information presented to students entering their fourth year of study.

While some students do skillfully identify specific problem spaces to respond to, we found that by adjusting the emphasis of the class that many students felt empowered to identify projects that were celebratory in nature and not problem-centered. Many students use the thesis as an opportunity to explore their own culture. With the previous problem-centered lens, students had gone into their communities looking for problems to solve, an approach with the potential of leading to harmful behavior or the perpetuation of cultural stereotypes and stigma. The shift away from problem-specific thinking presented the opportunity for cultural celebration and public-service to form part of the capstone project, allowing the students to use their skills to positively contribute to their communities. This shifted the role of faculty from ensuring that students collectively met specific criteria and project milestones, to supporting and nurturing the development of individual project plans for research and development that were aligned with individual student ambitions. Two years have passed since we restructured the curriculum and many of the students who were part of the 2020 second year class have graduated. What we have found is that the student projects now cover a diverse range of outcomes and practices, touching on personal history, culture and issues of concern.

The first example is *Ecuadorian Futurism* by Camila Burbano del Alcazar, an interactive reflection on the identity and cultural legacy of Ecuador. Working with the concept of Ecuadorian futurism, Camila aims to, “bring Real Maravilloso/magic realism elements to the forefront as a way to reconsider and

explore Ecuadorian culture”.¹⁰ A series of masks in the form of Augmented Reality (AR) filters allow the user to embody different characters that each speak to different Ecuadorian folk cultural traditions, holidays and stories (see fig. 8). While we do not have a dedicated AR class within the Communication Design program, the structure of the capstone project presented Camila with the opportunity to independently pursue her own interest in AR through a studio-based Communication Design project.



Figure 8. A sample of Camila Burbano del Alcazar's *Ecuadorian Futurism* AR masks.

Another example is Michelle Zheng's *AZN Femzine* and the *Dim Sum Collective*. A direct response to the March 2021 Atlanta spa shooting during which six Asian women died,¹¹ Michelle's project goal was to create a community among Asian American Pacific Islander (AAPI) women to share their stories of experience involving racism and misogyny through the design of a print-based publication *AZN Femzine* (see fig. 9). Broader project goals included the organization of the *Dim Sum Collective*. Named after the Chinese tradition of afternoon tea during which friends and family come together, the *Dim Sum Collective* uses design to create space for discussion, empower women and encourage vulnerability through storytelling.

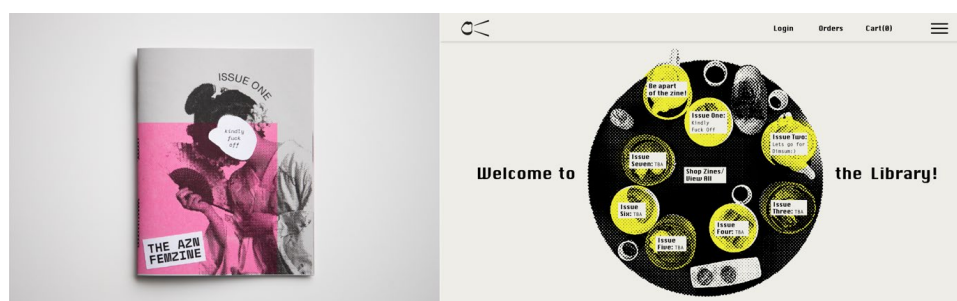


Figure 9. Michelle Zheng's *AZN Femzine* (left) and the *Dim Sum Collective* website (right).

The final project example is Kin Chua and Fyonna Laddaran's *Bahay Natin* (Our House). Sharing an interest in the intersections of food and Filipino resilience, their project sought to understand how colonialism and migration impacted Filipino cuisine and culture, asking "How do we begin to understand our place in the world as Filipino-Canadians?" Embracing cultural ceremonies such as the *Kamayan* or *Boodle Fight*,¹² the project emphasized communal eating and story gathering as design research, creating a space for the sharing of local stories concerned with immigration, identity and food. Further conversations with local Filipino-Canadian creatives, community advocates, and scholars brought an awareness of the issues faced by Filipino people in Vancouver and an understanding that the process of constructing and reconstructing cultural identity can be complex, nuanced and multi-faceted. Project deliverables included the development of the *Bahay Natin* dinner kit that consolidated many of the project learnings into a kit that would allow other Filipino people to host their own story-sharing *Kamayan* event (see fig. 10).



Figure 10. Kin Chua and Fyonna Laddaran's Bahay Natin dinner kit (left) and Kamayan research activity (right).

CONCLUSION

While the last few years have been incredibly difficult - balancing student expectation and experience with the challenges and limitations of teaching through unfolding world events - it has also presented many opportunities to rethink pedagogical approaches and reflect on what we hold dear as designers and educators. We are emerging from a forced online teaching environment into predominantly in-person or hybrid forms of instruction, but rather than simply reverting to what we did before the events of 2020, we find ourselves looking to bring forward many of the new approaches and learnings from our time online as permanent additions to our program. The ongoing and reflective nature of this exercise has taught us the value of slowing down and how working slowly can give us the time to listen, reflect and move forward. The guest workshops, which were initially considered low-stakes interactions for our students, brought incredible value to the learning experience, a diversity of perspectives and served as a source of great inspiration for faculty. We have therefore endeavored to maintain these virtual interactions with our long-distance academic collaborators. This has meant embracing a more flexible and hybrid approach to the use of technology, through an approach that appreciates the benefits of bringing international perspectives into the classrooms. Simultaneously, it emphasizes the importance of designers understanding the local context and the value of community participation, acknowledging the privilege of being able to gather and learn together.

NOTES

- ¹ Gillian Siddall, "Reflections on Transformation: A Message from President Siddall," Emily Carr University, August 17, 2020. <https://www.ecuad.ca/news/2020/reflections-on-transformation>.
- ² Kat Khong, "Co-Designing with Anti-Oppressive Action Frameworks for Curriculum and Pedagogy," BCcampus, August 9, 2022. <https://bccampus.ca/2022/08/09/co-designing-with-anti-oppressive-action-frameworks-for-curriculum-and-pedagogy-part-two/>.
- ³ Miri Yemini et al. "Place-Based Education – a Systematic Review of Literature." *Educational Review*, February (2023): 1–21, doi.org/10.1080/00131911.2023.2177260.
- ⁴ "The decolonizing, [or puncturing, or de-Westernizing, and SHIFTING], Design Reader," *Decolonizing Reader*. Accessed June 20, 2023. <https://tinyurl.com/y43sukuu>.
- ⁵ Ghassan Zainel Mahmood and Nsiyf Jassem Mohammed. "The influence of the Bauhaus in contemporary graphic design," *Al-Academy*, no.107 (2023): 257–70, doi.org/10.35560/jcofarts107/257-270.
- ⁶ Perrin Grauer, "Joy, Imperfection and Humanity in Design," Emily Carr University. February 2, 2021.
- ⁷ Rikke Friis Dam and Teo Yu Siang, "Empathy Map – Why and How to Use It," The Interaction Design Foundation, November 17, 2016. <https://www.interaction-design.org/literature/article/empathy-map-why-and-how-to-use-it>.
- ⁸ Meg Miller, "What Does 'Queering Design Education' Actually Look like in Practice?" *Eye on Design*. January 28, 2019. <https://eyeondesign.aiga.org/what-does-queering-design-education-actually-look-like-in-practice/>.
- ⁹ "Mission Statement," The People's Graphic Design Archive. Accessed June 20, 2023. <https://peoplesgdarchive.org/about#mission>.
- ¹⁰ "Magic Realism," Tate. Accessed June 20, 2023. <https://www.tate.org.uk/art/art-terms/m/magic-realism>.
- ¹¹ Richard Fausset, Nicholas Bogel-Burroughs, and Marie Fazio. "8 Dead in Atlanta Spa Shootings, With Fears of Anti-Asian Bias," *The New York Times*, March 17, 2021. <https://www.nytimes.com/live/2021/03/17/us/shooting-atlanta-acworth>.
- ¹² Daniel Bender and Adrian De Leon. "Everybody Was Boodle Fighting: Military Histories, Culinary Tourism, and Diasporic Dining," *Food, Culture & Society* 21, no.1 (2018): 25–41, doi.org/10.1080/15528014.2017.1398469.

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TEACHING CLIMATE RESPONSIVE ARCHITECTURE AND URBANISM

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INTRODUCTION

Climate change is no longer a future scenario that is going to happen in forthcoming years: It has already happened. Climate change in the form of flooding affects millions of people and urban infrastructures across the world, especially in densely populated coastal, riverside, and low-lying areas. It is affecting the environment, economy, and social and political relations. And the worst affected are the urban poor and neglected communities. Countering climate change is imperative for flooding cities. In order to instigate positive change, cities have to be developed more coherently by including all inhabitants in a shared conversation where all stakeholders participate. We put forth that one-way to achieve this is through design teaching and practice with speculative means. It is practiced through course lectures, design workshops. This course showcases the speculative design; which takes a bottom-up and collective approach in University of Innsbruck, Institute of Experimental Architecture, Hochbau.

UN scientists delivered a stark warning about the impact of climate change on people and the planet, saying that ecosystem collapse, species extinction, deadly heat waves and floods are among the "dangerous and widespread disruptions" the world will face over the next two decades due to global warming.¹

METHODOLOGY

Course suggests that communities and institutions need to collectively reflect on flooding scenarios to counter climate change in the long run. *Collective Approach* follows a bottom-up approach to study, think, build, evaluate, and negotiate the communicative formats of *Speculative Design* teaching, course workshops and exhibitions; starting small and thinking long-term through building social cohesion– as illustrated in Figure 1.

Collective Approach

The work of the Thinking Hand NGO has largely been inspired by Mathur and da Cunha's imaginative speculative design practice, as a way forward in counteracting climate change and dealing with flooding cities. In six years, the organisation, which consists of NGO members and volunteers, and the author team, all of whom have experience in both architectural practice and architectural education, have developed a bottom-up approach which we call a collective speculative design approach. The name (Thinking Hand) is associated with the idea of thinking and building

simultaneously, and emphasizes a hands-on and careful approach to the built environment. It is an effort to create awareness about environmental issues through design and its processes by collaborating with local communities and organizations, and building in the scale 1:1. We claim that doing such collective speculative design workshops and exchanging experiences and launching competitions to encourage original thinking, while creating exhibitions to share ideas with a wider public, can advance a new way of thinking about, and building, cities as an innovative way of dealing with crises and challenges (Thinking Hand/ Ketham's Atelier 2015).²

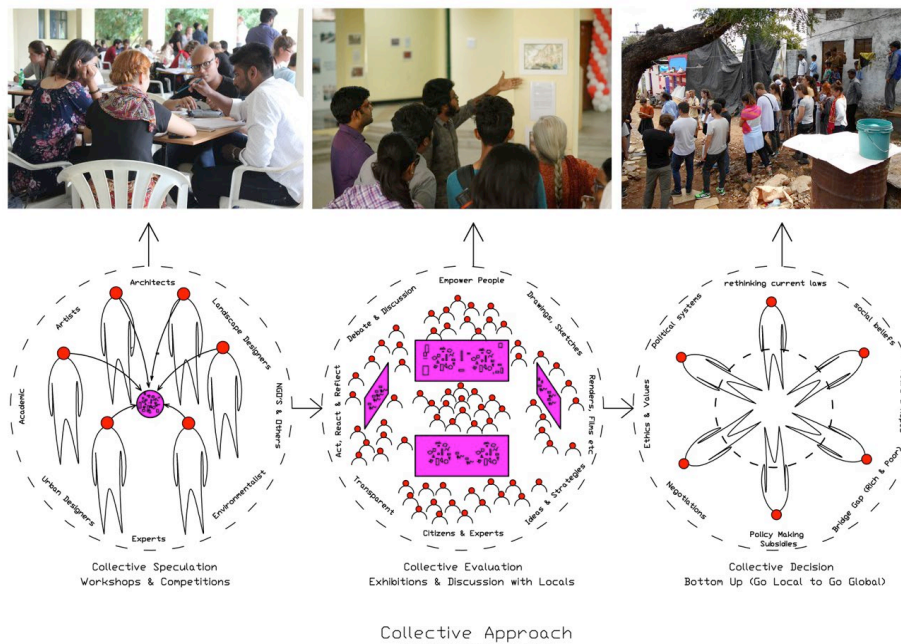


Figure 1. Collective Approach, Speculative Design: Drawing by Author (Santosh Kumar Ketham).

Our collective participatory format aims to bring actors from various sectors, disciplines, and communities together, including students, professionals, and experts, who are rarely able to meet to discuss the issues and problems neighborhoods and cities are facing. It addresses these through speculating, thinking, constructing, narrating, and ideating future possibilities and probable solutions which contemplate and adapt to the local culture, material, climate, context, community needs, and socio-economic realities, together.³

Speculative Design

Speculative design, a concept which is often attributed to the British designers, Fiona Raby and Anthony Dunne, encourages designers to think further ahead and widen the possibility of design by going beyond merely finding solutions to problems and asking different questions (Dunne/Raby 2013).⁴ In Dunne and Raby's terms, speculative design combines Design-thinking methods with storytelling and future-world-building techniques from speculative fiction to produce prototypes and experiences. These may take the form of a physical or digital product, video, documentary, book, manual, website, sculptures or other form of art. Their purpose is to generate discussion, debate, and awareness beyond projected or plausible futures so that designers, companies, and the public are not only aware of how their actions contribute to manifesting certain futures, but that they can also begin to imagine and articulate preferable futures (Lutz 2020).⁵ Futures are stories we create to analyze, plan and build consensus», according to design researcher Elliott P. Montgomery. His »narrative

futures cones» represent the subjective limits of our capacity to envision probable stories; they are often just one alternative to earlier representations that suggest a singular present, linear past, and infinitely expanding futures (Montgomery 2020).⁶ In speculative design thinking, however, ideas of possible futures can be used as tools to better understand the present and discuss the kind of futures we need to create for our survival.

“The best way to predict the future is to create it.”

— Abraham Lincoln.⁷

CLIMATE RESPONSIVE ARCHITECTURE FOR FLOODING CITIES COURSE

The course is a timely and important part of architecture, urbanism, landscape, environment, conservation and more. And it's high time to rethink our cities collectively in combating climate issues. This course was inspired by the ongoing doctoral thesis project of author (Santosh Kumar Ketham) and his design practice (studio, ‘Ketham’s Atelier Architects’ with the NGO ‘Thinking Hand’). Currently, he is teaching the course with the support of University of Innsbruck and Prof. Marjan Colletti, Institute of Experimental Architecture, Hochbau and Thinking Hand NGO. Students have an opportunity to learn, explore, study other urban cities, which are complex, messy, flooding crises and challenges cities are facing. It’s an opportunity to understand other cultures, climate, people, and places and also to build international relations between Europe and India.



Figure 2. Course lectures and collective discussions with master students at Institute of Experimental Architecture Hochbau, University of Innsbruck, Austria 2022-2023.

AIM AND OBJECTIVE

The importance of design as a profession and inculcates sensitivity towards nature and people thus making students understand the flooding crises, context, culture. Thereby allowing them to create speculative design strategies accordingly. The course is more informal in nature fostering discussion, entertaining the views of all the creative individuals coming out of their ingenuity and labour to solve the challenge. Emphasis would be on harnessing collaborative learning and positive innovations. The aim and objective of this course is to speculate how the needs of flooded cities are addressed using the method of speculative design. This technique involves students in brainstorming and generating scenarios, discussion, and reflection. It is practiced through course lectures, design workshops. This course showcases the speculative design; which takes a bottom-up and collective approach in the Institute of Experimental Architecture, Hochbau. (Exparch, Innsbruck University)⁸

As Frank Lloyd Wright once said, “The architect must be a prophet... a prophet in the true sense of the term... if he can’t see at least ten years ahead don’t call him an architect.”⁹

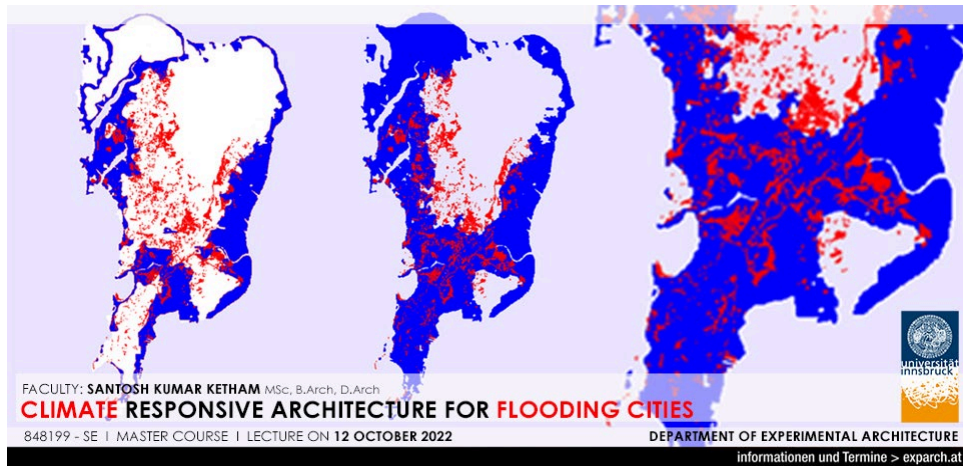


Figure 3. Poster, Master Course, Climate Responsive Architecture at Department of Experimental Architecture, Exparch, Innsbruck University.

COLLECTIVE STUDIES

As part of the course students had collectively studied various countries on climate change and flooding scenarios, problems, effects. Further the site Mumbai, India, which is author's PhD research and part of the research methodology on flooding city and speculative design. Students had opportunity to see and understand author's researcher work and experience in understanding of place, culture, climate, people and crisis.

Mumbai is one city from all the cities in India, which has enchanted everybody with its charm and liveliness. No matter your caste, creed, financial status or which part of India you come from, once you set foot in Mumbai, it accepts you with open arms. Mumbai is all about art, history, culture, food, theatre, cinema, nightlife and a lot more. This has raised the level of real estate sector in Mumbai and costs of properties are skyrocketing. Mumbai is the second-most populous city in India after Delhi and the eighth-most populous city in the world with a population of roughly 2 crore (20 million). A new analysis on the impact of sea level rise on coastal Indian cities has revealed that some critical properties and road networks in Mumbai, Kochi, Mangalore, Chennai, Vishakhapatnam, and Thiruvananthapuram will be submerged by 2050.¹⁰ RMSI's experts created a high-resolution Digital Terrain Model (topography) for the coastline of the identified cities. They then used a coastal flood model to map the cities' inundation levels based on various sea-level rise forecasts.¹¹ Mumbai City Urban plan is complex and irregular growth with lead to 55% of Mumbai's population lives in slums, and is routinely excluded from urban planning.

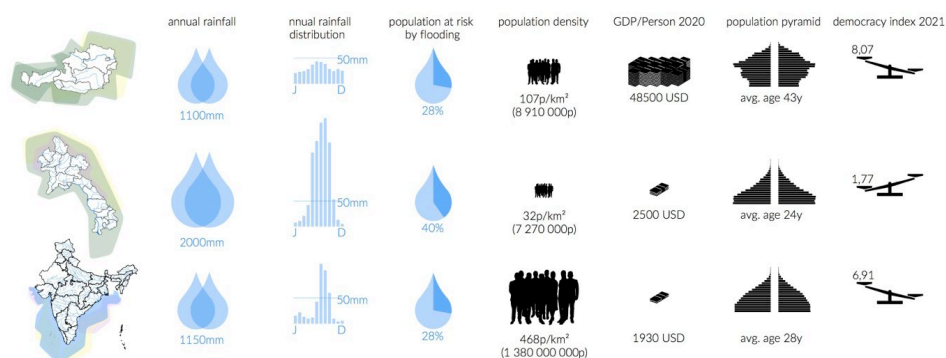


Figure 4. Showing analysis of three countries (Austria, Laos, India) its rainfall, population risk, flooding etc. Drawing by Institute of Experimental Architecture, Hochschule student Luis Navarro Preuss.

COLLECTIVE DISCUSSION AND TALK WITH EXPERTS

The Embassy of India, Vienna in partnership with the Institute of Experimental Architecture, University of Innsbruck, and Thinking Hand NGO hosted a Webinar on the topic 'Climate Change, Flooding and Infrastructure Resilience'. Through this Webinar, the issue of climate change with focus on flooding in urban areas and the importance of infrastructure resilience is highlighted. The programme was held on 12 December 2022 from 0900 – 1100 hrs (CET) [1330 – 1530 hrs IST].

The aim and objective of Webinar is to raise awareness about the issue of flooding of cities due to climate change, ways to empower people and suggestive actions to combat the crisis. The talk had participation by experts and students from various disciplines from Austria and India. The Webinar will not only enhance knowledge and expertise of the participants but also explore avenues of future cooperation relations between India and Austria in the field.

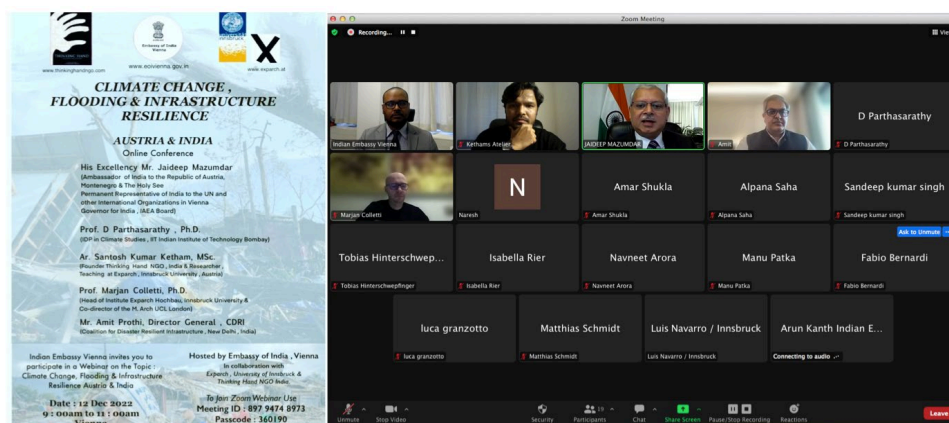


Figure 5. Climate Change, Flooding & Infrastructure Resilience Conference poster and screenshot showing experts collective discussion and talk. (Poster by Indian Embassy Vienna and Screenshot by Thinking Hand NGO)

The programme included remarks by the Ambassador and 20 minutes talk each by other panelists. The other panelists include i) Mr. Amit Prothi, Architect and Director General, Coalition for Disaster Resilient Infrastructure, CDRI; (ii) Univ.-Prof. Dipl.-Ing Marjan Colletti, Ph.D, Austria, Head of Institute Exparch Hochbau, Innsbruck University; (iii) Dr Parthasarathy, PhD. IDP in Climate Studies, IIT Indian Institute of Technology Bombay and (iv) (Author)Mr. Santosh Kumar Ketham, Architect and Educator, & Researcher at Institute of Experimental Architecture, Hochbau. The conference highlighted the challenges of urban planning and the architectural solutions for creating flood resilient infrastructure. Students and audience had an insight view of flooding problems along with example solutions, ideas to combat crises (Indian Embassy Vienna and Thinking Hand NGO).¹²

SPECULATIVE DESIGN BY STUDENTS

Research and Speculative designs for Mumbai by my master students from climate responsive architecture for flooding cities course at Exparch, Innsbruck University 2022-2023. Projects/ speculative design thinking varies from small Product, Architecture, and Landscape to Urban design.

Speculative design by student Mr. Matthias Schmidt Underground Structures

The Idea of the Speculative Design is to create a contemporary structure, which is able to store a lot of rainwater and guarantee a safe place in case of heavy flooding. As the Density of the city of Mumbai is extremely high, the structure is located in certain areas, where flooding is a major problem and

where it can rise in the high. In case of no rain or flooding, the structure should have the characteristic to disappear under the ground and does not take away area or space from the city. With the amount of water, the structure raises slightly as it is able to float. Under the ground a huge amount of rainwater can be stored and prevents flooding in the area. The aim is to locate on strategic important points for flooding a lot of these structures, to store and collect all the rainwater from the surrounding, keep the city safe from flooding and guarantee people a safe place in case of flooding.

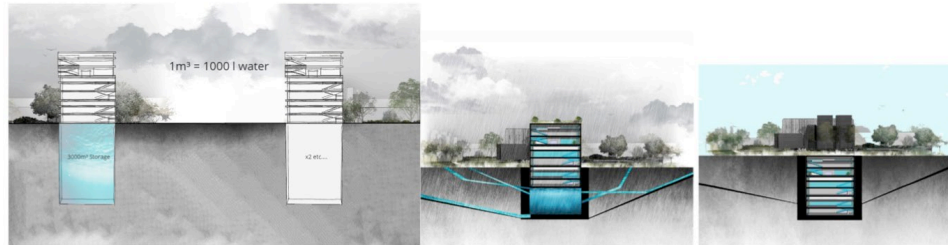


Figure 6. Underground structure for collecting, absorbing rainwater to prevent flooding in city and similar structures can be implement around city. Drawing by Matthias Schmidt.

Speculative design by student Ms. Maja Link Dharavi Clean & Green Towers

A landscape over an already existing structure. This image inspired me to add another layer over the Dharavi slum. Furthermore, I took the idea of the water tank network, and then added more helpful elements to the supply towers. The Cyclone Shelters were planned to accommodate about 1,500 people and numbers of valuable livestock during cyclones occurring within a 1.5-kilometer radius. For regular activities each center was planned to serve as a health clinic with a medicine dispensing area; as a seed/grain store; as a focus for education, training and community information; and as a communication center and office. The requirements included water and sanitation facilities within the main structure. Both the upper floors have toilets. In evolving the design brief special consideration was given to the use of the shelter in normal times; to disaster preparedness; to capacity; to livestock protection; and to maintenance and construction details.

The design is the result of a synthesis of a number of factors: the program requirements; the adoption of a logical structural system; the construction budget and the architect's understanding of the interaction among space, form and milieu. The heights of the different floors were dictated either by external forces or by practical considerations regarding their planned use. Although function and context were decisive factors in the design of floor heights, ramp, structural elements and finishes, these elements have been brought together and presented as a cohesive architectural expression within a rural environment.

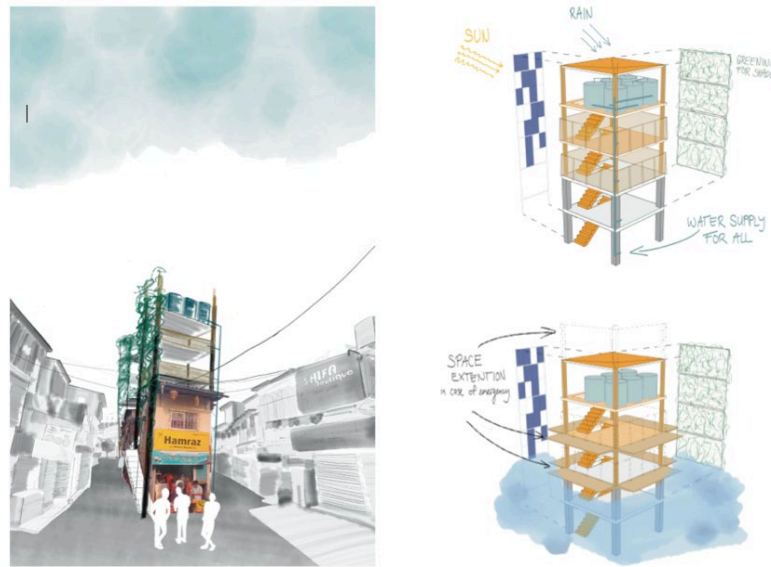


Figure 7. The Cyclone Shelters were planned to accommodate about 1,500 people within a 1.5-kilometer radius. Drawing by Maja Link.

Speculative design by student Mr. Luis Navarro Preuss Dharavi Lift

In the project DHARAVI LIFT the qualities of the reference project Quinta Monroy in Chile were integrated with the qualities of traditional architecture in Laos to design a solution against the flood endangered slum structure in Mumbai. Considering the usual apartment sizes in the slum, an axial grid was designed which allows a very large variation in apartment sizes around the 60 square meters of usual floor space. The axial dimension of three meters in floor plan is quite narrow by European standards. The reason for this, however, is that the smaller spans make it easier to carry out the finishing work oneself. In addition, many materials can be reused, which also has a sustainability value. The lighter weight compared to concrete and the ease of processing by the residents speaks in favor of it. The local building culture, however, tends to build with concrete, so the concept may have to be modified in this respect.

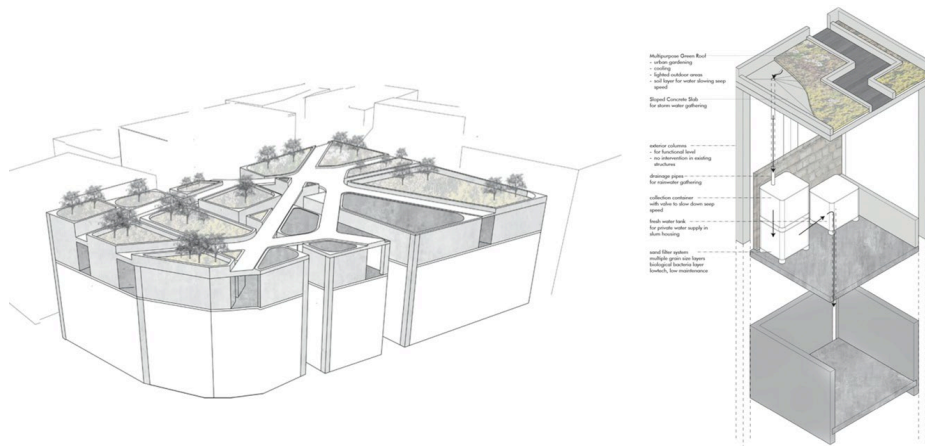
The doubling of walls between houses should be avoided; the neighbor may use the outer wall of the neighbor's house. Steel cables stretched diagonally will brace the structure. Concrete foundations protruding from the ground ensure that the wood does not rot. In order to protect the established structures in the slum, a master plan is deliberately not designed. Neighborhoods will organize themselves and exciting typologies will develop. In principle, these typologies do not differ from the ones we are familiar with, but in a slum the density will require many specific solutions and transitions and intermediate forms between these typologies.



*Figure 8. Dharavi lift, minimal buildup with grid construction.
Drawing by Mr. Luis Navarro Preuss.*

Speculative design by student Mr. Tobias Hinterschwepfinger The Sponge Roof

The Sponge Roof tries to guarantee the usability and storage of rainwater to decelerate water income on the ground and the therefore arising problem of destruction, sickness and usability of the Dharavi slum. The project develops a city scale design to ensure the connection and enhance the living quality of neighborhoods in India. Due to high floor sealing percentage, possibilities of drainage in the slum area are low. The sponge roof is trying to face that problem by slowing down incoming water volume and giving time to the floor and inhabitants to deal with it. Rainwater within monsoon season is enough to supply private household.



*Figure 9. The sponge roof and block, connecting community with green roofs.
Drawing by Tobias Hinterschwepfinger.*

Therefore the Sponge Roof implements another layer on households. Multipurpose Green Areas on the top layer create possibilities of urban gardening cooling as well as much needed lighted outdoor areas. A second soil layer also creates the first barrier for water to come in. The second slowing step happens with in the collection containers, where a valve regulates water speed in order to ensure the biological filter is still working. The last container stores the incoming water and makes it usable for private households. The Sponge Block connects multiple households within a neighborhood by adding a rooftop layer and connecting them on the same heights. Therefore, a large recreational area is created, which can be multiuser in emergency situations. It is a space to meet, relax, grow food, be fueled with sunlight.

Speculative design by student Ms. Claudia Handler Wetland Architecture

For the second approach, a new area has been chosen. It is located at the coast of Mahim Bay. This concept introduces an approach of generating a universal and modular wetland architecture that can be applied in slum areas. The chosen site is a possible example. The idea is based on generating different housing typologies, using squares in various sizes ranging from 3 to 24m, which are distributed on a grid, based on variable parameters such as existing road networks. The pattern though, is not entirely controlled; it still holds a certain amount of randomness. By including more and more parameters in combination with randomness, a complex pattern evolves, that mimics the complexity of a slum structure. Looking at the pattern on site reveals some interesting moments. The built structure adapts to its ground conditions, closer to the sea it can even be fully floating. This designed transition from sea, river and land mass acts as a relief for flood scenarios and further should support a co-existing with future environmental changes, caused by global warming.



Figure 10. Above image shows rethinking wetland areas and below image shows wetland architecture. Drawing by Claudia Handler.

CONCLUSION

I argue it's high time to think on flooding crises and which needs to start in our schools and universities. One way is speculative design method i.e. collective approach to reform cities with What-if scenarios for probable, plausible and possible for present and future flooding cities. This can act as a catalyst and also collectively redefine our relationship to reality. Courses, workshops and seminars on this topic can bring creative and non-conformist ideas to the table, and provide an opportunity to test the possibilities and limits of what architecture can do for society. I believe that such courses and studios in universities can play a crucial and important role in redefining our cities and involving various actors and experts in making speculative designs based on place, context, culture, people, climate and problems. Further show these designs to local people inform of exhibitions for discussions, negotiations with local government in reforming cities and communities. Additionally, taking feedback from community exhibitions, especially what community locals want, interests them or key important areas which further need to be reworked on. I argue that speculative design can bring transparency to issues and act as catalysts in negotiations. Furthermore, the studio courses, seminars and workshops can bring a sense of responsibility to students, various communities and building professions. They are an attempt to make

sense of deeply interconnected and interdependent problems through developing probable and possible scenarios; both theoretical and practical that envision change. I argue that the collective approach is time consuming, messy and challenging but on the positive side it can create an impact on rethinking current laws, political systems, social beliefs, ethics, values, fears and hopes. I believe if every university and school can start a studio subject, course, seminar or even workshops on this timely important topic can make a lot of difference and it's a great way to change, reform and recreate our cities with thinking hands.

ACKNOWLEDGEMENT

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EDUCATION BACK: DECOLONIZING LEARNING FOR INDIGENOUS PEOPLES OF TURTLE ISLAND

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EDUCATION AND SCIENCE: TOOLS OF COLONIZATION

Political, economic and occupying goals created education systems with the hopes of remaking the Original Peoples into a palatable image for the colonizers. This perspective is shared in the literature by Native American scholars; Leroy Little Bear, Spring, and Reyhner. This belief and practice thereby affords the Indigenous to become subservient in the violent exchange for natural resources and the attempted eradication of cultural communities and languages. Land displacement is discussed at length in the historical accounts of colonization on Turtle Island, North America. While this is not the story typically elaborated on in history curriculum in North America, it is the reality of the consequences of untold history which describe Native American learners as being significantly academically lacking compared to European Americans.¹ While gains among Native Americans in education have been made, there remains an acute revitalization of Indigenous Identity. Tribally run schools and Tribal Colleges are examples of self-determination.² However, in the public schools that 90% of Native children attend (K-12), there remains a need to acknowledge the lack of progress with culturally diverse pedagogies. There are many reasons for the disconnect between mainstream education and the Indigenous learner and/or their communities. Indigenous learners are raised understanding that their communities, topographies, and the planet are all living beings of which they as individuals are also a part of, not adjacent to. These concepts are easily romanticized, on the surface, with aesthetic language given to the cultural diversity and similarities within and across Indian Country. From; tribal status, varying political and apartheid Indian recognition labels and the imposed and granted characteristics of Native communities. Being a part of your environment and seeking to steward it as a member and caretaker versus, land for pure gain and political control, or more directly, land as commodity. This is the foundational thrust of searching for a new world and the potential for conquering people, the natural spaces and all that reside upon or in them. This is acted out over the United States history of settlement behaviors. The problem of course being, this extractive posture justifies the removal of peoples from their lands, and then justifies slavery.

What was the first educational battle? The tangible fact that Indigenous peoples understood and practiced land and water management. Undermining the anglo saxon colonial powers with ecological sovereignty and the woven autonomy of the environmental spaces Native Americans call their territories, a war began.

However, there are knowledge domains that function differently across cultures, such as science. Science seeks knowledge and engineering to solve problems. In STE(A)M fields, science shares

answers to shared questions about geological profiles, species migration patterns, and weather shifts among others. The human-made conflicts are that of necessity. The necessity to eat, have shelter and potable water, as the original conflicts of human development and settler colonialism. These created problems such as; fishing and hunting, as well as how to use Indigenous knowledge for extractive and gluttonous purposes. North American and western science present themselves as purely objective, but in fact, are not.³ It is this belief that engineering solves human and truly organic problems, but in point of fact engineering has created many Indigenous challenges; from place to peoples, and is now in the process of trying to “undo” or “remediate” those very conflicts. This is the first and ongoing challenge to STE(A)M as it continues to encounter Indigenous spirituality and philosophy. Earth is our Mother and therefore everything is our relation.⁴

While the phrase “culturally relevant pedagogy” is associated in the contemporary socio-political context as an educative approach to conscious realities of democratizing education experiences and opportunities, these authors proffer that all pedagogies are value laden. The current discourse uses language that is increasingly problematic for expressing Indigenous sovereignty and sacredness in science, technology, engineering, art and math education. In short, intent and the direct outcomes matter.⁵

Education in the formal structure, as expressed under current laws, reflects a system isolated and siloed from what is often referred to as the natural environment. This removes and displaces’ learners and educators alike as community members, from the land; the air and the waterways.

The settler colonial value system of displacement, removal and separation is the infamous lesson obtained from the American Indian boarding school era, as well as the early colonies of the Eastern Woodlands. The removal of children from their communities and families included the removal from their homelands quite literally, or as relatives in their traditional and spiritual valuing systems (i.e hawks, eagles, and botanic family).⁶ This affront to cultural and intellectual sovereignty of persons was also an extension of the lack of appreciation for the sovereignty of natural spaces and first creatures of Turtle Island.

When human beings see themselves as part of an environmental community, an ecosystem, that environmental community becomes a part of their identity.⁷ The exhibited notions of science as a practice of objectivity is a false one. Science, in particular environmental science, requires interest, curiosity and a willingness to immerse into nature. Sovereign Science is an act of individual and community practices.⁸ Science and the related TE(A)M fields can nurture learners’ personal and community sovereignty, grounding governance in terra, versus terra nullis,⁹ which is exactly what Indigenous science education, or cultural way of being, has always done.

Sovereignty, as a word, is a difficult hurdle within itself, as sovereignty is instantly linked to westphalia and the European historic context. Rarely do we differentiate between pre-westphalian societies’ understandings of self-determination and governance and post-westphalian. Within this paper and research, we rely upon pedagogies and curriculum that recognize sovereignty as a tool of knowledge-sharing and intellectual autonomy. The position of Sovereign Science and education back is to edify with conviction and embrace the reality that the uniqueness of life and communities inherently is an expression of sovereignty.

For example, in the North American context, National Park systems deliberately set spaces aside where animals, plants, mountains, valleys, woodlands, water, air and others are afforded a sovereign status. In these cases, we see the sovereign status as protecting them from the conflicts STE(A)M is supposed to solve (i.e extraction).

It is then ever more clear, in the case of European understandings of sovereignty, the exceptionalism of humans to determine human and nonhuman power. When people infringe on the space of bison,

bears or killer-whales, and these organisms respond, then people recognize the sovereignty within that given space and that of the nonhuman relatives.¹⁰

Storytelling is used to illustrate the connection of all relatives. The colonial approach to academic silo-curricula is contrary to the integrated approaches of Indigenous education. Education is the role of all family members, all tribal members and all nonhuman relations. The sharing of knowledge and instruction of skills is a duty or power that resides within everyone in order to have the most abundant form of sovereignty. The phenomenon of what is described as ‘science’ is explored, experienced, discussed, and celebrated. This paper presents a perspective that aligns with Indigenous Ways of Knowing.

Science is about asking questions to make knowledge, while engineers attempt to ask questions to solve problems. Engineers are then posing as the diplomat, while mathematics is the common language of the two. When Indigenous knowledge is shared, it is typical for it to be shared in the complexity of storied cognizance. The storied cognizance does not remove the complexities of space and relationships, but instead examines and builds upon them. Land in Indigenous Creation Stories and eco-phenomena, such as aurora borealis, night and day, and many others, are the sovereign protagonists, and it is within Creation Stories that the protagonists’ relationships are paramount to knowledge-making.¹¹

Community extends to relatives such as foxes, spiders, trees, grasses and Sky. The communities indigeneity extends itself to are the exact systems scientists study. Thus, learners whose formal and informal educational experiences do not include those spaces are less likely to fully appreciate the shared sovereignty they have with those communities.

Teaching on the land should not be unusual or unique. What you are learning about in curricula as content is how the natural world functions.

Leroy Little Bear is noted for his contributions to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and as a science scholar. He asks people to think about the imposition of linearity by humans on natural systems.¹²

Educators that speak to Native or Indigenous science, such as Cajete, and Little Bear, have advocated for proactive acknowledgement of sovereign approaches to science. Approaches that respect the knowings and ceremony of the immensely diverse spaces.

INDIGENOUS PEDAGOGY AND EDUCATION

The consequences of cultural sovereignty are the abilities to teach in ways that originate from within communities, and to learn what is valued and shared by others. This seems a fundamental truth when viewed through the political lens of democracy. Parents can teach their children or seek out education for their children. Historically this has not been the case for Indigenous people of Turtle Island. Children were taken away from tribal communities and housed in abusive boarding schools. The political goals were clear and persistent; stop the teaching of Indigenous languages, separate the children from their families and thus ecosystems and culture. The gravesites at Native schools punctuate the physical landscapes where the Lonely Innocents reside. Mother Earth’s embrace provides the only ceremony for them.

Unlike a percentage of today’s youth, those that were subject to genocidal, colonized education knew who they were and where they were taken from. This is the essence of public education trauma. These intellectual and academic traumas go unaddressed for both learners and educators alike, as resources and trauma informed pedagogies are just brushing the surface in higher education preparation programs.¹³ Furthermore, Indigenous communities and survivors rarely get the intensive and consistent support necessary to address or mitigate the inter and intra generational aftermath of the forced American Indian Education system in the United States from the early 1800’s through 1970.

EARTH SPACE AS A LIVING LEARNING SPACE

As the Progressive Era in American Public Education was underway, the draconian practices experienced by Native children and others (e.g. African Americans, Asian Americans) was established and normalized.

Dewey spoke to the purpose and experiences of education in that modest volume of lectures. He was clear and eloquent about the duality of social purposes and the role of education. Those purposes are displayed and experienced through the curricular dynamic in schools.

Curricula is not only what is written, nor is it only what is done, but it is the teaching and learning that matters. It is the experiences that are had. Dewey described it best in *Experience & Education* (1938). Human interactions comprise instruction. For an Indigenous twist, it is the human and nonhuman interactions that comprise learning and being. Instruction should not override the nature of the learner nor exclude the learner from the resources that align with instructional or educative experiences and opportunities. Interestingly enough, for the sciences, that happens to be the planet and multitude of planetary events. While computerized simulations serve a valuable role, they do not replace being in authentically natural spaces. Being in these spaces assure that students become story-of-life tellers who include their feelings, sensory responses, random encounters with other organisms and their authentic questions and wonderings.

CHILDREN AS SEEDS AND MOTHERS AS FIRE

Indigeneity is not a “one fits all” label, ethnicity, or class structure. However, for all Indigenous peoples, it is the topography; airways, animals and waterways that give us our sustenance, our communities, and the ongoing grief and joy of our Ancestors that unite us across tribal nations and diverse lands in pedagogical thought and practice.

Many Indigenous nations and communities have experienced ongoing genocidal encroachment from various colonizing powers such as; Great Britain, Portugal, The Netherlands, Spain, France and the ongoing neo-colonial settler state of Canada, the United States, Australia and New Zealand. The previous list is not to negate other anti-Indigenous and aggressive powers such as; the Russian Federation, China, India, ongoing conflicts in Peru, Brazil, Colombia, Kenya and others that use education and science as tools to subvert Indigenous rematriation and cultural sovereignty. The University of Tennessee at Martin defines colonialism as “the subtle propagation of socio-economic and political activity by former colonial rulers aimed at reinforcing capitalism, neo-liberal globalization and cultural subjugation of their former colonies.” There is nothing former about these colonies, nor subtle, about large scale attempts at ethnic erasure.

Children are our seeds and our fire, the same way in which colonizing forces have viewed them as opposition. The land was once a militant like opposition also.

So why remove babies? Why remove nurture as a stage of life? Because colonizers then, and settlers now, have no environmental empathy or intrinsic knowledge, hence the extractive-riddled term, “natural resources”.¹⁴

The land and the youth are one in the same to Indigenous peoples in a positive way, but to others in a negative. We see this in Roger Williams notes from the first colonies and interactions with Wampanoag, Narragansett and other North Eastern Woodlands communities.¹⁵ The lack of willingness to even eat merely red fruits because of overly religious beliefs not attached to the land one now wants to claim as theirs. The first colonizers died in massive numbers because of ignorance to Indigenous food chemistry, sovereignty and land intimacy.¹⁶ In turn, this animosity towards the land has been drawn out and presented itself in genocide of human seeds.

Youth learn, adapt and carry on the messages of their communities, cultures and relatives. Considering the intrinsic upper-hand on certain continental knowledge, the Indigenous youth from

Turtle Island (North America), and parts of Condor (South America) have and continue to be a direct threat for colonial and settler colonial capitalist “success”.¹⁷ In the case of Mayans in Guatemala, the spiritual relative and food source of corn was burned in massive numbers by invaders to destroy Mayan morale and landscapes.¹⁸ These tactics were to also scare the youth out of being Mayan, out of loving corn, out of tending to the land. These types of atrocities led to the stolen children and forced adoption era of millions of Mayan and other Indigenous groups across Central and South America such as the Mapuche in Chile and Argentina.¹⁹

If there are no more seeds, there are no more plants. If there are no more youth, there are no nations, no tribes, no communities that have relations or connect us to place; past, present and future. Offering an eerie solution to a five hundred and plus years old conflict.

The residential school era is misleading in title. These were prisons for children as young as two years old, and as old as sixteen. These were detainment camps: not schools with proper teachers, but children-worked; kitchens, boiler rooms, farms, and forced language immersion most of which the instruction and abuse was led by anglo-saxon women aligned with catholic and christian churches.²⁰ This attempt at re-representing what motherhood should look like is a part of the fire that Indigenous women and Indigenous youth are using now to scorch and grow new forms of accountability and nurtured connection. Motherhood is a form of sovereignty, childhood being the parallel sovereign. It is the institutionalizing of Indigenous children that needs to be undone daily for true Indigenous education to flourish and be rematriated to the people and communities.

CONCLUSION

Self-determination implies the motivation a person/people have to take action. The legal and moral consequences of the U.S. Supreme Court decision granting sovereign status to an entity that already had sovereign status was a decision that resulted in American Indian Nations becoming political wards of the United States, which is antithetical to being sovereign. This act facilitated the decrease in the ability of Indigenous communities to make the most fundamental decision as to how to raise their own children and shape their own communities.

While Maria Montessori was creating a modern child-centered pedagogy in the late 1800s in Italy, in the United States, Indigenous children were being raised and educated by the harsh routines of identity re-assignment via the Pratt model for educating American Indians.²¹

Eventually, as a result of the American settler legal recognition process, state level Tribal sovereignty, with regard to education policy and practices, offered a few affordances for culturally supportive practices in education. However, the continental diaspora has resulted in diverse cultural attainment and loss of the Indigenous learners. State level education laws and policies bring additional complexities to the ongoing discourse of educating Indigenous learners given the role of state sovereignty in particular with control over curricula, teacher preparation and the allocation of funds. Increasingly, with the advent of the state and federal recognition processes, there are tribal entities that have their own early childhood schools, once again reclaiming and rematriating our youth and nurturing phase of being.

It would not be until the 1960s that the rise of Tribal Colleges and Tribally run community schools began the process to remake formal settler education to serve their communities. This is in keeping with the historic outgrowth of written/text-based literacy as presented by Lisa Brooks.²² Indigenous Peoples have learned the role of literacy education toward preserving human community, cultural values and lands on which they belong.²³ For example, despite having such high literacy rates among the Cherokee, the federal government usurped their progress and initiated removal from their original sovereign lands. This is crucial to the discourse of science education. Nations have expressed interest in the preservation of languages using a variety of means.

This is also the case for maintaining and sharing knowledge of their traditional lands, and, if applicable, the new lands to which they were assigned. Oral traditions facilitate the preservation of place-based knowledge alongside the physical artifacts of Indigenous cultures.

The processes and practices of science, as articulated in the science education literature of today, require the applications of discovery associated with phenomena (events) as described in the various science education journals and standards. The structure of sciencing reveals a playful intellectuality needed for asking and answering questions based on initial experiences in the world and of the world.

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COMPARISON OF PRESCHOOL PROGRAMS IN SWEDEN AND BOSNIA AND HERZEGOVINA IN THE CONTEXT OF THEIR SUSTAINABILITY IN RISK TIMES

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INTRODUCTION

The most obvious feature of the last three years was an unthinkable crisis, caused by coronavirus 19 (COVID 19), which besides bringing to light enormous importance and significance of health protection, also influenced many other spheres in life including education system. Although there are many studies dedicated to researching the effects of the pandemic on the education, we believe that only a few and insufficient number of those was aimed at studying work programs in the context of their sustainability in the crisis such as the pandemic.

Considering that a basic level of educational system in every country is preschool education,¹ this paper focuses on the analyses of the preschool programs in a typically Nordic country such as Sweden, and another one located on the Balkan peninsula - Bosnia and Herzegovina. These two European countries are very different according to numerous criteria: their geographical and cultural features, the development level, the tradition of developing preschool programs, the importance of preschool programs in their educational systems, etc. Besides, these two countries were interesting as a part of a wider comparative analysis because the preschool programs in Sweden are unique/uniform, and in Bosnia and Herzegovina they are pluralistic. In this paper we described and compared basic characteristics of the preschool programs in Sweden and Bosnia and Herzegovina, and then analyzed research studies on key challenges and problems in the preschool education during the pandemic in order to determine the extent to which the preschool programs in these countries are sustainable in time of crisis.

METHOD

A descriptive method was used in this paper to present preschool programs in Sweden and Bosnia and Herzegovina, an analytic method to examine the content of the mentioned programs and a synthetic method to compare these two and try to determine their sustainability in time of crisis. Using systematic research of the literature and relevant studies on the topic of the preschool programs in the selected countries, as well as key challenges in the preschool education during the pandemic, our goal was to critically assess and integrate the existing theoretical findings in order to gain better understanding about their sustainability in time of crisis. The process of collecting data included searches of the following data bases: Google Scholar, Web of Science (WoS), Clarivate Analytics,

Scopus, Springer Nature, Scindeks, Hrčak.srce.hr. This process was conducted in the period between August 2022 – March 2023.

BASIC FEATURES OF PRESCHOOL PROGRAM IN SWEDEN

Swedish preschool has a long tradition of integrating play, learning and care which is made clear in the term “EduCare”. The English concept of educator is a way of highlighting how care and pedagogy are related.² The first Swedish preschool curriculum was issued in 1998 and its altered edition in 2019. The basic working approach in this program was expressed through the term “EduCare”, which integrates learning, care and development as inseparable whole. The preschool education is carried out in all milieus where a child, as an active participant of his/her development, resides. The focus of their interest is a consideration of child perspective, because children make meaningful initiatives which should be interpreted and incorporated into learning processes by their preschool teachers.³ The establishment and development of the preschool institutions in Sweden dates back from 19th century.⁴ Swedish preschool education seems to be an arena for cultural meetings characterized by an intercultural approach and democratic values. Preschool activities are conducted in democratic forms (democracy education) and thereby lay the foundation for children to be formed into democratic citizens. Preschool has a social mission to work with the democratic values.⁵

The preschool curriculum describes the preschool's values and mission and contains goals and guidelines for the work in the preschool. The curriculum aims for all children to have an equal start in the first steps of the education system. The preschool teachers and everyone who is a part of the work team must relate to the curriculum and the Education Act. In the Swedish preschool, there is also a connection between the requirements of the curriculum and the school-preparatory model that children in the preschool must learn, for example, mathematics, science, etc.⁶

The preschool's democratic task was inspired by concepts such as Reggio Emilia as a political, social and cultural challenge.⁷ Swedish preschool is also based on the UNICEF Children's Convention.⁸

Language work is a central part of preschool's everyday life and preschool teachers are sensitive people who listen to the children and put in a lot of effort on awakening children's metacognitive ability in dialogue. The proximity to children's perspectives, the interacting atmosphere and playful meetings between preschool teachers and children provide good quality in children's development and learning. Children learn in interaction, through active participation and interaction with other children and committed adults. The Swedish preschool exists in parallel between two models, the Scandinavian model (a social pedagogical preschool) and the school-preparatory model. The Scandinavian model - preschool in the Nordic countries - is characterized by a child-centered full-time activity where pedagogy, care and nursing form a whole.⁹

The preschool tradition is based on the theme-oriented work or projects, but it is advocated that teaching is not divided into school subjects but continues to be interdisciplinary in its form, and the process of children's learning is more important than the results. Play is a central part of the preschool's educational mission. The purpose is that the activities lead to development and children's desire to learn.¹⁰ Children are involved and influential in their own learning and in the care of the preschool's everyday life. Children are the subject of their learning and build its content.

BASIC FEATURES OF PRESCHOOL PROGRAMS IN BOSNIA AND HERZEGOVINA

The development of preschool programs in Bosnia and Herzegovina begins in 1899. These were followed by a couple of somewhat conceptually different preschool programs and finally the rapid development in preschool education which occurred in 1970s. The war period encompassing years from 1992 to 1995 was marked by a crisis in preschool education.¹¹ Today Bosnia and Herzegovina is the country in Western Balkans which, after signing the Dayton peace agreement in 1995, was divided

into two, politically separated, entities (Republika Srpska and the Federation of Bosnia and Herzegovina) and since 2000, it also includes Brčko District. While Republika Srpska is a unique and constitutionally and lawfully inseparable entity with unique preschool program, the Federation of Bosnia and Herzegovina is divided into following cantons: Una-Sana Canton, Posavina Canton, Tuzla Canton, Zenica Doboј Canton, Bosnia-Podrinje Canton, Canton Goražde, Central Bosnia Canton, Herzegovina-Neretva Canton, West Herzegovina Canton, Sarajevo Canton and Canton 10. Every canton has its own autonomy in adopting preschool programs under the jurisdiction of relevant ministry departments. Some of the cantons have integral development program,¹² others have obligatory programs for preschool education for children starting school,¹³ as well as common core of the development programs for preschool institutions in one canton. The preschool programs in the Federation of Bosnia and Herzegovina were developed at different periods from 2007 to 2018. By analyzing preschool programs in the Federation of Bosnia and Herzegovina, we can notice certain common elements such as: basic principles of the programs, goals, their orientation to the aspects of children development and the content of the programs. In most of the programs, the cooperation between preschool and family as well as wider community is anticipated. The preschool education is a constitutional part of the educational system whose goal is to provide optimal conditions for the development of every child in the first six years of their lives.¹⁴

In Brčko District, the Basic Program of Preschool Education has been implemented since 2007 and it includes: an introductory part, the definition of preschool program, the goals of preschool education, didactic and methodical conception in interpreting the program, cooperation with family, the basics in program for children under 3 years of age, the basics of kindergarten program for children from 3 to 6 years of age, the school preparation program for children who did not attend preschool institutions.

Starting from the original program of preschool education in Republika Srpska from 2007¹⁵ all the way to the most recent, still valid, program,¹⁶ it can be discerned that this program was based on the holistic approach to children development. The program in Republika Srpska, including the goals, foundational tenets it was based on, as well as its focus on child development, planning, documenting and evaluating educational work, represents a complex and modern learning approach which was based on the modern findings about child development.

Starting from the analysis of valid preschool programs in Bosnia and Herzegovina, a document *Common core of the integral development programs for preschool education* was made with the goal of creating a unique basis in the field of preschool education based on humanistic and development orientation, holistic approach and integrative planning.¹⁷

The common tenets in preschool programs in Sweden and Bosnia and Herzegovina, as well as their differences are shown in Table 1.

Similarities	Differences
Preschool is the first step in the educational system	The term “EduCare”
A childcare that is based on a holistic view of the child	The learning is planned, but it also takes place in spontaneous situations.
The view of children is based on the UN Convention on the Rights of the Child	The children are competent and they develop through constant dialogue with other children and preschool teachers
The activities in the preschool are based on a child perspective	Sweden has a unique preschool program
Children participate and influence their development	The programs in the entities of Bosnia and Herzegovina and Brčko district have inconsistent programs

Table 1. The comparison of preschool programs in Sweden and Bosnia and Herzegovina according to their basic features.

KEY CHALLENGES AND QUESTIONS IN THE FIELD OF PRESCHOOL EDUCATION DURING THE COVID-19 PANDEMIC

The authors of many studies agree that a position of children in the time is especially sensitive. The crisis can cause children's dependence on adults and make them lose their initiative in finding ways to overcome crisis situations.¹⁸

Some authors think that a crisis situation in education, which was caused by the pandemic, reassessed the role of parents in the concept of educational curriculum. The parents found themselves in a complex situation during the pandemic since they were expected to provide support in learning with no prior preparations. Crisis situations can be potentially dangerous but they also point to a need to reassess the stability of educational systems, as well as their flexibility, the methods for dealing with the crisis, as well as a need to make action plans which would anticipate the ways of how to react in future crisis.¹⁹

There are opinions that it is important to use the crisis as the potential for different understanding of the preschool institution as the community of learning and that the learning itself should be based on investigative and creative approach. In preschool education during the crisis it is necessary to show interest for children experience, play and a way of thinking which function as the basis for educational work. Also, it is necessary to promote different understanding of children, the role of the professionals but also the functions of education.²⁰

Certain authors offered concrete steps for creators of educational policies regarding the implementation of new working methods during the pandemic. Learning through the use of technology can prove itself efficient if the teachers are equipped for its implementation and children motivated for work. At the same time, they also warn that there are certain risks: if at the time of crisis, the expected curriculum is met, it can lead to professional exertion and the decreased level of motivation among the teachers. In this context, it is necessary to provide help to teachers in the form of professional improvement about the new working methods and the use of technology, caring about their mental health, increasing salaries etc.²¹

Without a doubt, one of the key challenges of the future education would be to reassess the curricula in the context of their sustainability in time of crisis,²² ever since the pandemic left its trace in the form of the current and future consequences on the preschool programs.²³ The scientists warn that poorer capacities for preschool educations at home were reflected both on children previously attending and not attending preschool institutions.²⁴ This is why the creators of future educational policies are advised to be flexible in adapting preschool programs to new circumstances, in finding new, alternative working methods and in relying on the acquired competencies of preschool teachers. A considerate progress will be made if more integral working models are introduced at platforms adjusted to children, which would be used successfully both by preschool teachers and parents, as well as the supportive programs for preschool teachers and parents.²⁵

PRESCHOOL PROGRAMS IN SWEDEN AND BOSNIA AND HERZEGOVINA DURING THE PANDEMIC

The reports by some of the authors used as sources show that Sweden introduced the smallest number of measures during the pandemic when compared with other countries. Preschool institutions in Sweden remained open and continued their work with certain limitations regarding emergence and the spread of the virus. Firstly, a detailed action plan was defined for acting in the crisis situation with the goal of preventing the appearance of virus in preschool institutions. In practice, this referred to strict controls, sanitary protocols and different roles and mutual relation between preschool teachers and parents. In the concrete educational situations with children, the conversations were held on the topic of the pandemic and strict hygienic measures. Furthermore, the presence of parents in the preschool

institution was strictly limited. According to the opinion of the National Agency for Education and Public Health, children were supposed to attend preschool institutions regularly except in the case of their illness.²⁶

During the pandemic in Sweden, preschool institutions organized more outdoor than indoor activities. Their preschool teachers faced a number of exterior measures prescribed by the state and health institutions, which made their position worse and potentially could have caused problems with the motivation and the level of stress.²⁷

Although it seems that preschool education in Sweden was not directly influenced by the pandemic, because the preschool institutions continued their work, some research show a different picture. The difficulties that teachers had in the preschool education were manifold: a great number of outdoor activities, social distancing, lesser opportunities of building a relation between teachers and parents, as well as teachers and children, less active role of parents in the preschool institution.²⁸

When the pandemic was declared in Bosnia and Herzegovina, a regular work of all institutions was stopped and the entire country followed the measures prescribed by relevant health institutions. These mostly included home isolation, remote work, transition to online learning and education on all levels of the educational system. The focus of the educational work with preschool children was redirected from preschool institutions to family. Preschool teachers used educational technologies for communication with parents and helped them indirectly in realizing play and learning activities at home.

The results of the research studies in Bosnia and Herzegovina about the functioning of preschool system during the pandemic revealed the following as the key challenges: the use of technology and maintaining continual working process, and after the pandemic the lack of preschool teachers and organizing educational work with respect to all prescribed health measures. Therefore, it can be concluded that in crisis situations it is necessary to provide adequate support to the participants in facing new circumstances.²⁹ In nearby Serbia, with similar measures and limitations, some studies were focused on child perspective on the “remote” kindergarten and determined that most of realized activities were organized regardless of the opinions of children and even if they thought them pointless.³⁰ Another study concludes that preschool children show desire for experimenting with the surrounding world which can be a precious resource for adults while creating learning activities in crisis situations.³¹ Starting from the potential measures of sustainability of program in time of crisis, as recommended by scientists, we have analyzed preschool programs in Sweden and Bosnia Herzegovina and the results are presented in Table 2.

Potential sustainability measure in time of crisis	Sweden	Bosnia and Herzegovina
Program flexibility and alternate working methods	Yes	Partially
Hybrid education	No	No
Making of action plans in time of crisis	Yes	No
Motivation of children, preschool teachers and parents	Yes	Yes
Training parents for helping children in their learning	No	Yes
Professional improvement of preschool teachers on the uses of technology	Continually	No
Improving mental health among children, preschool teachers and parents	Yes	Partially
Relying on children play	Yes	Yes
More integral working models on the digital platforms	Yes	No

Table 2. The comparison of preschool programs in Sweden and Bosnia and Herzegovina in the context of their sustainability in risk times.

CONCLUSION

In this theoretical and comparative research, we have reached the following conclusions:

The preschool programs in Sweden and Bosnia and Herzegovina have the same scientific approach to children, children's development and learning, but that democracy mission is presented as very central in the Swedish preschool. Bosnian preschool is under democratic construction and it is not an intercultural country like Sweden. In both countries preschool learning is guided by children's interest. Swedish preschool program prescribes more potential sustainability measures in time of crisis, as recommended by the scientists around the world, compared with the programs in Bosnia and Herzegovina. On the official websites of preschool institutions in both countries, there are visual attachments about education during the pandemic.

The basic implications for further educational policies, the development of preschool programs and future activities in preschool education, in both countries, in case of new crisis situations, are: to provide additional flexibility of the program and alternative working methods, to use the potential of a child play, to provide support for children, their parents and preschool teachers in the most urgent areas, to define new roles and responsibilities of the participants in educational process.

NOTES

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THE WELCOMED PROBLEM: CENTERING THE ENDS TO DEVELOP THE MEANS IN ART EDUCATION

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INTRODUCTION

Emergent research has questioned the efficacy of longstanding teaching techniques and practice in studio arts classrooms,¹ and there have been recent efforts to consider studio instruction anew.² This was exacerbated in the COVID-19 pandemic, where the learning spaces, equipment and methods of the studio art classroom were radically rethought. Suddenly, teachers across art education were forced to examine their teaching methods to maintain student engagement across vastly different circumstances. With many novel limitations, the problems teachers faced in delivering traditional content allowed for a fresh approach to the real problems art students face such as resilience, confidence and studio practice development. For the authors of this paper, the challenges faced during the pandemic led to numerous discussions and mutual support that has continued to the present day. As the pandemic restrictions relaxed, we began to reflect on our teaching practices in live art classrooms, considering the specificities and synthesis between our varied teaching situations of K-12 education, community education and university studio and teacher training. In this paper, we discuss how these reflections and experiences led to developing a problem-based model for studio teaching that aims to center the problems and expected directions for art teaching in the development of art lessons.

Formation of STAC

Our collective is called STAC, which stands for the Shortcuts for Teachers Artist Collective, and is made up of co-authors Nancy Long, Breanna Shanahan, Jeannie Kim and David LeRue. STAC is interested in developing rigorous art teaching methods, bringing together educators from various realms of art education to draw on their diverse experiences and approaches to improve the delivery of art education at all levels. We work across art education disciplines, having taught children and adults in community sites, public high school, post-secondary institutions, in museum education and instructional design. We seek to bridge gaps between these various institutional art teaching paradigms to build on a network of artistic, pedagogical and bureaucratic experiences. Presently, we are also working toward providing resources such as lesson plans and curriculum for art educators. In our pursuit of finding better teaching methods, we developed a framework of a shortcut for learning. A shortcut is a pedagogical device which makes evident to learner's art concepts, techniques

or approaches that we feel are necessary for student comprehension of a given medium. Shortcuts came about when we realised that some of the ways we were taught core concepts as students were not what ultimately made us understand and implement them as artists. Thus, rather than being a shortcut *around* the work it requires to master a competency, the shortcut makes key concepts and methods in artistic practice immediately visible so that we may explore them collectively. With a shortcut we seek to have students recognize the value in what they are going to learn by first recognizing the problem, and then understanding steps to the solutions of those problems. The STAC problem model is the result of synthesising our approaches to finding shortcuts so that other educators might make use of our model.

ACADEMIC CONTEXT

Our experiences in the classroom guides our relationship to theory, meaning that we engage with theory only insofar as it has a formative relationship to our practices. The four main theories of relevance to our problem model (figure 1) include critical pedagogy, backward design, visual thinking and problem-based learning.

Our relationship to critical pedagogy is rooted in the work of Brazilian educator Paulo Friere,³ who developed the problem-posing model of education. This model is designed as a critique of what Freire called the banking model of education, which describes teaching that is rooted in the authority of the teacher who deposits knowledge into the minds of students. Friere instead argues educators and students ought to engage with problems collaboratively through dialogue. Likewise, we are influenced by theorist bell hooks's⁴ advice to teach so that anyone can learn, which has led to making our lessons accessible and challenging for seasoned artists and beginners at once. We maintain these approaches through constant check-ins with our students, engaging them in dialogue and diverting from lessons to make sure that everyone in our classes is able to progress as artists.

Backward design is an instructional design method that works backward to rethink the necessary steps and time frame needed to reach a desired outcome in learning.⁵ For example, in a reflection written by grade seven science teacher Jennifer Gonzales, teaching the phases of the moon was shifted from a traditional learning approach where students memorised information and were tested at the end, to an approach where students developed and described a model of the system, a shift that taught students to think like scientists in their ability to observe, understand and convey the lunar cycle information.⁶ This makes for a student-centred approach that attempts to put the learners' comprehension at the core of the process. However, much of the backward design theories evaluate evaluation and grading, a topic which STAC does not yet engage with meaningfully and will put aside for the purposes of this model.

In adopting visual thinking in our teaching methods, we aim to humanise artists, teaching students that they must make mistakes like any other artists to develop their creative outputs. We believe using contemporary art to teach visual art skills highlights those that have persevered through problems is imperative in art education.⁷ With a reiterated importance in sharing contemporary - and if possible, local - artists, students can move away from romanticised ideas of art and the 'genius artist' and start to see themselves as forging their own paths into the art world. When showcasing artists, we show both successes and failures, investigating what inspired projects and the stories behind the work. Of particular interest are the challenges or experiences that led to a given project.

Our understanding of problem-based learning (PBL) is rooted in Yew and Goh's⁸ review of the subject, which claimed that PBL is the process of posing real life problems for students to work through and reflect upon in the contained environment of the classroom. We refer to the model from Queen's University's Center for Teaching and Learning,⁹ which outlined differences between traditional learning and PBL methodologies. In traditional learning, students are taught information

with a focus on an ability to memorise and apply the information later. In a problem-based model students are taught the skill of approaching a problem from their own perspective, filling in gaps of knowledge with self-directed learning. Though both skills can be used outside of the school for and in different contexts, it is our belief that practising one's ability to identify a problem and the learning needed to confront the problem is more useful.

STAC TEACHING MODEL

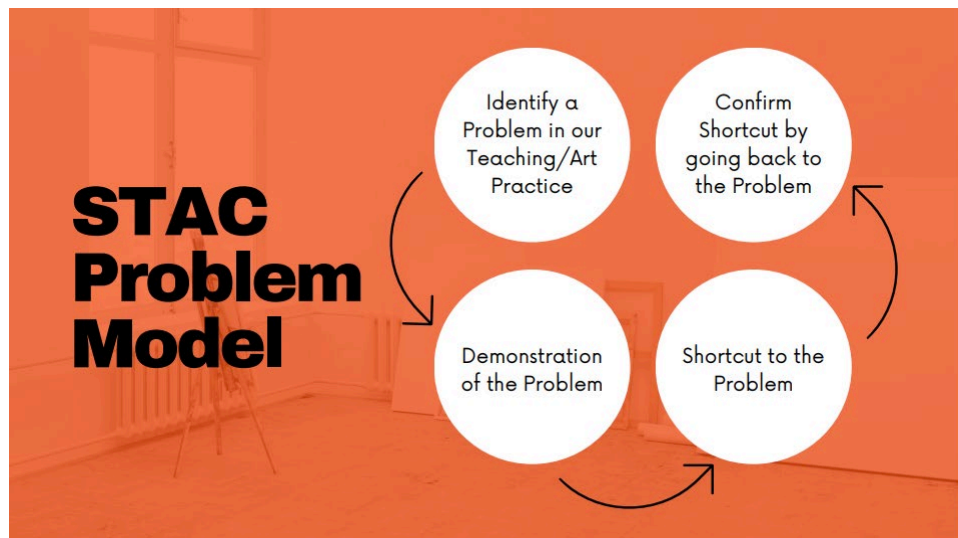


Figure 1. STAC problem model

The STAC Problem Model (Figure 1) was borne out of dissatisfaction due to the unpreparedness and challenges of our own individual transitions from art-student to artist and art teacher. As artist educators, we recognized how much we learned about making both through the trial and error of our own practices, and in the communities of practice we engaged with outside of school. Our successes required chance encounters with our materials and mentors which built a clearer view of the realities of the artistic communities in which we lived and wished to be a part of. It is in looking back that we can examine why we did not feel our education prepared us in general and take action going forward to think through our classrooms this way.

Our problem model examines problems that are terminal to either art teaching or artistic practice, deducing amoebas, meaning the irreducible aspects that one will encounter throughout a career. The aim of the model is to make these amoebas explicit, so that learners of all levels and all backgrounds are forced to grapple with the complexity of contemporary art teaching to whatever extent possible. Through conversations as a group, we have conceived our model as the four interlinked components listed in Figure 1 and described below.

Identify a problem in our teaching or art practice

When we are teaching courses or lesson plans that we have directed ourselves, it is important to know the problems we wish to tackle intimately and are passionate about conveying the lesson to our students. In this first step we begin by identifying a problem that likely was not addressed in earlier schooling, or that students will presumably experience once they are beyond the classroom. Questions to consider:

- What did we struggle with as students?
- What do our students struggle with in classes now?

- What were the gaps in our learning we wish we were told?

The problem must be clear to the educator and it must be plainly described to students in a way that they can comprehend before experiencing it themselves. This first part of the model takes backward design into account and situates the experience or knowledge that we wish to impart to students at the beginning of instruction so it is clear to them that their labour means to overcome a focused obstacle.

Demonstrate the problem

Since we have used problems that we have discovered in our own teaching or art practices we must explain the problem in a genuine way. Through visible thinking we make them real, visible and knowable. Problems can be demonstrated through:

- Action
- Story
- Example

In describing our experiences or the experiences of contemporary or historical artists, through storytelling and / or artefacts like (artists sketchbooks showing processes for developing a final masterpiece) we employ visual thinking. If the problem is something that we have observed in other artistic practices, storytelling is a useful method to explain artistic outcomes in a way that shows how facing the problem is part of the solution. Even if the outcomes are not clearly defined yet, we use this initial explanation to help students know that their own artistic journeys will not have a necessarily set or predictable path.

Shortcut to the problem

In this step we present an active shortcut that responds to the problem, either as a lesson plan or course structure. We explain what the shortcut is intended to show, and walk through how the shortcut operates, and throughout the lesson we check in to see if the shortcut helps or causes further confusion. It is the ongoing dialogue that helps us refine the shortcuts both for the class and in future teaching. We close by explaining that this is likely just the start of engaging with the problem, which is usually something that will recur throughout one's practice. The primary aim is to identify and make ready the problem, empowering students to begin working through these problems as they carry on in their practices.

Confirm the shortcut by going back to the problem

The shortcut is confirmed by reiterating the problem and what was done to prepare for it. In this stage, discussions and reflection as a class are necessary since we believe that students need to feel open to discuss challenges, successes and failures. This reflection process restates what can be done to continue to develop further approaches or alternatives to the problem. Even if the shortcut was not successful yet, students are better equipped now that they know the problem ahead of time, and can still prepare themselves to face it. It is a good point to also value and state the successes that were experienced by the individuals in the class. The energy felt in this closure part of the Problem Method can help students maintain momentum and keep up the methods outside of the classroom.

THE MODEL IN ACTION

Case study 1: Daily art practice

Artists of all levels face two major problems: Developing their style and approach, and maintaining a consistent habit of artmaking. *Daily Art Practice* was a course that scheduled ideation weekly, where Shanahan had students conduct exercises of automatic drawing in short, timed bursts at the beginning of each week. By the end of the course, students had at least 80 drawings, which had the benefit of

desensitising students to failure in a rigorous, accountable and liberated environment since production was integrated into the course in a format where skill and rendering did not have enough time to be realised. From here, exercises and course material helped students develop these initial drawings into an artistic practice, discussing trends towards and against certain themes, styles and subjects. Students were encouraged to discuss with each other their different approaches, and to see through the lens of those approaches when tackling the second challenge presented each week which was often experimental and done in longer duration.

The course structure built toward an online exhibition on a program called Artsteps.¹⁰ The virtual vernissage saw the most successful student-selected works, exhibited in a clean white cube gallery space, where discussions on process, failures and successes amounted to a deep sense of accomplishment and preparedness felt by students. As the class wrapped up, students often exchanged contact information to self-organise groups to continue their developed artmaking habits.

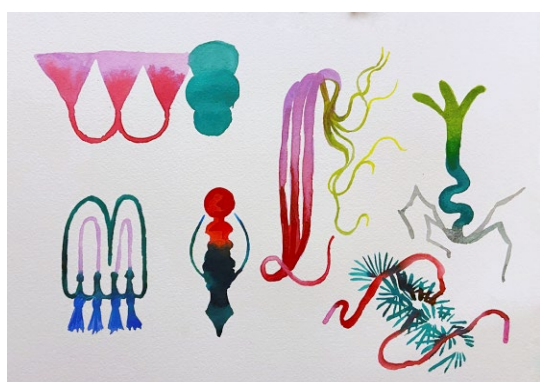


Figure 2. (Left) Example of Daily Art Practice exercise inspired by touch. Breanna Shanahan (2022)



Figure 3. (Right) Example of Daily Art Practice exercise inspired by the Bay of Fundy. Breanna Shanahan (2022)

Case study 2: Chaekgeori painting

Translated as ‘books and things,’ the chaekgeori genre from the Joseon Dynasty in Korea (1392-1897) depicts a scholar’s tools, books, and foreign objects¹¹ which continues to be a subject of interest to contemporary artists due to its play of Western painterly devices such as *tromp l’œil* and *chiaroscuro*.¹² As an artist-educator, Kim was interested in sharing the concept of depicting books and possessions by having the students create their own chaekgeori piece. Kim applied the first step of the STAC Teaching Model by establishing the problem within her teaching practice: fostering cultural appreciation rather than appropriation in her five-week virtual community arts classroom. Next, Kim applied the second step of demonstrating the problem by sharing her Master’s thesis project of depicting her own chaekgeori piece during the pandemic when most were relying on indoor resources for inspiration. The third step of determining the shortcut to the problem was completed by providing accurate research on the historical information of each chaekgeori piece observed as a group while exploring the works of contemporary artists to make the content relatable to students’ current everyday life. Lastly, to cover the last step of confirming the shortcut by going back to the problem, Kim allotted time at the end of each class for students to reflect on experiences of creating their own chaekgeori piece and to share their works with their peers which encouraged a student-based framework to explore, experience and connect within short the five-week course. This encouraged communicative competence and intercultural citizenship by the non-Korean students by normalizing practicing acknowledgement and discipline in between cultures through artistic creation, cultivating genuine understanding and cultural appreciation for the art of chaekgeori.¹³



Figure 4. (Left) Example of contemporary chaekgeori. Jeannie Kim, 2020.

Figure 5. (Right): Still life for chaekgeori painting. Jeannie Kim, 2020.

Case study 3: Every colour is a value

LeRue's experience reveals that the most difficult skill to teach painters is that every colour is simultaneously a hue and a value. Despite using our vision for most daily tasks, we are seldom invited to notice the complexities of colours around us. Usually, colour is taught using the six-part colour wheel consisting of red, orange, yellow, green, blue and violet, creating value and tint scales to learn the limits of the paint. Most of the colours we see in the world do not fall onto the six-part colour wheel, and are supplanted by neutral browns and greys. Painting tint box exercises tells us nothing about applying colour to a painting.

To demonstrate this problem, LeRue had groups arrange coloured pastels or paint chips from darkest to lightest. Sorting black and white is easy, but debate arose with the middle colours. Red coloured lights were used to verify the sorting, which showed all colours as values of red. Students put most colours in order, but there were a few surprises, demonstrating the difficulties of discerning value. The class spent the rest of the session painting still life objects from observation under the red lights, where the colour of the objects and paint applied remained a mystery. This consistently led to surprising colour choices, showing versatility and possibility for application out of context so long as values are correct. As the course moved forward, students developed more discernment in seeing value and in taking risks with colour, leading to a clear demarcation in ability to see values and subtleties in colour.



Figure 6. (Left) Colourblind red light painting session.

Figure 7. (Right) Example of colourblind painting. David LeRue, 2022.

CONCLUSION

To Welcome a Problem in the art classroom is to adopt an approach to art education which seeks to identify, both in and beyond the school experience, problems that individuals will face when pursuing the arts. Using the Problem model is an approach to teaching art that recognizes that the problems faced by artists today are not those that have been traditionally taught in art education. Rather, the problems are those that contribute to the lack of resilience in the arts and to the journey necessary to develop a practice outside of the structures of school. The Welcome Problem is a shortcut developed in concert with contemporary theories of relevance, it is by art educators and for art educators, to reimagine their lesson planning in a way that is collaborative with students developing resilience and tools to transition out of art school and into the art community. Whether it is in developing a skill, sharing a cultural practice, or building an art practice, by centering the ends one can develop the means to conduct art education.

NOTES

- ¹ Amanda Burke, John Christie, Tim Fedak, Raymond M. Klein, Geniva Liu, Brian Maycock, Mathew Reichertz, and Jack Wong. *Researching the Teaching of Drawing*. Edited by Klein, Raymond M. S.I.: Vernon Press, 2022.
- ² Sydney Walker. "How Shall We Teach? Rethinking Artmaking Instruction." *Teaching Artist Journal* 4, no. 3 (July 2006): 190–97. https://doi.org/10.1207/s1541180xtaj0403_7.
- ³ Paulo Freire. *Pedagogy of the Oppressed*. Translated by Myra Bergman Ramos. 50th anniversary edition. New York: Bloomsbury Academic, 2018.
- ⁴ bell hooks. *Teaching to Transgress*. New York: Routledge, 1994.
- ⁵ Donna Harp Ziegenfuss. "Information Literacy and Instruction: Backward Design: A Must-Have Library Instructional Design Strategy for Your Pedagogical and Teaching Toolbox." *Reference & User Services Quarterly* 59, no. 2 (March 4, 2020): 107. <https://doi.org/10.5860/rusq.59.2.7275>.
- ⁶ Jennifer Gonzalez. "Backward Design: The Basics." *Cult of Pedagogy* (blog), June 21, 2020.
- ⁷ Julia Marshall. "Visible Thinking: Using Contemporary Art to Teach Conceptual Skills." *Art Education* 61, no. 2 (March 2008): 38–46. <https://doi.org/10.1080/00043125.2008.11651141>.
- ⁸ Elaine H.J. Yew, and Karen Goh. "Problem-Based Learning: An Overview of Its Process and Impact on Learning." *Health Professions Education* 2, no. 2 (December 2016): 75–79. <https://doi.org/10.1016/j.hpe.2016.01.004>.
- ⁹ For Queens University Center for Teaching and Learning diagram, see: <https://www.queensu.ca/ctl/resources/instructional-strategies/problem-based-learning>.
- ¹⁰ See ARTsteps software website, <https://www.artsteps.com/>
- ¹¹ Cha-yong Cho, and U.-hwan Yi. *Traditional Korean Painting: A Lost Art Rediscovered*. 1st ed. Tokyo ; New York: Kodansha International, 1990.
- ¹² Jeannie Kyunjin Kim. "Korean Chaekgeori Paintings: A Research-Creation Approach to Intercultural Art Education and Heuristic Thinking." Master's Thesis, Montreal, QC: Concordia University (2020). https://spectrum.library.concordia.ca/id/eprint/987185/1/Kim_MA_F2020.pdf.
- ¹³ Hyungsook Kim. "Community and Art: Creative Education Fostering Resilience through Art." *Asia Pacific Education Review* 16, no. 2 (June 2015): 193–201. <https://doi.org/10.1007/s12564-015-9371-z>.

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ENABLING OWNER-OCCUPIERS TO RETROFIT: A PRACTICE-BASED STUDY OF ARCHITECTS' EDUCATIVE ROLE

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INTRODUCTION

Globally, buildings contribute approximately to 40% of CO₂ emissions, and almost half of this share comes from homes.¹ In the UK, homes are responsible for 58% of buildings' emissions,² around 85% of which results from the operational energy consumed to run homes and perform routines. Heating is at the top of this list, accounting for 82% of domestic operational emissions.³ Therefore, most climatic benefits can be made by targeting energy use for heating. The low rate of housing replacement in the UK means that energy transformation must target existing homes to drive meaningful change.⁴ Owner-occupiers must be a priority as they constitute around 63% of existing housing stocks and have the highest number of inefficient properties.⁵ However, installation of low-carbon measures amongst this group has remained below the required rate to mitigate against global warming and avoid further catastrophes.⁶

Reaching owner-occupiers as key decision-makers is often attempted through educational programs.⁷ However, the failure of top-down educational strategies has highlighted an alternative approach that links learning with making sense of energy efficiency within the complex of everydayness and through personal connections.⁸ With regards to domestic retrofitting, this translates to exploring retrofitting in complex interactions of owner-occupiers with a network of suppliers, regulatory agencies, and building professionals.

This paper defines retrofit as upgrading existing house components to improve energy use.⁹ The study explores retrofitting as a process of sense-making and adaptations within broader topics, extending beyond merely technological concerns.¹⁰ Previous studies used social practice theory to explore how retrofitting practices develop and highlight architects' strategic role in promoting these practices among homeowners.¹¹ The current research draws on praxis-oriented approaches, which emphasize the sociality of practice formation to comprehend situated contingencies of accomplishments.¹² By understanding learning as being steered into practices, it explores architects' role in enabling owner-occupiers to retrofit.¹³

EDUCATION FOR ENERGY EFFICENY

In the absence of direct legislation, considered too intrusive and expensive to exercise, attention has been focused on encouraging homeowners' voluntary adoption of low-carbon measures.¹⁴ Voluntary actions have been connected to environmental education since 1960.¹⁵ In response to the energy crisis

of the 1970s, educational strategies were employed to encourage energy-saving activities among homeowners.¹⁶ Previous studies have documented and reviewed these approaches.¹⁷ However, the emphasis on categorizing methods has overshadowed the underlying perceptions that associate learning with energy efficiency.

In general, education relates to energy efficiency either for encouraging engagement or enablement. Education for engagement sees energy efficiency not as a one-way exercise and as a rational choice. Therefore, disengagement is linked with homeowners' lack of awareness or attitude, and learning is considered the natural solution to address these shortages. Information deficit models link disengagement with a lack of awareness; assuming "knowing better" results in "acting better," these models employ information provision campaigns.¹⁸ In contrast, behaviour models see the deficiency as residing in attitudes. However, instead of directly amending attitudes to elicit engagement, the resulting dissonance of engaging in actions is seen to carry a moderative influence on attitudes. This is often followed by altering external conditions for desirable behaviour to emerge. Accordingly, behaviour models utilize incentive-based feedback as the primary strategy.¹⁹ Educationally speaking, in addition to cognitive development present in information deficit models, the behaviour change approach has elements of conditioning (Table 1).

Type	Identified Deficiency	Approach	Educational Concept	Strategy
Information Provision	Knowledge	Direct Learning to Result in Better Actions	Constructivism	Information Provision Campaigns
Behaviour Change	Attitude	Indirect Incentivizing Desired Actions to Result in Learning	Behaviourism and Constructivism	Incentive-Based Feedback

Table 1. Types of Education for Engagement in Energy Efficiency

Although, in government circles, engagement is conventionally viewed as an awareness issue,²⁰ current UK policies emphasise engagement through a combination of both approaches.²¹ However, it has resulted in a vicious circle, which associates the failure of incentives with the lack of awareness and connects the incapability of information campaigns to the absence of personalised support.²² Consequently, owner-occupiers remain mostly disengaged from such messages. But even in the case of possible engagement, other studies highlight these strategies' short-lived influence²³ whilst underlining the unethicity of persuading others into desirable behaviours.²⁴

Alternative approaches seek more ethical and lifelong education strategies to promote enablement. Here, the aim is not to raise engagement as the means to an end. Rather, the very act of engagement is seen to cause a greater understanding and ability to change the process.²⁵ Hence, there is a strong connection between learning, participation, and personal development, which some scholars call developing "playability."²⁶ Accordingly, learning is not anchored on what others consider essential for the performance of actions at present but is determined by the requirements of future situations.²⁷ This highlights an educative role that cannot be filled by the state, nor can it be dictated to individuals, as occurs in deficit models of engagement.²⁸ Instead, it is reserved for individuals inhabiting the sites of actions, that through successful communication, expand learners' capacities to take charge of their own lives.²⁹

Therefore, education for enablement connects retrofitting to Vygotsky's sociocultural theories of human learning, which assert that interactions with others lead to increased potential.³⁰ In energy research, community-based models particularly explore the potential of social interactions to encourage the voluntary involvement of owner-occupiers in retrofitting.³¹ However, recent findings highlight the limitations of energy groups in reaching broader public and identifying the most efficient retrofit solutions.³² Therefore, a growing number of studies are concentrating on the educative aspect of building professionals' interaction with homeowners,³³ among whom the educative role of architects has been continuously emphasised.³⁴

ARCHITECTS AS EDUCATORS

In deficit models, experts fill the gap in laypeople's knowledge, whilst, in education for enablement models, they are contributors to problem-solving efforts and are open to criticism.³⁵ The significance of architect's role is often attributed to their close relationship with clients and early involvement in the briefing stages of projects.³⁶ In addition, emergent findings illustrate the entanglement of low-impact technologies with patterns of dwelling, which architectural knowledge is strategically positioned to identify and resolve.³⁷ However, despite this emphasis, the educative role and potential of architects has remained underexplored.

The inability of energy research to frame the role of architects results from two gaps in the literature. The first gap relates to confusion around incorporating education into architects' professional practices. The "agency" of experts is often explored within the concepts of "middle actors" or "intermediaries." The former attributes agency to experts' knowledge which positions them in the middle of the social structure. Hence, experts are seen as intentional agents or "actors" capable of influencing homeowners in lower layers.³⁸ From the intermediary perspective, this agency is not given but is formed through connections of bodies in the network, which often concerns experts as careers of capabilities rather than intentional actors (Table 2).³⁹ Nevertheless, both concepts are fixated on tracing agency within systems that ignore happenings in proximally situated interactions that are considered the source of influence.⁴⁰

Concept	Understanding of Agency	Understanding of Agent
Intermediary	Interconnection of Bodies	Carrier of Capabilities
Mediator	Position in Social Structure	Intentional Subject

Table 2. Architects' Agency in Existing Conceptual Frameworks

The second gap, which is more methodological, is to see how learning travels from architects to owner-occupiers' practices. Previous studies identify potential for the contribution of "social practice theory" to explore this diffusion.⁴¹ Practice theory explores the formation of practices and their reproduction in a broader social context.⁴² Hence, bringing the theory to bear on education links learning to the augmentation of operability.⁴³ However, scholars noted that the implications of practice theory in education have mainly been limited to self-learning. As a result, the impact of interactional dimensions in expanding competencies is overlooked.⁴⁴ Similarly, although practice theory is attracting growing attention in energy research,⁴⁵ the same gap has made experts' influence invisible.

APPROACH AND METHODS

To better understand how architects' sayings and doings affect the personal growth of homeowners, the study adopts the concept of situated learning, which sees education as inseparable from where and amidst what happens.⁴⁶ The research mainly draws on the concept of "communities of practices (CoP)", defined as cultural communities residing in different situations but centred around specific ways of knowing and practices. Education is at the heart of these communities as their existence and ability to grow depend on initiating others into these particularities and supporting members to excel in them. Hence, members actively seek to recruit freshers and to educate or learn from each other in everyday encounters.⁴⁷

Accordingly, looking at domestic retrofitting as a community of practice highlights the educational relationship between all the members involved. In the community of domestic retrofitting (CoDR), architects take on the role of educators for owner-occupiers and pass on knowledge from experienced members to newcomers in the group. However, this leverage is relative to arrangements of situations and positions of homeowners. Hence, it is inherently a non-systemic understanding of architects' educational role that works at the scale of interpersonal interactions.

This situated definition addresses the failure of systematic approaches in locating building experts' actions and closes the first gap identified above concerning the agency of architects. Additionally, grounding influence and subjectivity to the situated nature of the CoDR links the study to praxis-oriented approaches. Praxis draws on the situated contingency of practices and conceptualises learning within the momentary social formation of 'co-players' to comprehend uncertainties.⁴⁸ Schmidt observes that this new practice-turn opens room for methodological situationism, that instead of focusing on individual subjectivity or dissolving it, opens analysis to the co-formation of sensibility in social processes.⁴⁹ Hence, framing education within the CoDR resolves the second gap.

The research's analytical lens underpins methodological situationism by employing the theory of practice architecture, which draws on reflexivity and the situated nature of the CoPs. Considering that all practices are located, practice architecture explores how the history of happenings in the sites of practices and among players who inhabited them reproduce sayings, doings, and relatings that characterise practices and hang together as projects.⁵⁰ Methodologically, the theory offers the possibility to trace praxis in the history of architects' and homeowners' inter-referential moves to make sense of retrofit in the constitutive dimensions of context. These dimensions include material-economic, cultural-discursive, and social-political arrangements (Figure 1).

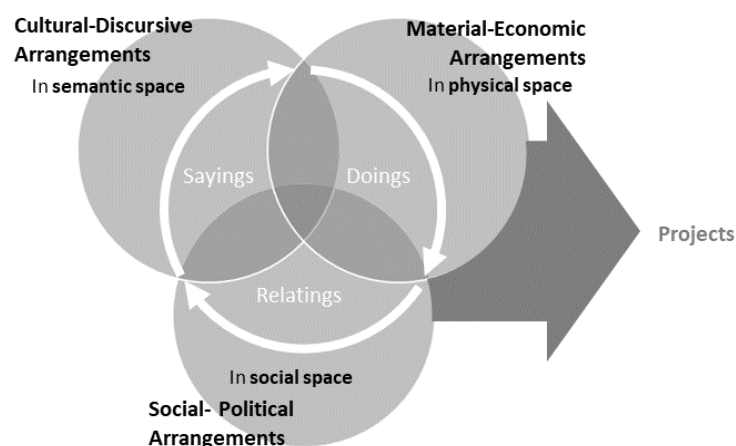


Figure 1. Practice architecture: practices bounded together in projects and context. Adopted from: Kemmis et al., *Changing practices, changing education*, (2013): 3, Fig 2-3.

Previous studies associated the formation of praxis around domestic energy use with changes in the physical settings of homes.⁵¹ Consequently, this paper explores the CoDRs at the periphery of domestic improvement projects that entail change and bring architects and owner-occupiers to share time and space.⁵² Architects with pronounced in low-energy design competencies were purposefully recruited to ensure their contribution to the learning community.⁵³ Through applying ethnographic methods,⁵⁴ interactions between architects and owner-occupiers were observed and recorded or reconstructed through interviews. This paper presents findings from observing six meetings between architects and owner-occupiers regarding four improvement projects. Additionally, ten interviews with architects and six interviews with owner occupiers were conducted. The research adopted the reflexive thematic analysis, which underpins theoretical assumptions to guide the analysis.⁵⁵

EMERGING FINDINGS

Exploring learning as social processes in the CoDR shifts the focus from architects' enactments in the void to ways these educative actions can be placed in the social context. Based on the empirical findings of this study, these broad positions can be grouped into four primary roles:

Transformative Role

In this position, architects aim to change what Architect -1 refers to as "tunnel visioning", which concentrates "traditional mindsets" on pre-defined solutions. In his view, opening this limited vision to broader possibilities requires architects to focus on "endings" rather than facilitating "processes". Similarly, Architect-2 believes what pushes the brief beyond preconceptions and towards energy efficiency is "thinking long term." During their conversation with Owner-1 around an extension project, they drew on the concept of longevity to explore retrofit from action the perspective of a father trying to "make the house possible" and leaves a "statement" for his son. Architect-2, through practising design, continuously accompanied Owner-1 in testing possible actions against the backdrop of future dwellings and being a father. By repeating this process, they form a history of practices influenced by the owner's family tradition of passing on the paternal house but essentially transformed actions around leaving a precious legacy. In other words, this history of negotiating alternatives results in accumulating skills, knowledge, and values that expand Owne-1's capacities to retrofit and enable him to make more informed decisions.⁵⁶

Supportive Role

This position becomes available through conflict in-between dwelling and retrofitting. Owner-2, who has just moved to a retrofitted house, shares stories of her struggles to rediscover her thermal comfort in the unfamiliar environment of her home. She compares this experience with "learning to drive a new car", which would be smoother with architects' support. Owner-1, who decided to carry on retrofit in discussion with architects, recalls how drying out his son's shoes leaves him wondering about "drying out clothes in a house without radiators." He contacted architects for guidance. Likewise, Architect-3 gives an example of being able to discuss "where to dry out underwear(s)" as an example to illustrate architects' strategic position in advocating for sustainable energy use. In other words, interactions around design provide opportunities that fill gaps and resolve conflicts between histories of dwellings and retrofitting. This entails learning skills and knowledge that make inhabiting sites of retrofit possible. Beyond merely learning how to use installed measures, which previous studies mentioned⁵⁷ and explored the educative role of architects in it,⁵⁸ education also concerns exploring learning broader possible actions that build everyday practices. In Kemmis's terms,⁵⁹ this means learning possibilities that exist at sites of retrofitting as the "niche" for practices of dwelling.

Directive Role

In this position, architects play their role as carriers of capacities to retrofit. Owner-3, who identified himself as a "DIYer" and "interested in retrofit", hired Architect-4 to retrofit and be guided in conducting side projects. They collectively engage in the co-production of detailed drawings to find the best arrangements that fit the walls' existing thickness. They create a sensible action plan, allowing for cost-effective decisions such as installing a heat pump when the electric boiler needs replacement. Hence, playing directive concentrates architects on the material-economic dimension enabling the owner to avoid sub-optimal solutions that are seen to limit the effectiveness of DIY-retrofit projects.⁶⁰ However, this does not constrain the enabling influence of architects to mere excellence in performance. Discussions around building details allowed exploring actions within the constrain of existing house arrangements to prioritize work in places with more impact on the owner's comfort and postpone disruptive ones to holidays. Playing the directive role also allows the owner to carefully plan actions concerning his position as a leaseholder or as someone "becoming a homeowner". Therefore, discussion with Architect-4 enabled Owner-3 to comprehend the complexities of acting effectively in the material-economic arrangement and apprehend the complexities of cultural-discursive and social-political arrangements that could constrain his retrofit actions. In other words, exploring possibilities of actions within the constraints of the site through the practice of design created a history of practices that relates to the background of activities, social status, and life flow of the owner. But also, it sees "the character of the building" in its "stone pillars between the windows." Hence, in playing this role, architects direct both, homeowners, and homes towards retrofit within their historical contextual restrictions.

Preparative Role

This role is played out concerning the temporality of architects' exchanges within the CoDR and to enable homeowners to pursue their trajectory in the community. In their last meeting with Owner-4, Architect-5 expresses concern that other experts unaware of their talks can conceive the project as the usual "brick box on the back of the house." Owner-4 is encouraged to remain involved in developing detailed drawings and forming knowledge about the right finishes at the right places, which would "be really useful because a builder might not know that is the best practice". Similarly, Owner-6 utilized the architectural knowledge she gained from a two-day course recommended by her architects to translate complex detailed drawings into understandable actions for their contractor towards "the best way of insulating the windows. " Owner-5 refers to this knowledge as a resource that facilitated working with others to retrofit and explore possible solutions with other experts throughout the project. Hence, in playing the preparative role, architects educate owner-occupiers about the practice of designing. The resulting knowledge, skills, and values enable homeowners to have greater contributions to future practice architectures and the co-formation of practicality around retrofitting. This type of enablement addresses the limitations faced by homeowners, which now often require architects to work on shorter contracts.⁶¹ Also, it aligns with the systematic approach of improving communication to explore more options for retrofit solutions.⁶²

CONCLUSION

Conceptualising architects' educative role within the learning community of domestic retrofitting stretches understanding of this role beyond the top-down view of it as a means of persuasion. The study shows various educative positions that, outside the control of architects, are played out concerning ways architectural knowledge contributes to addressing situated uncertainties that constrained owner-occupiers' actions towards retrofit. Acknowledging that the infinity of possible situations results in numerous educative positions, the current study frames these roles in four primary

areas. The transformative position addresses uncertainties in the relevancy of retrofitting to the traditions of dwellings. The supportive position explores the adaptivity of dwellings and retrofitting through design. The directive position brings architectural knowledge to bear on the intricacy of retrofitting in the context of happenings. The preparative position educates homeowners in pursuing retrofit in facing future uncertainties.

The study's outcome shows that the co-participation of architects and owner-occupiers in going through alternative ways of arranging materiality to retrofit produces a history of practices. These histories form alternatives vis-à-vis embedded traditions of dwellings and expand owner-occupiers' knowledge, skills, and values to retrofitting as a broader possibility. Learnings from the history of discussions can support homeowners in low-impact ways of living by shaping the missing ring in-between practices of dwelling and retrofitting. In the process of reviewing possibilities, homeowners learn about more efficient and flexible retrofit methods that better fit their situation and practices of dwelling. Finally, these exchanges create a history of architectural knowledge that enables owners to pursue retrofit in future situations. The outcome shows that architects' situated influence does not only catalyse the installation of low-carbon measures. The resulting learning enables owner-occupiers to cultivate low-energy practices and contribute to forming low-impact communities.

NOTES

¹ Global Alliance for Buildings and Construction (GABC). *Global Status Report for Buildings and Construction: Towards a Zero-Emission, Efficient and Resilient Buildings and Construction Sector*. UN Environment Programme (2019). <https://wedocs.unep.org/20.500.11822/34572>.

² UK Green Building Council (UKGBC). *Net Zero Whole Life Carbon Roadmap: A Pathway to Net Zero for the UK Built Environment*. (November 2021).

³ *The UK Low Carbon Transition Plan: National Strategy for Climate and Energy*. HM Government, 2009. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228752/9780108508394.pdf

⁴ *UK Housing: Fit for the Future? Committee on Climate Change (CCC), 2019.* <https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/>.

⁵ Inefficiency is measured based on the EPC rating below D or worse. The milestone refers to the UK government's goal in the Clean Growth Strategy issued in October 2017 to achieve EPC Band C by 2035. There are arguments around setting a higher goal or on the efficiency of EPC ratings. Nevertheless, in both cases, that would increase the number of houses needing upgrading.

⁶ *Energy Efficiency of Existing Homes: Fourth Report of Session 2019–21. London: Environmental Audit Committee (EAC), 2021.* <https://committees.parliament.uk/publications/5171/documents/52521/default/>.

⁷ Abrahamse, Wokje, Linda Steg, Charles Vlek, and Talib Rothengatter. "A Review of Intervention Studies Aimed at Household Energy Conservation." *Journal of environmental psychology* 25, no. 3 (2005): 273-91. <https://doi.org/10.1016/j.jenvp.2005.08.002>.

⁸ Toke Haunstrup Christensen, Simon Peter Larsen, and Henrik N Knudsen. "How to Engage Households in Energy Demand Response Solutions?" Paper presented at the EEEE 2019 Summer Study on energy efficiency: Is efficient sufficient?, France, 2019.

⁹ Sheida Shahi, Mansour Esnaashary Esfahani, Chris Bachmann, and Carl Haas. "A Definition Framework for Building Adaptation Projects." *Sustainable cities and society* 63 (2020). <https://doi.org/10.1016/j.scs.2020.102345>.

¹⁰ The definition is the fusion of two takes on retrofitting as a process. The "low carbon retrofit" concept explores the process over time rather than a one-off approach. Whilst "sustainable retrofit" places the process within various aspects of retrofitting. For "low carbon retrofit" see:

Tina Fawcett. "Exploring the Time Dimension of Low Carbon Retrofit: Owner-Occupied Housing." *Building research and information: the international journal of research, development and demonstration* 42, no. 4 (2014): 477-88. <https://doi.org/10.1080/09613218.2013.804769>.

For "sustainable retrofit" see:

Ray Galvin, and Minna Sunikka-Blank. "Ten Questions Concerning Sustainable Domestic Thermal Retrofit Policy Research." *Building and environment* 118 (2017): 377-88. <https://doi.org/10.1016/j.buildenv.2017.03.007>.

¹¹ Tara Hipwood. "Understanding Low-Carbon Housing Retrofit within a Wider Nexus of Practices." *Journal of architecture (London, England)* (2021): 1-22. <https://doi.org/10.1080/13602365.2021.1925328>.

¹² Thomas Alkemeyer, Nikolaus Buschmann, and Matthias Michaeler. "Critique in Praxis Arguments for a Subjectivation Theoretical Expansion on Practice Theory." In *Praxeological Political Analysis*, edited by Michael Jonas and Beate Littig, (Abingdon: Routledge, 2017), 67-83.

¹³ Stephen Kemmis, Jane Wilkinson, Christine Edwards-Groves, Ian Hardy, Peter Grootenboer, and Laurette Bristol. *Changing Practices, Changing Education*. (Springer Science & Business Media, 2013).

¹⁴ Karen Lucas, Michael Brooks, Andrew Darnton, and Jake Elster Jones. "Promoting Pro-Environmental Behaviour: Existing Evidence and Policy Implications." *Environmental science & policy* 11, no. 5 (2008): 456-66. <https://doi.org/10.1016/j.envsci.2008.03.001>.

¹⁵ Thomas Dietz, and Paul C Stern. "Exploring New Tools for Environmental Protection." In *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, edited by Thomas Dietz and Paul C Stern, (2002), 3-16.

¹⁶ Loren Lutzenhiser. "Marketing Household Energy Conservation: The Message and the Reality." In *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, edited by Thomas Dietz and Paul C. Stern, (2002), 49-65.

¹⁷ For example, see:

Wokje Abrahamse, and Ellen Matthies. "Informational Strategies to Promote Pro-Environmental Behaviour: Changing Knowledge, Awareness, and Attitudes." In *Environmental Psychology: An Introduction*, (2018), 263-72.

¹⁸ P Wesley Schultz. "Knowledge, Information, and Household Recycling: Examining the Knowledge-Deficit Model of Behavior Change." *New tools for environmental protection: Education, information, and voluntary measures* (2002).

¹⁹ Erik Bichard, and Nirooja Thurairajah. "Behaviour Change Strategies for Energy Efficiency in Owner-Occupied Housing." *Construction innovation* 13, no. 2 (2013): 165-85. <https://doi.org/10.1108/14714171311322147>.

²⁰ Stewart Barr. "Strategies for Sustainability: Citizens and Responsible Environmental Behaviour." *Area (London 1969)* 35, no. 3 (2003): 227-40. <https://doi.org/10.1111/1475-4762.00172>.

²¹ In England, the Government provides the Simple Energy Advice web service and Green Homes Grant to incentivise installing heat pumps. See:

The Ten Point Plan for a Green Industrial Revolution. HM Government, 2020.

<https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>.

The underlying assumption is also evident in the statement of the Environmental Audit Committee (EAC) of the House of Commons in the fourth report of energy efficiency of existing homes (2019-2021):

"...Many homeowners are unaware that their involvement is needed and will need financial support and advice to upgrade and retrofit their homes" (5).

²² Some researchers identified this vicious circle in their review of policies. For example, see:

Lutzenhiser, "Marketing household energy conservation," 54.

Catney, Philip, Andrew Dobson, Sarah Marie Hall, Sarah Hards, Sherilyn MacGregor, Zoe Robinson, Mark Ormerod, and Simon Ross. "Community Knowledge Networks: An Action-Orientated Approach to Energy Research." *Local environment* 18, no. 4 (2013): 506-20. <https://doi.org/10.1080/13549839.2012.748729>.

²³ Abrahamse et al., "A review of intervention studies," 273.

²⁴ Thomas W. Valente, and Darleen V. Schuster. "The Public Health Perspective for Communicating Environmental Issues." In *New Tools for Environmental Protection: Education, Information and Voluntary Measures*, edited by Thomas Dietz and Paul C. Stern, (2002), 105-24.

²⁵ Paul Vare, and William Scott. "Learning for a Change: Exploring the Relationship between Education and Sustainable Development." *Journal of education for sustainable development* 1, no. 2 (2007): 191-98. <https://doi.org/10.1177/097340820700100209>.

²⁶ Thomas Alkemeyer, and Nikolaus Buschmann. "Learning in and across Practices: Enablement as Subjectivation." In *The Nexus of Practices*, (Routledge, 2016), 20-35.

²⁷ Vare et al., "Learning for a Change,"(192-195).

²⁸ Catney et al., "Community knowledge networks," (508).

²⁹ Alkemeyer et al., "Learning in and across Practices,"

³⁰ Lev Semenovich Vygotsky. *Mind in Society*. (Cambridge: MA: Harvard university press, 1978).

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³³ Kathryn B Janda, and Gavin Killip. "Building Expertise: Renovation as Professional Innovation." *Constructing green: The social structures of sustainability* (2013): 35-55.

Barbara S. Zaunbrecher, Katrin Arning, Julian Halbey, and Martina Zieffle. "Intermediaries as Gatekeepers and Their Role in Retrofit Decisions of House Owners." *Energy research & social science* 74 (2021): 101939. <https://doi.org/10.1016/j.erss.2021.101939>

³⁴ Kathryn B. Janda, "Buildings Don't Use Energy: People Do." *Architectural science review* 54, no. 1 (2011): 15-22. <https://doi.org/10.3763/asre.2009.0050>.

Hipwood, "Understanding low-carbon housing retrofit,"

³⁵ Vare et al., "Learning for a Change,"(192-195).

³⁶ Niamh Murtagh, Aeli Roberts, and Russell Hitchings. *Architect-Client Interactions Research Project – Summary of Findings*. (The Bartlett School of Construction & Project Management, UCL, 2016). https://www.ucl.ac.uk/bartlett/construction/sites/bartlett/files/architect-client_interactions.pdf.

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³⁸ Kathryn B Janda, Katharina Reindl, Yann Blumer, Yael Parag, and Faye Wade. "Making more of middles: Advancing the middle-out perspective in energy system transformation." (ECEEE Summer Study Proceedings,2019).

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- ⁴⁸ Alkemeyer et al., "Critique in Praxis".
- ⁴⁹ Robert Schmidt. "Reflexive Knowledge in Practices." In *The Nexus of Practices*, (Routledge, 2016), 153-66.
- ⁵⁰ Stephen Kemmis. "A Practice Sensibility: An Invitation to Theory of Practice Architecture." (Singapore: Springer, 2019), 978-981.
- ⁵¹ Christensen et al., "How to engage households,"
- ⁵² This is also consistent with the fact that retrofit usually appears as a second priority alongside other types of work. See:
United Kingdom Housing Energy Fact File. London: Department of Energy & Climate Change (DECC), 2012. <https://www.gov.uk/government/statistics/housing-energy-fact-file-2012-energy-use-in-homes>.
- ⁵³ Alan Bryman. *Social Research Methods*. 4th ed. (Oxford University Press, 2012).
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PROPOSAL OF WORKSHOPS TO PROMOTE EDUCATIONAL INNOVATION IN HIGHER MATHEMATICS COURSES

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INTRODUCTION

The head of the Academic Department of Science (DAC), led the organization of a first Workshop on Flexible Hybrid Course Design (HyFlex) during the second semester of 2021.

Then, for the second semester of 2022, a group of mathematics teachers were summoned to develop a pilot project of educational innovation, consisting of using HyFlex in two weeks of classes. In order to support the implementation of this project, a monitoring and follow-up workshop was organized, and due to its design, we consider that it would be opportune to systematize it, to learn from the experience developed and to be able to improve and replicate it. Currently, the course worked the previous year has implemented HyFlex in another period of classes, and a second mathematics course is developing its pilot project.

Precisely the learning achieved with the systematization of the Monitoring and Follow-up Workshop of the pilot of the teachers, has allowed us to enrich the experience and now we recommend various preparatory activities to promote educational innovation projects.

Preparatory activities are offered in the form of workshops, lectures, and reading groups covering topics related to the ways in which students learn science, the application of various emerging educational trends, and the use of new technologies such as artificial intelligence in science teaching.

Before continuing, we will present our conception about: Educational innovation, systematization of innovative educational experiences, and explain how we have structured training to promote educational innovation.

CONTEXT OF THE MONITORING AND FOLLOW-UP WORKSHOP

Towards the end of 2021, the COVID-19 pandemic began to diminish, face-to-face classrooms were once again an option (with limitations and precautions); the PUCP prepared a group of classrooms for the hybrid modality, the teachers had experienced the remote modality, they had incorporated various techniques, didactic strategies, use of applications for teaching and it was wanted that this experience was not lost, but enriched.

In this context, a first Workshop called Design of Flexible Hybrid Courses was organized, the Workshop was requested to HyFlex Learning Community and was conducted by the main promoter and promoter of this modality Dr. Brian Beatty. See Figure 1.

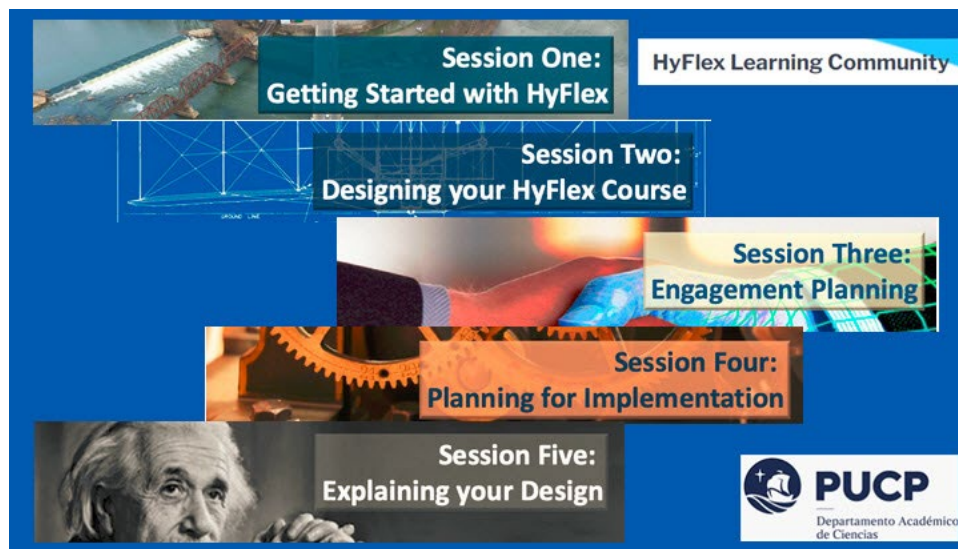


Figure 4. Image used in the call to the Workshop, indicates sessions and topics.

This workshop was held in the first semester of 2022 and was aimed at DAC teachers.

Subsequently, the Head of the DAC, commissioned a group of teachers of the Department, the preparation of various documents and didactic guides to increase the information on how to organize the classes following the principles of HyFlex. Next, he summoned the teachers in charge of the coordination of one of the mathematics courses so that together with their teachers they designed a pilot project to apply HyFlex during two weeks of classes in one of the mathematics courses of the PUCP.

Then, he summoned us together with a third teacher, to develop a second workshop, in this case of monitoring and follow-up of the proposed pilot project.

OUR CONCEPTIONS

Next, we briefly present our conception of the terms listed in the previous lines.

About HyFlex

As explained on the HyFlex Learning Community website,¹ HyFlex is an instructional approach in which a student can choose to follow each class in one of three modalities: face to face, online (synchronous by video conference) or fully asynchronous via an LMS system or CourseWorks. In addition, it must be ensured that students in all modalities can achieve similar learning, educational activities and resources must be available and accessible to all students (whatever modality they are in) and everyone must have similar opportunities to participate either directly in class with the teacher, or deferred.

About educational innovation

On the website of the Observatory of the Institute for the Future of Education.² It says that it is an educational innovation, when it implies a significant change in the teaching-learning process. In addition, it indicates that it is an incremental innovation when it improves at least one existing element, methodology, strategy or procedure.

All educational innovation requires a lot of reflection, critical attitude, discussion among peers, initiative, risks, dialogue, planning, organization, new knowledge and accumulated experience, both of the group that will undertake educational innovation and of the authorities that will authorize, support and evaluate it.

On systematization of educational experiences

According to Cifuentes,³ an alternative for the development of collective processes of understanding and action is the systematization of educational experiences. Likewise, Rivas,⁴ says that the systematization of experiences is a methodological-training strategy that promotes the active participation of communities, the recovery of their knowledge and the collective construction of new and complex ways of understanding educational realities.

The literature offers different ways of presenting the concept of systematization of educational experiences, we highlight the following:

- 1.It is a process of organized collection of information on the development of an educational experience that is carried out by the teaching staff in charge of the development of the educational experience, at least two teachers are needed because discussion, reflection and mutual questioning are necessary.
- 2.This collection of information must be accompanied by critical reflection of what happened, reviewed and questioning the evidence collected (photos, comments, tasks, comments, etc.)
- 3.Its purpose is to learn from the experience developed and allow others to learn.⁵
- 4.It facilitates the processes of improvement of the educational proposal.

In the systematization process an axis of systematization is established, ours was the instructional design of the Workshop, thus the systematization process, which we developed, was focused on the instructional design used by us that was precisely HyFlex. We thought that, if we used this axis, we could easily identify what were the difficulties and strengths learned by the teachers both in the HyFlex Course Design Workshop, and through the documents developed to support the implementation of HyFlex.

About the Monitoring and Follow-up Workshop

The Workshop in our charge basically consisted of reviewing the pilot project and making adjustments before developing it with the students, and then accompanying the teachers (by zoom) during the moment of development of the planned.

Unlike other expository training processes, we thought that the Workshop should allow teachers to experience in their own flesh the benefits and difficulties of the instructional approach that they were going to implement in their mathematics course. Thus, after the first interviews with some of the teachers of the course, we noticed that they needed basic training, in some cases they needed to improve their approach to the use of didactic strategies and new educational trends, so we organized a Workshop using the principles of HyFlex, Using flipped learning, and the part of gamification that we considered feasible to apply in such a short time, we also took some elements of the methodology of situated learning and learning-by-doing.

The Workshop had several stages, a first stage to level basic knowledge, a stage of review of the class sessions with the teachers and the sessions with the teaching assistants, then a stage of supervision and reflection with them on what they were developing. and how; and a stage of reflection, discussion and exchange of opinions for which we have the support of a professional, specialized in conducting focus groups.

The participants of the workshop were all the professors and teaching assistants in charge of developing the same course and the coordinator of the professors (who is also a professor of the course) and the coordinator of the teaching assistants.

The team in charge of the monitoring and follow-up Workshop was made up of 2 full-time professors at the University and a consultant in educational innovation for higher education, linked to the Research Institute on the Teaching of Mathematics (IREMPUCP), and two of us assumed the challenge of preparing this article.

DESIGN AND DEVELOPMENT OF THE WORKSHOP SYSTEMATIZATION

We were able to systematize the Monitoring and Follow-up Workshop, since we organized and developed it ourselves, but we could not systematize the pilot project because its planning and development was in charge of a group of mathematics teachers.

During the systematization, a critical interpretation of the experience developed is carried out, which implies having planned the process of collecting information, having designed instruments for it, organization of work, from the collection to the analysis of the results of the activities of the various actors of the process, the preparation of the report and, most importantly, the identification of the learnings achieved and the recommendations for improvement for the development of future activities, in our case of future training, monitoring and follow-up activities.

Identifying the learning, product of the systematization process, is perhaps the most enriching part of the work, since systematization is not an evaluation process in which it is only indicated that this went well, this did not work, this was achieved adequately, here it was very easy to understand the purpose, etc. The process requires that the causes of what happened be identified, since in this way improvements that can be proposed and the experiences gained by the participants are used. The identification of the causes of one or another event, should lead to the identification of learning from the drivers of the educational experience, these learning should allow us to propose improvements, and take advantage of enriching experiences for future training processes.

LEARNINGS OBTAINED

Having chosen the axis of instructional design to systematize the Workshop, we focused on reviewing whether the activities, the contents; the strategies and techniques used generated some direct or indirect influence on the proposed pilot.

IDENTIFICATION OF THE MAIN LEARNINGS FOUND

The first learning was the corroboration that the group of teachers and teaching assistants have developed a strong bond of work and camaraderie for the preparation of their classes: the tasks are distributed, such as the preparation of the classes, the selection of the exercises to be developed, the didactic strategies and techniques that are used, the exercises that are going to be developed, the time that is going to be used in the development of the activities are rigorously respected, so that practically everyone develops the same thing at the same times and in the same way. the same way (as far as possible).

For example, it was interesting to observe that in their class methodology they had already incorporated group work, with a strategy of bonus or compensation of points that were part of the marks/grades in the periodic evaluations, which indicates that they value the permanent evaluation of learning (although they do not use those terms when describing their strategy).

Everyone uses the same class materials, the same resources, develops the same activities, with the same strategies, and the possible differences are due solely to personal style of conducting themselves in class.

For the purposes of the review of the innovation project, we therefore found a single proposal for the development of the classes in which HyFlex would be incorporated, the students saw that it was a uniform work, the same for everyone, no one felt disadvantaged or favored or felt they were subjects of experimentation, it was something that the teachers as a whole had decided to develop.

A second point learned was that teachers prefer to be trained directly by watching or experiencing activities related to the teaching of mathematics. We saw that there were difficulties in understanding or assessing a didactic strategy or technique if they had not seen examples of the application of this technique applied to a specific case in their professional area. This led us to propose math-specific

training activities, for example, by asking conference speakers to use science-oriented and university-level examples.

A third learning was to verify that teachers need different levels of training, and on different points, for example, some difficulties in preparing activities to reinforce learning were due to the fact that some teachers had not reflected on how it is that current students learn better and therefore, they intend to continue relying on the expository strategies with which they were educated. In other cases, communication at the educational level was difficult because mathematics teachers and teaching assistants are engineers or are mathematicians with master's degrees and doctorates, but they have not necessarily been trained in education or in didactics of mathematics, nor have they studied The new educational trends, although they have read about them, they have some ideas (sometimes somewhat wrong), and use different or wrong terms to refer to some educational processes or apply the strategies inappropriately.

A fourth learning was to detect the little experience to prepare educational projects, perhaps for the same reasons discussed in the previous lines and for them we saw that it is better to start incorporating after some previous preparations, the development of Workshops that motivate them to prepare pilot projects, but also a monitoring and follow-up on the proposal elaborated, until at a second level of experience, they can already prepare to develop in periods involving longer periods of time, a month, half a cycle or the entire course .

A fifth learning was the difficulty in working or raising the participation of students online, or the design of activities for asynchronous students. To date, in the monitoring workshop that has been implemented for this cycle, this aspect has been improved with two actions: in the training of the course design workshop, Dr. Beatty presented a real syllabus and planning of mathematics and physics classes in which it could be seen that there were items on how to serve asynchronous students. And in the monitoring workshop, a session was dedicated to review the principles of HyFlex and to highlight some of the characteristics that the lesson plan should have, in which it was highlighted that the work with the online students and the design of directions and activities for asynchronous students should not be overlooked.

These learnings have become recommendations of what and how the DAC can organize training to promote educational innovation in science courses (Mathematics, including Statistics, Physics and Chemistry) that DAC teachers offer to the University

RECOMMENDATIONS

We recommend that educational innovation processes are not personal challenges, but that they are projects devised in work teams. These teams must go through stages of reflection, discussion, making agreements, acceptance of commitments, with some knowledge of new educational trends, with certain management of technologies appropriate to the project and that also have the support of the relevant authorities.

In all cases, educational innovation should aim to improve the quality of teaching and achieve better learning of the relative concepts of the course in which the innovation is carried out, seeking to prepare the student so that he can successfully face the challenges that will be presented in his professional future.

The systematization that we carried out in the second semester of 2022, has led us to propose the following training scheme to promote innovation, some of these activities have already been developed and to date new courses, workshops and conferences continue to be organized and others will be repeated.

Proposal

General and applied science Mini-courses including Laboratories: Basic use of programs and applications and basic knowledge in didactics, new trends, concepts.

For example, at the beginning of 2023 the following workshop-courses were developed:

- What are our students like and how do they learn? See Figure 2.



Figure 5. Image used in the call to the Workshop.

- The technique of the actor at the service of teaching. See Figure 3.



Figure 6. DAC teachers learned acting techniques for their face-to-face classes

Webinar, Seminar, Conference: One or more specialists present a topic, an educational trend, an emerging application, etc.

For example, these Webinars were developed during the first semester of 2023

- Impacts on student learning using HyFlex. See Figure 4.



Figure 7. Image used in the call to the Webinar.

Workshop courses applied to science: Activities that are initiated on a theoretical basis but that necessarily lead to a product.

- Flipped learning applied to science courses. See Figure 5.



Figure 8. Image used in the call to the Webinar.

- Design of HyFlex science courses to achieve effective learning.

This webinar was led by Dr. Beatty, who gave a brief review of HyFlex and its principles, talked about creating and designing active and participatory learning experiences without sacrificing learning in HyFlex courses, and gave guidelines about exploring its use. of active and participatory learning in HyFlex science courses.

So far is the training proposal that was raised in the 2022 report. For the 2023 report, we are will add a mini course on preparing pilot projects for educational innovation and to develop the bases to participate in the annual events for the dissemination of teaching experiences at the PUCP.

CONCLUSION

The process of systematization of the teaching experience has facilitated the way to devise and propose a strategy that goes beyond the particular development of a specific activity, and also to improve the development of the teaching experience that we systematize.

The systematization process has allowed us to identify interests, weaknesses, abilities and strengths of teachers, who did not appear in interviews and surveys.

Using the same methodology used by the teachers, for their innovation pilot project, in the instructional design of the workshop was a success. Well, with this we could compare how we had influenced his project.

After a semester, not only the same course continues to do innovation, but there is a second course of mathematics that has executed an educational innovation with the same methodology of the first.

NOTES

¹ Brian Beatty, "FAQ – HyFlex Learning Community", HyFlex Learning Community – Building the Hybrid-Flexible Future Together, consultado el 20 de mayo de 2023, <https://www.hyflexlearning.org/faqs/>.

² Alejandro Murillo, "¿Qué es innovación educativa?", Observatorio / Instituto para el Futuro de la Educación, 3 de octubre de 2017, <https://observatorio.tec.mx/edu-news/innovacion-educativa/>.

³ Rosa María Cifuentes Gil, "IAP y sistematización de experiencias", SEDICI - Repositorio de la Universidad Nacional de La Plata, octubre de 2016, <http://sedici.unlp.edu.ar/handle/10915/108688>.

⁴ Maria Elena Rivas-Arena, "La Sistematización De Experiencias En Educación Inclusiva En Colombia Una Alternativa De Investigación", Sistema de Revistas - Universidad del Tolima, 29 de agosto de 2019, <https://revistas.ut.edu.co/index.php/perspectivasedu/article/view/1897/1472>.

⁵ Fondo Nacional de Desarrollo de la Educación Peruana. (2014). "En el corazón de la escuela palpita la innovación", https://www.fondep.gob.pe/wp-content/uploads/2014/09/Propuesta_Metologica_Sistemacion_04-09-2014.pdf

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INTERPROFESSIONAL INITIATIVES: AT HOME IN MORE THAN ONE DISCIPLINE

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THE PROCESS OF INTERPROFESSIONAL CREATION

A process from a priori to “Out of Thick Air”¹ : We distinguish between three approaches. “A priori”, “design of the design process” and “out of thick air”.

An “a priori” design is an approach that sees a subjective, initial idea as the final aim of the overall process. No changes are wanted, no experiment can happen, and no discoveries, no progress or lucky accidents are possible within this predefined context. The idea of a "pure" creative process is still a main driver behind many creative ambitions. Compromise is a necessary part of all creation processes. The difference lies within the starting attitude towards matters of moderation.

Within an "a priori" approach, moderation is seen as leading to unwanted diversion from the original idea. If changes are anticipated from the start, the process of moderation might lead to an enriched and expanded result overall.

In an approach that “designs the design process”² that considers all "matters of concerns" of an idea, every step towards a final outcome is considered a necessary point of negotiation and readjustment. This way of working invites the integration of wide networks of thought and applies them into a process driven development of the ideas.



Figure 1. Workshop discussion during skilling Phase, Image by Theo Lorenz

A project can be evaluated along its way and understood as a definable outcome and thus it can stop before the final envisioned outcome is achieved. In this way the design process results in a multitude of outcomes by means of a detour or a bifurcation of the process towards the next step along the path towards the overall initiating goal. All in-between results support the overall process and negotiation of the original idea. This way of working requires much higher attentiveness from all participants, but the creative energy is spent on actual tangible results at the here and now rather than to maintain hypothetical futures.

In a further step, we try to replace the overall aims with a wider definition of synergies between different initiatives. This leads to new creations that challenge original initiatives to extend their approach and create new forms of work or multiple synchronous results. In an "Out of Thick Air" approach, the scanning for initiatives becomes the main skill, and the results are accurate yet welcoming for further development. This opens many pathways for all its components, both human participants but as well the created artefacts, physical or virtual.

This approach is based on a starting point of projects that do no longer have predetermined "a priori" aims of a product or process but it is rather built on a process that is searching for overlaps, opportunities, and initiatives as a starting point for new networks and projects and develops these through collaboration to unexpected, yet tangible and definable realisations.

As an education model this approach is creating unique projects and events through continued discussion. The framework provides students with a starting point for individual careers within a new overarching discipline, that is defined by the sum of its areas of input and the resulting effects, rather than a mere multiplicity of genres. The professional individual in such an environment can apply all areas of interest and expertise to the work rather than having to elect a sequence or separation of professions.

The AAIS collective formulates each year a wider field of interest and investigations, and searches for overlapping alliances between individuals and institutions that have shared or separate aims and ambitions. The form, shape, extension and outcome of the overall project is not predefined, however the overall format, quality and intensity can be anticipated and envisioned.

Models of applied forms of education

A significant basis for the approach of the work of the interprofessional studio is the educational model of John Dewey. Dewey formed an approach to education that is based on applied learning. He rejected the traditional view of education as a mere transmission of knowledge from "scholars" to students and instead advocated for a progressive educational philosophy that emphasises experiential learning, critical thinking, and the cultivation of democratic values.³ In this way education should no longer be confined schools and universities but rather should be imbedded in applied experiences that connect students with their community and enable them to understand and shape their social environment. In this way Dewey sees education as the basis to develop independent, reflective, and socially responsible individuals who can engage in a democratic process and contribute to the society around them. Active learning, where students are encouraged to explore and investigate the task at hand and to find applicable solutions in collaborating with others can be seen as a fundamental basis of the collaborative approaches we discuss in this paper. Dewey's work influenced the way in which knowledge is perceived, and his emphasis on learning by doing forms the basis to a problem-solving approach to learning.⁴

The methodology of the studio shares many aspects of the principles problem-based learning. As many other educational models' problem-based education finds a large part of its basis in medical education, however it is a form of learning that Howard Barrows sees as one of the most basic forms of human learning,⁵ as it is oriented to real live situations. Problem based education is an educational

approach where the problem forms the starting point of the overall learning process.⁶ The student does not study predefined learning outcomes and memorised knowledge, but is confronted with a problem, that they start to solve through analysis, research, and applied work, building up applied and direct knowledge in relation to the task at hand.

De Graaff and Kolmos summarise the basic principles as a process that is directed by its participants and is based on their own interests and experiences. Such a process is by default active, breaching interdisciplinary boundaries and based on group work to achieve individual advancement and learning.⁷ Project based learning addresses important basics for education such as flexibility, adaptability, problem-solving and critique.⁸

The difference in the methodology of the studio can be seen in the initiation and the overall aims and result of the process. Within an “Out of Thick Air” approach the participants do not begin with a problem and then assemble the relevant teams and solution, but rather search for initiatives and overlaps of interest at the outset without predetermination. Once an initiative is discovered the process unfolds around the aims, problems, and abilities of the involved parties.

Whilst a problem-based learning process often is oriented at existing practice base to manage professional knowledge within individual professions⁹ an initiative-based approach seeks to define unique areas of investigation based on the multitude of professions that form its basis.

As an extended approach to problem solving in education, we can see the methodology of “Design Thinking”.¹⁰ Naturally the approach of design thinking, a methodology of problem solving based on the needs of a client or audience forms an important basis of any approach within the creative environment of art, architecture and spatial performance and design. With a focus based on empathy, collaboration, and experimentation design thinking involves many of the core elements of an interdisciplinary applied process.

Charles Owen distinguishes between two creative approaches that of finders, or one could say “researchers”, and that of makers, or inventors.¹¹ The category of finders here is described as a scientific approach that is based on unabridged facts and real content. The maker however develops ideas and a solution through new inventions and combined knowledge. The combination of both approaches, a science thinking and design thinking is described as the most balanced approach.¹²

We can find this balanced approach in the work of Bruno Latour¹³ and his concept of actor network theory and with it the concept of matter of concerns. In his approach he does not distinguish between scientific or inventive approach, but rather invites us to circulate between the sides and to constantly re-evaluate the one with the other. Actor network theory takes into consideration not only the material properties of the elements of design, nor merely the human and social interactions within it but looks at the matter of concerns attached to them and the transformative power each element within the network has on each other.¹⁴ This approach is a fundamental basis of a work that is looking for initiatives. In the search for collaboration and creation of new partners and networks it is important not simply look for likeminded “comfortable” partners and components, but to seek a transformative network that is not merely the addition of parts but forms a new overall project that reaches beyond predefined ambitions and expected results.

To work outside our own comfort zone, we need to seek collaborations that does no longer rely on the individual to apply their knowledge they have developed within their discrete disciplines. Yet at the same time one should still be able to apply existing and developed professional knowledge, to develop and extend it. In interdisciplinary teams this existing knowledge sits next to each other and is applied by the expert within each field, each discipline relying on the professionalism of the other. However, to achieve a work that is transformative and challenges the best practice an approach outside the fixed definitions of disciplines becomes necessary.

Here another form of education comes into focus. Interprofessional Education, again an approach most used within health education.¹⁵ Here the individual expert within the interdisciplinary team is no longer the executing body of the discipline specific task, but rather becomes the teacher of his expertise to other team members, who will transform and develop the given knowledge through their own experience and best practice. Synchronously the same expert and teacher of one field becomes the student of the other discipline. In such an approach every member of the team always needs be aware of ones one knowledge and how to disseminate this knowledge, whilst being able to learn and apply new knowledge to the task at hand. Heidegger's notion that the teacher learns the most as he must learn how to let the others learn,¹⁶ comes to full fruition in these circumstances, as it becomes a reciprocal endeavour.

Methodology of our Studio

Applying a work process that is defined by initiatives across the disciplines within an educational setting depends on a process teaching that leads the students from predefined teaching methods and curricula towards an independent mode of developing individual and unique networks of collaboration and work. It is a process that is analogue to the process of teaching students to "swim". First the teacher still "holds" the hand of the students whilst explaining and demonstrating possible ways of movement and styles. Then the students as a group learn to swim with provided aids like hydrofoils or form boards. But ultimately the students will let go of these aids and swim into the open sea, developing new techniques and form new alliances to reach new shores.

We subdivide these phases of "letting go" in three areas of development: "Skilling", "Working in Initiatives and Networks" and "Forming Initiatives and Networks". The skilling phase consist out of a series of discipline specific workshops, such as music and sound, narrative environments, dramaturgy, design, or choreography, each accompanied by a series of seminar and lectures in relation to the genre, different network theories and collaborative design approaches. Each of the workshop is applied and cumulates in a bi-weekly cycle in public performances of the results, that reflect the interpretation and response of the multidisciplinary group of students to the genre of the workshop.

In the second phase the students develop a project that applies the different disciplines within a wider, given set of networks of professionals and initiatives of national and international partners. Here the accumulated and transformed skills are tested as unique festivals and events, that pool together the talents and interest of the students and requires them formulate projects that are not predefined, yet need to be applied within a real-world environment of professionals of musician, dancers, and technicians, and respond to a general public and socio-political setting of the predefined partner-organisations and locations. Students thus learn to act professional and to collaborate outside their own network of peers. At the same time students are challenging the norms of the given professions and forming new alliances.



Figure 2. Workshop Performance Presentation, Image by Tanja Siems

In a final phase the students are required to develop their form of their own networks and initiatives, both as theoretical frameworks and frameworks for applied projects. Each student must learn to disseminate their gained knowledge of collaboration towards the new initiatives they try to form for their projects. They need to negotiate all aspects of the endeavour, ranging from the creative setup and aim to the economical and socio- political environment they seek to work in. In this way each cohort of students, equipped with the skills of negotiation and forming networks, set out to a multitude of pathways forming new unique areas of work as the sum of their individual assembly of genres.



Figure 3. Test setting of Workshop, Image by Tanja Siems

Applied examples

The results of such an approach are manifold, and thus are best demonstrated with examples of pathways and results, proven by evidence. In this paper we will use applied project of the studio as a case story of the approach for the first two phases, and examples from alumni of the studio of how this approach formed individual projects and pathways.

Each year the studio sets out an overall academic brief as a starting point for the development of the project series throughout the year. These briefs response to a wider set of frameworks of current challenges and questions in our society, concerning areas such as networks on collaboration and their impact on spatial dimensions, design and objects but as well political implementation of performance as a form of protest and question of identity and responsibility.



Figure 4. Studio Live: the studio transforms form active design studio to stage, Image by Tanja Siems

As an example, the 2022/2023 cohort of students worked with the topic of “new graces”, a brief that responded to the libretto “tree women with the iron mask” by the Portuguese writer Augustina Bessa Luis. The set of six workshops addressed various aspects of the brief in relation to the specific genre, building up a catalogue of skills as well as creating projects as response to the topic. In the dramaturgy and film workshop students produced filmic self-portraits of each’s interests and professions that needed to be renegotiated in relation to a spatial installation of the overall peer group. In the music workshop the newfound groups explored and negotiated the emotional qualities of each ensemble of peers. The spatial narrative workshop explored the text of Augustina and translated these into spatial arrangements and installation that in turn needed to be performed as a narrative scenario. Acting, activism and choreography each developed means of analysing and exploring hidden potentials of the projects brief.

The second phase of the projects let to two performance festivals that the cohort tilted “moult”. In the festivals, first in London within the setting of the Architectural Association and later in Lisbon at the Teatro Aberto, the students developed in four performance-based pieces in response to the brief of the “new graces”. The difference between the approaches and topics showed the width of possible collective responses. Whereas three of the pieces developed dance-performances, one team developed a narrative piece of spoken theatre. The three choreographic pieces in themselves where very different too, where we can see references to history, and the triadic ballet in one, virtual reality and artificial intelligence driven sets in the second and a precise choreographic narrative in relation to sisterhood and gender equality. Whereas each of the pieces where fully developed as full-length performances

with unique characteristics, the surprising overall result and success of the entire team working in an ensemble became apparent in the connectivity of the pieces as one whole body of work. The pieces together were arranged in such a way that they formed one overall narrative and dramaturgy, each piece showing a logical and complimenting view on the questions of identity and graces and their antithesis. In this way the project serves as a perfect example of networks, techniques and different perspective come together through an overarching initiative and form a unique overall that is bigger than all its parts.



Figure 5. Moul't performance: first segment: Partida, Image by Alexandra Radounikli

Through this professional and well organised ensemble of ideas, the students could extend their networks into the professional world of theatre and performance on the highest level. On the one side the studio was able to extend the networks to five performers who performed across the pieces, on the other side the project, even though experimental and unusual, extended seamlessly into the professional setting of the Teatro Aberto. Students learned thus both, finding initiatives and unique answers within their chosen field of endeavour, and professional delivery within the creative industry.



Figure 6. Moul't performance: third segment: Seen, Image by Alexandra Radounikli



Figure 7. Moult: fifth segment: Metamorph, Image by Alexandra Radounikli



Figure 8. Moult: second and forth segment: Parding your Beggon, Image by Alexandra Radounikli

This methodology allows students to take this approach forward into their final thesis project and developing careers. Once they have learned to move within professional settings, create and collaborate within extended networks they are free to develop individual ideas and briefs within their unique set of interest, and are enabled to disseminate this individual approach to their networks.

The results here are so manifold and extensive that a detailed discussion would exceed the framework of this paper. The resulting projects range from performances, media installation and research driven performance art to exhibitions and applied constructions. Alumni formed through their final projects networks bridging industries they seek to work in, ranging from collaborators, venues and partners and supporters as well as clients. Their pathway forward has been leading to the creation of award-winning performance companies, film productions, and galleries, but as well the foundation of new event centres, galleries and culinary activities.



Figure 9. Curtain call after Moulty festival in London, Image by Theo Lorenz

Black Mountain College and the Interprofessional Studio

The discussion brings us back to the outset of our research. John Dewey's approach to applied learning has most prominently been applied within the Black Mountain College in North Carolina.¹⁷ Here the open, applied approach to the development of projects led to a series of innovative interdisciplinary endeavours, achieving a high level of innovation within the cultural industries ranging from experimental music to modern dance and engineering. Most known here are the work of Josef Albers, continuing his work he started at the Bauhaus, developed his work on colours at the college but as well as Buckminster Fuller's experiments and built prototypes of the geodesic dome leading to his work on geodesic structures.

In terms of interdisciplinary work here the collaboration between the choreographer Merce Cunningham is most outstanding, who formed his dance company here, and the musician John Cage.¹⁸ The collaboration led to a series of new works that challenged both the traditional disciplines of music as well as dance. This collaboration continued further across disciplines with the work they created with the artist Robert Rauschenberg, creating genre defying work such as "Minutiae", were the performance showcased their shared interest in pushing the boundaries of their respective disciplines and challenging traditional notions of dance, music, and visual art.¹⁹

Whereas the results of the Black Mountain school clearly showed a way of working that successfully created new initiatives and collaborations across disciplines, here a few distinctions might be noted. The artist and their collaborations mentioned as participants of the black mountain college were often composed of already well known and established figures, able to start initiatives on a high and independent level from the outset. Even though the Architectural Association and with it the Interprofessional Studio is a renowned institution with global connections and established faculty, today's students come from a broad cultural background and continue their studies right after their bachelor's degree. The respective skilling and learning curve towards own initiatives thus need to be phased from skilling towards experimental work within applied settings.

In addition, today's students and institutions face a much more complex environment. Experimentation must happen within a much tighter network of regulations and legal frameworks, where students must learn to embrace and utilise regulations on safety, copyright, and budget without losing innovation, ingenuity and experiment. A further area of added complexity lies within the technological challenges students face in their work. Technology expands the field of work to a wider

field, both as tools of creation, but as well as means of collaboration, communication, and organisation.²⁰ The studios approach to guide students through the phases of development towards the abilities to create initiatives and collaborations within their set of interests and talents has here proven successful.



Figure 10. Knowledge dissemination: Lisbon students conduct workshops, Image by Tanja Siems

CONCLUSION

The methodology of the Interprofessional Studio guides students through a transformative journey from predefined teaching methods to independent collaboration and work. The applied methodology gradually enables students to develop new skills, form alliances, and create their own networks and initiatives within professional setting and they learn to navigate the complexities of the creative process with confidence and adaptability.

The results of this collaborative approach are reflected in the case studies and examples presented. Students who engage in this educational model not only acquire discipline-specific knowledge they also cultivate a mindset of collaboration, empathy, and continuous learning. By embracing the principles of negotiation, interdisciplinary collaboration, and adaptability, students are prepared to address complex and ever-evolving challenges in their future careers within the creative industries as practitioners that are at home in more than one discipline. The collaborative approaches in creative processes, demonstrate the significance of negotiation, experimentation, and interdisciplinary collaboration. By embracing these approaches, educational institutions can empower students to become agile thinkers, problem-solvers, and active contributors to society. The integration of these collaborative practices will enable the future generations to continue to develop innovative and transformative outcomes in the creative disciplines.

NOTES

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DEVELOPING *FUTURE-SCAFFOLDING SKILLS* THROUGH COMPLEX SYSTEMS EDUCATION

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INTRODUCTION

To face the demanding challenges to which our society is exposed, the educational systems are called to make learners of all ages develop skills to construct coherent pictures of the complexity of the present to empower future-aware agency. For example, in the recently published European sustainability competence framework GreenComp, “embracing complexity”, “envisioning futures”, and “acting” are identified as three fundamental competence areas to tackle with sustainability issues, to which specific competences such as systems thinking, critical thinking, and futures literacy belong.¹ Educational research has been proposing several approaches to foster the development of these competences.² In the field of science education, in the last decade, the dimensions of complexity, future, and agency have been embedded in a novel approach named future-oriented science education.³ At its core lies the idea that science embeds a conceptual, epistemological, and methodological structure that, if suitably exploited in teaching, can work as scaffolding for a rational analysis of the present and a serene imagination of the future. Levrini and colleagues have identified a specific set of competences that science learning can foster: the future-scaffolding skills.⁴

In this contribution, we argue that these skills can be achieved by reflecting on important tools at the basis of the current scientific method: computational simulations. Of the plethora of possible simulation methods, we address agent-based simulations. They can lead learners not only to envision a plurality of futures but also to find spaces of action in the present to contribute themselves to the realization of desirable scenarios.⁵ Indeed, agent-based simulations show that the global evolution of a system strongly depends on the rules for the interactions among the individual components of the model.⁶ We will describe an activity in which high-school students were required to identify a real-life problem of their interest, model it through a simulation, and describe different future scenarios and possible actions to be undertaken to have it fixed in 20 years. Analyzing students’ final outputs and interviews we will show which future-scaffolding skills were exhibited during the activity and how the students report their development. We will argue that a misalignment can be observed between the skills exhibited and verbalized, and, on this basis, we will draw some implications for further educational studies.

The paper is articulated as follows. Firstly, we provide an overview of the concepts at the basis of research in future-oriented science education, borrowed from the discipline of futures studies; in the same section we summarize the results of previous studies, especially in terms of the recognition and operationalization of future-scaffolding skills in science education. Then, we describe the module on

simulations and the future-oriented activity designed, the context of implementation, and the data collection tools. After presenting the methodology of analysis, the results are reported in terms of future-scaffolding skills detected in students' presentations and interviews. In the discussion, we highlight the potential of agent-based simulations in general and specifically of the future-oriented activity we designed to foster their development.

FRAMEWORK

Future-oriented science education is an emerging field in educational research that borrows many concepts from Futures Studies i.e., the discipline that investigates ways to construct future scenarios.⁷ In its same name is embedded the idea that talking about the future requires envisioning a plurality of scenarios. There are possible (all we can imagine), plausible (that could happen according to our current knowledge), probable (supposed likely to happen following current trends) and desirable futures (imaginative, based on personal values).⁸

Envisioning the existence of many different futures mirrors crucial ideas of the science of complex systems. For these systems, it is often meaningless to think in terms of prediction because of their non-linear dynamics, the high sensitivity to initial conditions, the complex forms of causation that include feedback effects and emergent properties. The relationship between Futures Studies and complexity is particularly interesting also from an educational perspective. On one side, exploring non-Newtonian, non-mechanistic, and non-deterministic scientific models can help students imagine the future in a more open way; on the other side, learning basic concepts of Futures Studies and scenario-building techniques can give personal and societal relevance to scientific concepts that research has otherwise shown to be particularly challenging for novices' learning.⁹ Future-oriented science education stems from here.

This research is grounded on the findings of science education studies in which students engaged in future-oriented activities in which an explicit reflection was carried out on the concepts of Futures Studies and their connection with complex systems.¹⁰ The analysis of the data collected in these studies allowed to point out that, through these activities, the students developed future-scaffolding skills (see Table 1 for their description). Two macro-types were identified: structural skills as abilities to organize pieces of knowledge and build systemic views, and dynamical ones as competences to navigate across the complexity of knowledge, without trivializing the relations between local details and global views, between past, present, and future, and between individual and collective actions.

Structural skills	ST1 Distinguish between disciplinary details and the comprehensive picture of the issue
	ST2 Unpack the issue in simpler, addressable parts
	ST3 Recognize causal relationships
	ST4 Recognize multiple aspects of the problems and their relationships (e.g., distinction between problems, objectives, solutions or between pros and cons) for structuring proper thoughts and articulate strategies and plans for solving them
Dynamical skills	DYN1 Move from thinking locally to thinking globally (and vice versa)
	DYN2 Move from thinking at the present to thinking at the future (and vice versa)
	DYN3 Move from thinking at the individual to thinking at the societal community and/or the other stakeholders
	DYN4 Think creatively for imagining new possibilities and concrete actions
	DYN5 Balance the need of aspiring and desiring with that of keeping feet on the ground
	DYN6 Think in a multidisciplinary way, breaking down the barriers among disciplines
	DYN7 Move from thinking in terms of necessity to thinking in terms of multiple possibilities

Table 1. Description of the markers for future-scaffolding skills

THE TEACHING-LEARNING MODULE ON SIMULATIONS OF COMPLEX SYSTEMS

The future-oriented activity was part of an 18-hour module on Simulations of Complex Systems, implemented online in 2021, in which 35 upper high school students enrolled as part of their university orientation program. The module comprised conferences of experts, roundtables with researchers and interactive lectures; one was devoted to the epistemological analysis of agent-based models via NetLogo simulations. It ended with a future-oriented activity in which students, in groups, were guided to work with agent-based simulation to construct possible, probable, and desirable scenarios for real-world problems of their interest. After the end of the module, semi-structured interviews were carried out with volunteer participants to make them reflect, among others, on the knowledge and competences they had put into play during the course. In the next paragraphs we describe in detail the tasks of the future-oriented activity and the structure of the interview protocol.

The future-oriented activity

The first task of the future-oriented activity consists in the identification of a real-world problem of students' interest, followed by the request to explore possible future scenarios with NetLogo agent-based simulations. Then students are asked to imagine a desirable scenario and to engage in a back-casting procedure, identifying actions, decisions, policies, contingencies which have made it possible to realize the ideal future in 2040. To exploit the role of individual agency in the imagination of the future, in the fourth phase students are required to illustrate which role they have in the path of changes from the present to the future they foresee, as professionals, members of society, and as individuals in general. In the end, the students are asked to prepare a presentation about their story of success.

The individual interview

The interview protocol was structured across three sections. In the first, the students are asked to recall the main things they had learnt during the course about simulations as scientific tools; a question is aimed at understanding if they recognize a novelty in the agent-based simulation approach with respect to other models encountered at school. In the second, the students are guided to construct their agent-based model for the phenomenon of virus spreading. The third phase aims at making the students reflect on the knowledge and competences they have put into play during the course, what kind of knowledge learnt at school they perceived as more useful in the course and, in turn, which competences learnt in the course they can bring back to their school contexts.

METHODS

This study addresses two research questions: RQ1) Which future-scaffolding skills do the students exhibit during a future-oriented activity? RQ2) How do they describe the development of these skills?. The qualitative data analysis was articulated in several phases¹⁰. The dataset was built with the transcription and pseudonymization of the 7 groups' presentations at the end of the future-oriented activity and of the 8 final interviews. To answer RQ1, a top-down analysis was performed on the presentations to identify signals that could indicate the development by the students of structural and dynamical future-scaffolding skills. To address RQ2, a similar procedure was conducted on the transcripts of the individual interviews to understand how students talked about the competences they developed through the course, and to which extent they were able to recognize and verbalize them. In the interviews, the skills are identified no more because they are exhibited but as self-reported by the students at the end of the course. The methodological difference between the two is remarkable: skills "exhibited" are evaluated by experts who analyze classroom data and check them against a theoretical model, while the "verbalized" ones are identified by the students themselves with respect to their self-

evaluated learning trajectories. The distinction between these two levels of competence is a methodological choice rather common in the literature¹¹.

FINDINGS

Future-scaffolding skills exhibited in the final presentations

To answer RQ1, we present the analysis concerning the identification of the future-scaffolding skills put into play by the groups in their presentations at the end of the future-oriented activity. In Figure 1 is reported the graph of the skills displayed by each group.

All skills, but Dyn6 could be detected in at least two presentations; six (St2-3-4, Dyn2-3-7) were traced in more than half of the groups; Dyn7 was the only one recognized in all the presentations, followed by St4 that only one group did not put into action.

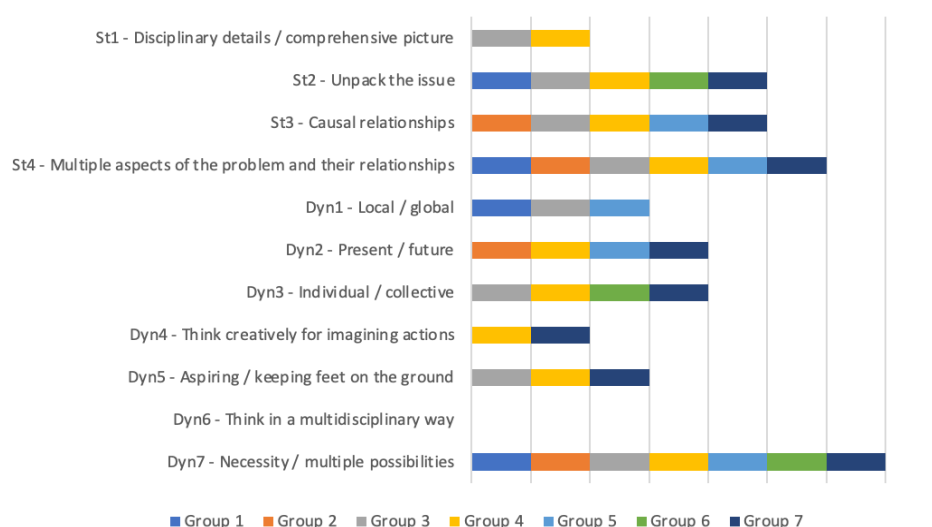


Figure 1. Distribution of future-scaffolding skills detected in the final presentations of seven groups of students

While Figure 1 is organized per skill, in Figure 2 we can see more clearly how the skills are distributed in each group: indeed, we report the summative graphic with the structural and dynamical skills per group, normalized between 0 and 1. In particular, we notice that there are groups which are very equipped of both structural and dynamical skills (like groups 3-4-7), while others seem quite poor for what concerns the detection of these competences (like group 6).

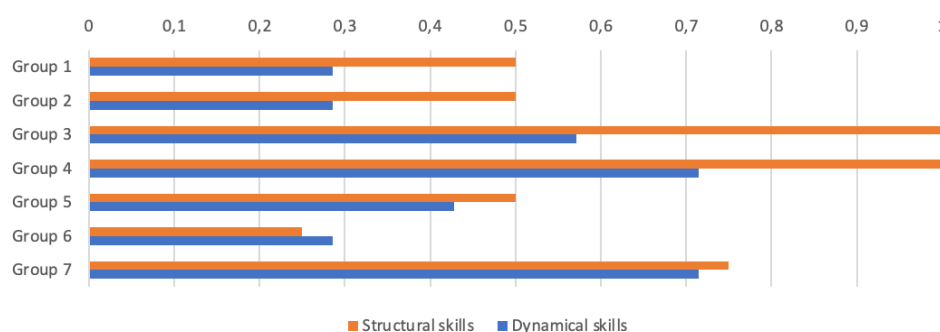


Figure 2. Structural and dynamical skills detected in the final presentations for seven groups of students, normalized between 0 and 1 (1 for structural means that the group has put into play all 4 structural skills, 1 for dynamical means that the group has put into play all 7 dynamical skills)

If from Figure 1 we can count 23 occurrences of dynamical skills against 18 of structural, when we normalize these values in Figure 2 weighting them with respect to the total possible structural skills (4) and dynamical ones (7), we can notice that for all groups but the sixth, structural skills are more recurrent than dynamical ones. These results are novelty with respect to the original study by Levrini and colleagues. There, they write: “Frequencies of occurrence cannot be compared between structural and dynamical skills due to the difference in difficulty of describing them. The dynamical ones are easier to describe even without specific questions in the data collection tools since they require a narrative style. On the other hand, description of structural skills can require specialized language. On the basis of these remarks, the fact that many students show structural skills is in itself a very interesting and positive result”.¹²

In our findings, the high frequency of structural skills confirms the importance of the scaffolding provided by a purposefully designed activity to trigger them. Indeed, as it will be illustrated in the discussion, the very same structure of the activity invited the students to structure their thinking about the future-oriented issue in terms, for example, of distinguishing between problems, causes, goals, solutions, actions.

Future-scaffolding skills verbalized in the final interviews

To answer RQ2, we analyzed the individual interviews carried out at the end of the course with eight voluntary students. The analysis was conducted to understand how students talked about the competences they developed through the course, and to which extent they were aware and able to verbalize the development of the competences. Figure 3 depicts the skills reported by the students in the final interviews. We notice that the most frequent is Dyn7, the skill to pass from thinking at a deterministic future to a range of possibilities, with all students who said in the interviews to have become aware of this distinction. Dyn7 is followed by St4, with six students who said they have learnt to distinguish between problems, goals, and solutions. We can observe that all skills but three were cited by the students in the interviews. These are Wid3, about the role of non-experts in the future-oriented scientific issue, Wid5, about the concrete strategies to address the problem, and St3, about the recognition of causal relationships in a topic.

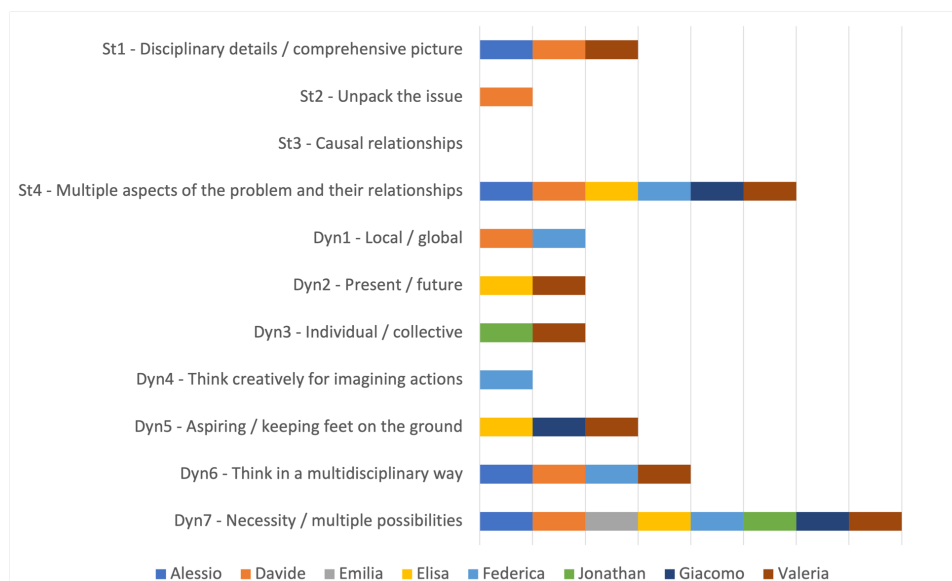


Figure 3. Distribution of future-scaffolding verbalized by eight students

To have a broader picture on the distribution of the macro-categories, in Figure 5 we report the aggregate distribution of structural and dynamical skills normalized between 0 and 1. Here we notice that on average dynamical skills are more represented than structural skills. Indeed, all students recognized to have gained at least one dynamical skill (specifically, from Figure 4 we know that all students reported Dyn7). 6 students recognized the development of at least one structural skill.

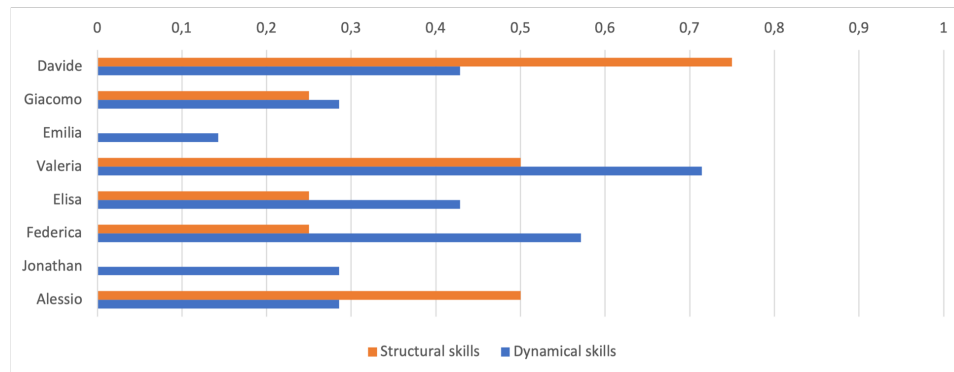


Figure 4. Future-scaffolding skills verbalized by each student, normalized between 0 and 1 (1 for structural means that the student has verbalized all 4 structural skills, 1 for dynamical means that the student has verbalized all 7 dynamical skills)

Comparison

In both cases, the most detected skill was the dynamical one on the plurality of scenarios (Dyn7), followed by the structural skill on the organization of the inquiry (St4). The main difference is that in the students' presentations we could not detect any Dyn6 while this was an important aspect in the interviews in which a specific question asked the students to reflect on the disciplinary tools and ways of reasoning they had put into play in the activity. Conversely, in the interviews, no students mentioned St3, while the recognition of causal relationships was at the heart of all but two presentations. If we consider the relative frequencies, in the presentations were detected much more structural than dynamical skills, while in the interviews the students gave slightly more emphasis to the development of dynamical than structural skills. The difference between the distribution of the two types of future-scaffolding skills is remarkable. If, with tailor-made designed activities, the students can be led to develop and exhibit structural skills, when we ask them to describe these competences, they are unable to recognize their achievement.

DISCUSSION AND CONCLUSIONS

To better understand the findings and the answers to the RQs, a deeper discussion is needed on the role of the future-oriented activity based on simulations in triggering the development of the future-scaffolding skills.

For what concerns the structural skills, the use of simulations in the future-oriented activity allowed the students both to handle and dive into the complexity of the problem they had selected. Indeed, having to choose a simulation to address a problem made the students engage in a process of "disciplinaryization"¹³ in which the complexity and multidimensionality of the issue needed to be unpacked and reduced to a set of agents and modes of interaction to allow computation. On the other side, the structure of the future-oriented activity encouraged the students also to explore the relationship among the sub-components of the systems, focusing on causal or logical relationships (e.g. distinguishing between pros and cons, identifying problems, objectives, and solutions). Our

hypothesis is that the use of simulations in the future-oriented activity triggered the exhibition of much more structural skills than in previous studies.

While the structural skills allow building a rational scaffolding for the topic, the dynamical allow moving across the layers of the scaffolding. We recall that all dynamical skills include in their formulation a balance between tensions (local-global, determinism-probability, individuals-society). Agent-based simulations include in their epistemological structure all these tensions. While coding the microscopic behavior of individuals, their run allows to see macroscopic emergent phenomena, show multiple future evolutions of the systems starting from initial conditions, and allow experimenting the connections between local rules and global patterns. We argue that the introduction to the students of the basic principles of Futures Studies offered them the reading keys to enhance the epistemological values of these tools. Conversely, the work on the disciplinary topic of simulations was a way to ground the development of these competences.

In this study, the data analysis has shown a clear misalignment between the skills exhibited by the students during the presentation of their work in the future-oriented activity and the self-reported ones. This difference between the distribution of the two types of future-scaffolding skills deserves further analysis. Being the competence of self-perception “a cornerstone of both social and emotional development”,¹⁴ research in future-oriented science education needs to investigate ways to make the students active protagonists of their own learning, able to recognize the transversal gain they can have from science future-oriented learning.

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INTERCULTURAL METHODOLOGY IN VIRTUAL SPACE

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INTRODUCTION

Over the years, humanity has been studying brain function, in order to understand the origin of mental, motor and sensory functions, which has given way to understanding the complexity of relational events that affect the acquisition of knowledge and retention of information in memory.

In a historical journey, neuroscience has been adding more and more variables that affect the complex learning process. Vygotsky, (1934) put forward the idea that the sociocultural aspects of the context join the biological base of the person, where thought becomes verbal and language rational.¹ In 1968 Alexander Luria spoke of memory as a set of various information storage subsystems that can be remembered in many formats related to sensory functions such as taste buds, olfactory bulb, vision, touch and hearing, which receive stimuli that are transmitted through the nervous system to the cerebral cortex.² These discoveries related to the teaching-learning area generated hypotheses of optimal contexts and methodologies for this process to develop in a better way, among which we find: enriched environments for learning, brain plasticity, and flexible background that promote differentiated learning structures in the classrooms.

In the current decade, studies of the brain and neuroplasticity reveal that the learning process starts from the relationship of human beings with the environment in which they find themselves through the senses and their unique way of processing these stimuli. It is a complex system in which biology represented by each person's neuronal connections, psicosocial linking environment to subjective, social and cultural factors; and cognitive aspects referring to the learning environment to which the student is exposed.³

COLLABORATIVE ONLINE INTERNATIONAL LEARNING (COIL)

With these advances, the Collaborative Online International Learning COIL methodology was born, integrating academic knowledge with intercultural experience based on Project Based Learning (PBL) through which teachers and students develop a virtual exercise between topics of a curriculum that share common themes or generate mutual contribution. These groups can occur between universities, careers, and diverse subjects, which contributes to soft skills development for interdisciplinary professional profiles.⁴ The COIL methodology was born in 2004 to nurture students with a variety of competencies. Among the benefits of the COIL methodology for the teaching-learning process are the ability to be inserted into the curriculum without affecting the natural flow of the subject or its impact on the grade or accreditation of the course.⁵ In addition, the approach to diverse learning spaces where teachers and students generate new ways of learning around collaborative and intercultural learning

experiences by approaching other realities with different perspectives promotes identity, empathy and recognition of diversity.⁶

Ever since, the COIL methodology has been applied by several educational institutions, such as Middle East College (Oman), Coventry University (England), and Ghana Communication Technology University (Ghana) who used the methodology to achieve three objectives:

1. To build an app that helps to navigate and notify students about their classes in case they are lost in locating the classroom within the campus or forget about the class, customized to respective campuses.
2. To widen the knowledge of Enterprise Systems in a global context and enhance intercultural communication.
3. To help PG Students understand how research is perceived in other cultures and how best to carry out research.

The objectives reflect the potential impact on postgraduate and undergraduate students, their learning linked to research, knowledge acquisition and creation of a digital product.⁷

Another example is the collaboration in nursing programs between the Training and Further Education Institute (Australia) and the post-secondary educational institution in Alberta (Canada) offers meaningful and rewarding opportunities to develop international partnerships without economic, organizational or geographical barriers.⁸

A third case that can be highlighted, is the collaboration between the University of South Carolina (United States) and Coventry University (England) where the methodology is applied in order to develop intercultural learning experiences.⁹

In the context of PUCE (Ecuador) and PUCP (Perú), the COIL methodology has been applied in other classes linking Product Semiotics undergraduate students with Social Marketing master students, where participatory methodologies are applied to analyze the context of the Social Marketing problem through tools such as empathy map, customer journey, participant observation, among others to know the consumer and their profile. The objective of this COIL linkage was: to propose a consumer profile based on semiotics and participatory research, implementing it in the social marketing project. This allows both courses to work together in a specific part of the Social Marketing project.

EXPERIENTIAL LEARNING THEORY (ELT)

The experiential learning theory (ELT) is a methodology where experience is prioritized during learning, which is widely used in education practice. It is a cyclical learning process where feedback, conflict resolution, adaptation and knowledge creation are essential for effective learning. Kolb proposes a cycle of four stages: Concrete Experience (CE), Abstract Conceptualization (AC), Reflective Observation (RO), and Active Experimentation (AE).¹⁰

In addition, in the present case study, we are based on the concept of Howard, who defines the CE as a stage where context and time are essential to emphasize experiential learning. In this sense, the student must be involved in a real practical experience.¹¹ This experiential learning develops the meta-cognitive skills of students, in improving their ability to apply information to real-life situations, and in giving them the ability to become self-directed learners.¹²

Language

Language is one of the most complex mental tasks that human beings perform. Initiating from birth in order to develop physically and intellectually and through which people can integrate socially. Through language, the person receives most of his learning and transmits knowledge. This communication ability is developed by the interconnection of various areas of the brain and is of great importance as it is considered a mediator of learning and relationships. Several authors have defined

typologies of languages such as artificial, verbal and non-verbal, within which we find the best known for their frequent use such as oral language, visual language, and written language.

In the present investigation, these types of language are handled in the exercises within the four phases of the project and constitute the relational medium that intertwines the exposed methodologies.

PLANING

This article exposes the exchange of 33 students and two teachers from Peru and Ecuador belonging to the Graphic Design careers of the Pontificia Universidad Católica del Perú and Product Design of the Pontificia Universidad Católica del Ecuador to design web pages for small Latin American companies using methodologies that promote neural connections. Also, for better outcome, students have openness to choose the companies thematic and the tools for their presentation.¹³ The exercises involve unrelated sensory stimuli from the different languages, seeking a positive experience that leads to significant learning.

In this project, COIL and ELT methodologies are intertwined to promote consistent and experiential learning by linking academic knowledge from an intercultural exchange approach.

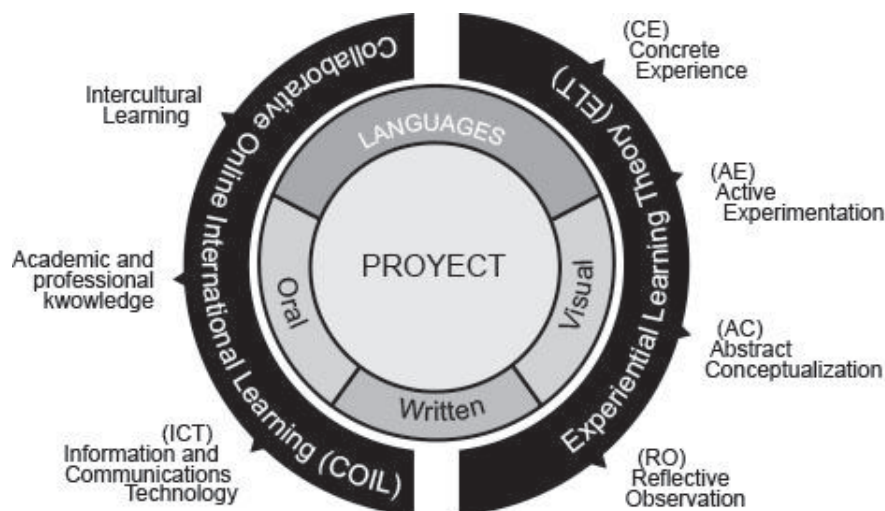


Figure 1. COIL and ELT methodologies applied to the project and the different types of languages as means of communication.

The project planning then starts by creating exercises that promote neural exchange from the senses. It seeks to unite the Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation from the ELT with the intercultural interaction using information and communications technology from COIL to relate to students from different environments.

The virtual medium brings some advantages since it allows efficient activities articulated in information networks without requiring a synchronous connection, in the same way, it has a great incidence in the stimulation of different sensory organs to motivate the student who is accustomed to and comfortable with this virtual environment. The exercises can then cover the three languages as a means of exploring information and recording the progress of the project with free access to information.

The practice is created in a realistic context by approaching small companies, generating the student's commitment to their learning since the research allows them to be linked to the social, economic and

cultural reality of various environments, perceiving that their contribution is relevant and assuming the learning as convenient for their professional life.

Based on these methodologies, approach activities are generated as icebreakers and tools from the creative disciplines are applied, such as mood boards, target and competition analysis of the company, the definition of objectives and design requirements and the resources for its development.

IMPLEMENTATION

For the elaboration of the activities and the learning process of the project experience has been taken into account as a transformer of neuronal connections.¹⁴ The David Kolb Experiential Learning Theory (ELT) methodology was considered, which emphasizes the importance of the learning experience. The four stages of Kolb's learning cycle are Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. In these stages, Concrete Experience and Abstract Conceptualization are ways of capturing the experience, and Reflective Observation and Active Experimentation are ways of transforming the experience¹⁵. Added to this methodology is the inclusion of COIL where students work remotely with a group of students from another country. The table below compares the ELT and the problem management model with the process applied in the project.

	ELT	Stages	Project stages
Modes of grasping experience	Concrete Experience	Situation Analysis	Work collaboratively and remotely with students from Peru and Ecuador on a website design.
	Reflective Observation	Problem Analysis	Stage 1: Definition of target based on intercultural contexts Stage 2: Analysis of the company's competition
	Abstract Conceptualization	Solution Analysis	Stage 3: Definition of objectives and requirements of the website
	Active Experimentation	Implementation Analysis	Stage 4: Design of the web page
			Modes of transforming experience

Figure 2. Relationship of the ELT and the problem management model with the process applied in the project.

The first stage, Concrete Experience, is the framework for the student's work and the skills and knowledge to be applied. In addition, through the application of the COIL methodology, there has been a merging of the academic and intercultural spheres. In the academic sphere, tools from each discipline were shared and small companies from both Peru and Ecuador were linked, while in the

intercultural aspect, it allowed linking the participants to local and international realities. At this stage, the group of students must reflect together on the choice of a small company.

The development of the project begins in the Reflective Observation stage, where the company's target and the essential characteristics of the consumer must be reflected together, based on the mood board, a board of images with keywords that convey the sensation of the company. It is the beginning to guide the project and transform the learning experience. Then the analysis of the competition of the company is worked on. This analysis allows us to know the context and the possible functionalities of the product. The information is presented in comparative tables and a list of contents. With these activities, the project is oriented through verbal, written and visual language, making patterns and connections between the company's vision, values and competence with the message to be conveyed to the public.

In the Abstract Conceptualization stage, the activity of defining the objectives and requirements of the website is applied. The purpose is to search for relevant information for the construction of the company's digital product. From the inputs of the previous stage, the objective and the scope of the project are defined, including visual, functional and communication aspects. The information is presented in a list of content and graphic elements boards. With this information, a new understanding of the project is formed, and the possible routes to solve the visual proposal are defined.

Finally, the web page design creation is applied in the Active Experimentation stage. To build the visual proposal, the information from the previous stages, especially the requirements, is used to choose the functionalities, the way of presenting the textual content, the colors, textures and typographies. In this way, the ideas and concepts are materialized in a visual way to communicate the sensations and valuable information to the consumer.

PROJECT EXERCISES

Language from the areas that students develop throughout their lives, such as verbal, gestural and expressive language, are taken into account when planning academic exercises. We start by generating empathy with their classmates and to be able to develop other languages related to the specificities of their professional study, such as verbal, written and visual language, which are areas of study in the professional career of Graphic and Product Design where the students come from. As a strategy, the student's previous experiences are linked to create new learning related to their professional work through academic tools and exercises. In this way, the senses are used to link the new knowledge with the old, discovering relationships and patterns that support new learning on past associations.

The academic project is organized into different exercises that are consecutive and allow relating the information acquired at a given time to be able to make informed and accurate decisions for the nature of the project.

The definition of the target, the analysis of the company's competition, the definition of the website's objectives and requirements, and the design of the website are linked to experiential learning methods. In each of these stages, participatory development activities are planned with three language areas: visual, written and verbal, to stimulate different sensory receptors. As Donald Hebb (1949) states: "Neurons that fire together, wire together,"¹⁶ referring to the importance of relationships in the teaching-learning process and the impact that brain organization has on human behavior.

The following table expands the exercises linked to each language with its objective.

STAGES	EXERCISES	LANGUAGE			OBJECTIVE
		VERBAL	WRITTEN	VISUAL	
Problem Analysis	Target definition	Oratory about the target, their tastes and preferences	Keywords	Mood board	Knowing what the target consumes, their attitudes, the sensations evoked by the brand and the consumers' experiences to apply them to the website.
	Company competition analysis	Discussion on aspects of improvement	Definition of evaluation criteria based on UX honeycomb factors	Benchmark	Define the positive and improvement points of each competitor company to then qualify according to the criteria in the analysis table.
Solution Analysis	Definition of objectives and requirements of the website	Discussion of the basis resources; in relation to the target, value of the company and its competition.	Writing SMART goals Writing functional and content requirements	Board of textures, colors, fonts, basis composition resources, etc. Based on consumer perception	Define the objectives, functional requirements, content and visual elements of the website to attract the attention of the consumer.
Implementation Analysis	Website design	Definition of sound language (music, reading, artificial intelligence, etc.) Oral presentation	Content in written language for reading and navigation (menu, submenu, guide words, etc.)	Application of components in the visual and functional composition of the website: typography, primary and secondary colors, textures, photography, illustration, etc	Design the website formally and functionally to communicate the company's service and its value to consumers.

Figure 3. Table of exercises carried out during the web page design project classified by type of language.

The academic planning of exercises related to oral, verbal and visual languages broadens the students' experience and learning by including a larger number of sensory-sensitive resources.

Each exercise in the table is carried out in a weekly synchronous session. It starts with an icebreaker activity where tastes and experiences are shared to get to know each other and their culture to create empathy among the participants. Information is exchanged on representative customs of each country, special places in each region and the participants' favorite traditional dishes. Topics that involve memories of the senses capture attention and connect different areas of the brain.

Once the company for which the website design is to be developed has been selected, the first exercise is to define the target on the basis of its tastes and consumer preferences, using a perception study linked to brands, shapes, colors, typographies and other resources. On the other hand, in the second exercise, the company's competition is analyzed using evaluation criteria based on the UX honeycomb¹⁷. In addition, the values that differentiate the company for which the website is being created are identified to highlight them on the site. In the third session, the objectives of the website are discussed verbally and defined in writing and visually, and the functional requirements of the site are determined. In addition, design resources are selected for the design of the site. In the fourth and final session, the functional and formal elements are incorporated to guide the user's navigation through visual and sound elements.

APPLICATION

To understand the application and the relationship and interconnection between each stage, Figure 4 shows the proposal's development for the Panqa company. This diagram shows the stages, results of the activities and the relationship between each concept. In the beginning, they are abstract concepts that are transformed into visual elements with connotative and denotative values linked to the company's values to create a coherent and clear message to the consumer.

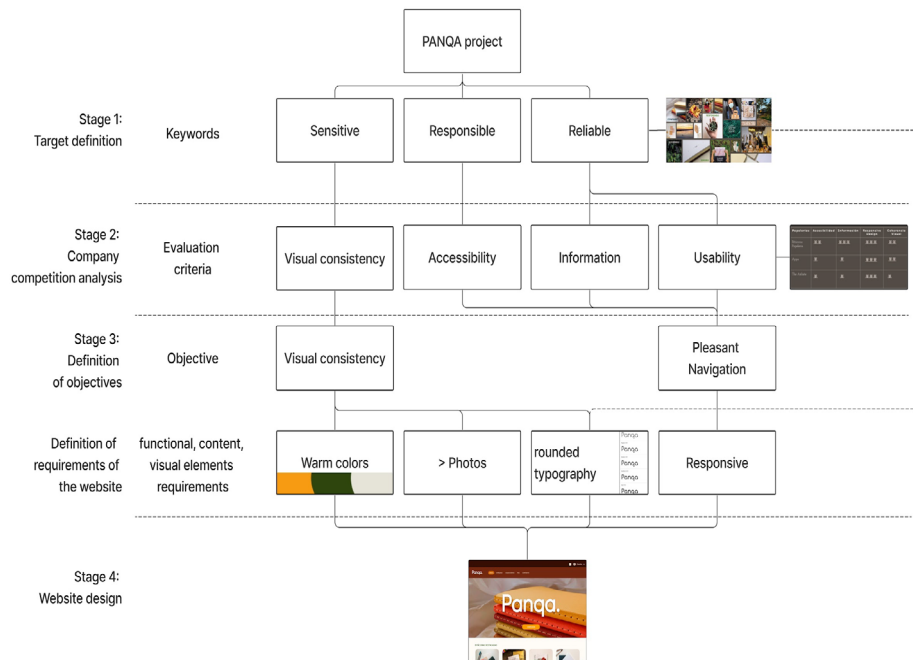


Figure 4. Relationship between the elements of each of the stages of the process in the Panqa project.

In the Panqa project, the student group synthesizes the target with the following keywords: responsible, responsive and reliable. Based on this and the UX honeycomb factors, the competitive analysis criteria are defined: visual consistency, accessibility, information and usability. Two or more evaluation criteria can be derived from one keyword, and the relationship between them is wide and varied. A scoring table is created for visual interpretation of the analysis.

The objective is written in a specific, measurable, achievable, realistic, and time-bound manner following the SMART¹⁸ strategy. However, this diagram emphasizes the actions to be taken and the relationship to the previous stages. In this stage, the students defined two aspects of improvement: visual consistency and pleasant navigation. A convergence of contents can be observed, where the specificity of the same objective can be appreciated and then diversified into different requirements. The requirements cover the functional, visual and textual content and the aesthetics of the product. At this point, the textual content is transformed into visual content and the mood board of the first stage is used to extract the elements with denotative or connotative meaning that best contribute to the final message.

Finally, the visual proposal organizes and selects the construction elements of the digital product. The final proposal shows the interconnection between the stages and how interculturality and visual, textual and verbal language contribute to the final visual product creation. It should be noted that throughout the process, oral language is essential in the development of the shared reflective decision and the communication proposal.

The result was six websites for small companies in Peru and Ecuador, designed from an intercultural work, applying a learning process by stages and visual, written and verbal language. The integration of these elements gives the students a better understanding of the problem to be solved and allows them to develop a coherent process between each stage. The participatory development activities are intertwined with the intention of building an optimal and adequate product for the clients' consumers.

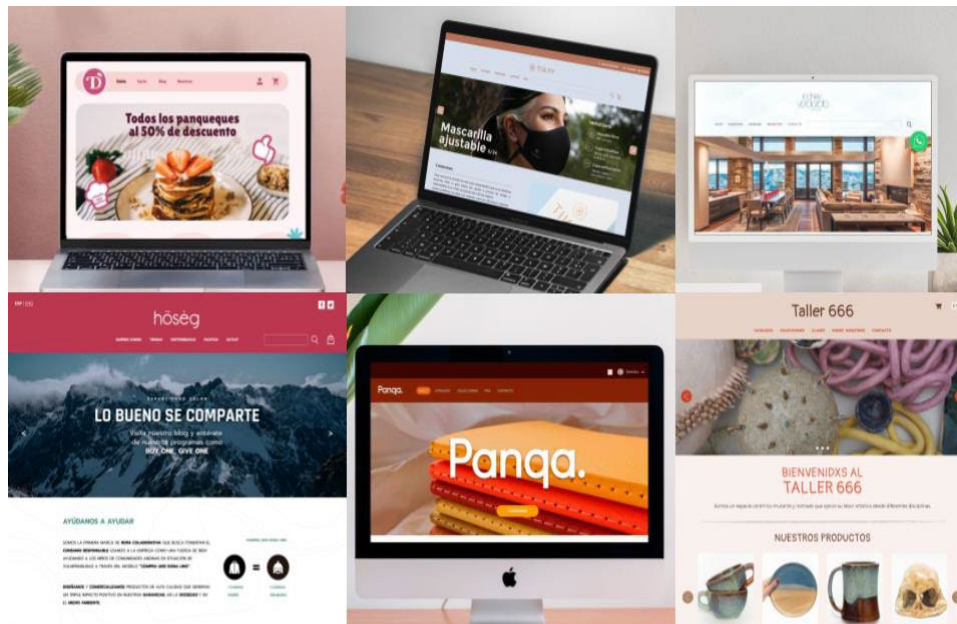


Figure 6. Visual proposals from student groups for small businesses in Peru and Ecuador.

ASSESSMENT

A questionnaire was used at the end of the experience to evaluate the relevant aspects of the project related to the methodologies used. The questionnaire consists of 5 questions; 3 open questions and two Likert questions with a scale of 1 to 5.

In the analysis responses, two codes were evaluated: academic knowledge and intercultural skills. The academic knowledge code is related to questions two and three. The intercultural skills code is related to questions one, four and five. The units of analysis are free-flowing and were compared by constant comparison.¹⁹

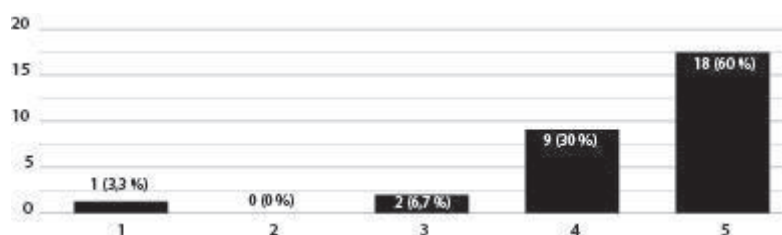


Figure 7. Table with results of the self-assessment of learning.

In the present research, academic knowledge includes the learning outcome, the teaching method, the activities and tools used, the expansion of professional knowledge, and the development of digital skills. In the Likert-type question related to the self-evaluation of learning, 90% of the students accepted the teaching method as valid. In addition, in the open-ended question, they highlighted in their comments the concise and relevant feedback, the simple exercises with clear explanations, an orderly and concise process, and useful and sufficient tools such as SMART objectives and FIGMA. In addition, the broadening of knowledge was evident in several of their comments, as Student A from Ecuador comments, "I learned about a discipline different from my own and how knowledge can be combined".

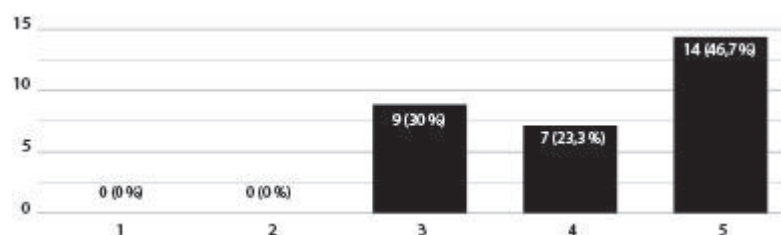


Figure 8. Table with results on the recommendation of the collaborative project.

Among the cultural skills highlighted by the students in the two open-ended questions were empathy, conflict management, communication skills, and emotional intelligence. The exchange activity between students from different countries and cultures was interesting and enriching, as mentioned by Student B from Peru: "I find the fact of exchanging cultural knowledge as well as knowledge about our career quite interesting". While in the closed question about the recommendation of the collaborative project, 70% of the students would recommend the international experience at levels 4 and 5.

Teamwork allowed for collaborative learning and reinforcement of skills. In addition, mutual support and constant follow-up were emphasized to achieve work success despite the difficulty of working with strangers and virtually. In this sense, the collaboration and constant communication among team members was positively evaluated. The cultural exchange and the opportunity to broaden perspectives were also considered useful and beneficial.

CONCLUSION

Neuroscience and education are closely related in that both seek to understand how the brain learns and processes information. Building on neuroscience by having a deep understanding of the neural mechanisms underlying learning and memory can guide educational practices and the development of tools that produce successful outcomes, such as those described in this article.

In terms of planning, there is coherence between each phase of the project's development thanks to the methodologies applied, which guide participants through an efficient process of developing activities that, with formative evaluation, allow them to achieve the objectives set.

The selection of different oral, visual and written languages to demonstrate the participatory development and its outcome was successful because it recognized the knowledge background of the participants, made them feel comfortable with the delivery formats and allowed them to communicate assertively within the established time limits.

According to the students, international collaborative learning is recommended because it allows them to develop their critical thinking and communication skills, as well as collective responsibility and solidarity. In addition, they believe that the project allowed them to achieve the learning outcomes of the exercise and the subject.

The brain can adapt and change in response to new experiences and is more attentive when exposed to diverse and enriched environments that create and store knowledge. Therefore, it is recommended to plan exercises that promote stimuli that use different sensory organs to connect the student's previous knowledge with the new content of the subjects.

The synergy among the participants promotes the exchange of experiences and international creative networks. In addition, teachers share teaching and learning experiences that promote active, hands-on education.

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LEARNING LENSES: FOUR THEORIES FOR INTERPRETING EXPERIENCE DESIGN SCENES

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INTRODUCTION

Designing for experiences is highly complex because it integrates traditional approaches like architecture and interaction design with experiential approaches like service design to create useful, usable, desirable, and memorable experiences. People who “purchase” experiences are *participants* in the experience instead of passive users.¹ Products, services, and systems designed to facilitate experiences rely on design research and co-creation for creating outcomes that anticipate peoples’ needs and match their makeup.² When designers plan scenes like riding theme park attractions, prospective student tours at universities, and meditative moments of prayer in synagogues for the experience they create in participants, the resulting memories and emotions often spark people to return to and repeat these experiences.³

The complex nature of experiences makes designing with this approach and teaching it difficult. This paper shares how four theories taught in the Experience Design Studio course in the Master of Fine Arts in Experience Design program at Miami University have enabled students to better understand and design for experiences. By applying theory, designers and students gain new ways of seeing as they research and create meaningful and memorable product, service, and system experiences.

THEORY FOR DESIGNING EXPERIENCES

The dynamic nature of experiences underscores that those who design with this mindset understand and apply theories that isolate parts of the entire experience design scene, not just the design itself. Designers with a traditional mindset place the most significant importance on the designed outcome’s format, such as elegant typographic layouts, how to engineer unexpected materials to produce voluminous interior spaces, or state-of-the-art motion design. These designers use theories that guide the creative process to create physical and digital outcomes that ensure the realization of the designer’s vision. Designers with a human-centered design mindset emphasize usefulness, usability, and desirability for those who use them but do not prioritize designing emotionally moving experiences. Human-centered and participatory designers invite users to the design process as collaborators and often use co-creative theories and methods such as card sorting, paper prototyping, and affinity mapping.⁴

Teams that design for experiences endeavor to produce outcomes that create memories and must consider perception’s highly variable and phenomenological nature.⁵ If designers are to develop outcomes that spark emotions, sensations, and motivations, they must be fluent in these concepts as

well as traditional and human-centered design principles. Because no two scenario-person pairings are alike—tested theories that guide research and design can assist designers as they account for how people, contexts, and design operate and interact in experience design scenes so designers can anticipate the effects of their design decisions on aspects of these scenes.

EXPERIENCE DESIGN STUDIO: EXPERIENTIAL LEARNING FOR HIGH-FIDELITY INQUIRY

Design studios, where students learn through actively doing, is a typical course format in higher education. This Design-Based Learning format is highly experiential, involving many rounds of revisions, engaged instructor feedback, and methods and tools that model industry-standard practices.⁶ Unlike lecture-based, “sit and get” learning, experiential learning makes learners active participants in the learning process, enhancing the learning process.⁷ At the most basic level, experiential learning happens when an instructor asks students to raise their hands in a class or to diagram a sentence on a whiteboard. However, in its highest fidelity, experiential learning makes students active investigators who learn through activities that intertwine context and content.⁸

While on-campus design studios create an experience that facilitates learning through doing, travel envelops learners in a high-fidelity experience that activates a broad spectrum of senses to supercharge learning.⁹ Study abroad and study away trips integrate Hawtrey’s context and content at the highest level. To maximize experiential learning and foster connections between remote learners, the Experience Design Studio course in the MFA in Experience Design program includes a three-day “Destination Weekend” trip when students meet in person on-site at a location in North America that holds significant learning in experience design. During the three-year degree, students in the program take the Experience Design Studio course four times—twice during the fall semester and twice during the spring—completing all four variations over two years. Each variation of the course focuses on an essential component of designing for experiences where students explore one theory throughout the semester through a major project and intensive on-site study during the three-day “Destination Weekend” trip. The four Experience Design Studio variations are shown in Table 1.

	Spring	Fall	Spring	Fall
Experience Design Scene Component	Context	People: Self	People: Relational	Design
Theme	Setting	Meaning-Making	Motivation	Interaction
Theory	Soft Systems Methodology	Self Determination Theory	The Theory of Planned Behavior	Semiotics
Destination Weekend Location(s)	Zion National Park, Utah & Las Vegas, Nevada	Santa Fe, New Mexico	New Orleans, Louisiana	Montréal, Quebec
Destination Theme	Environment	Culture	Multisensory Design	Language
On-Site Assignment(s)	Soft Systems Methodology Field Research	Culture and Service Design Field Research	Mapping Behavior to Theory & The Feeling of a City	Semiotics Field Research
Final Project	Designing for Resilience	Inside Out Project	Feeling Moved	The Finer (Touch) points

Table 1. Experience Design Studio Variations

Academic semesters at Miami University are 14 weeks long. During each semester in Experience Design Studio, students complete an initial project introducing surface-level experience design concepts related to the studied component. At the semester midpoint, students complete several readings and an asynchronous online discussion that introduces the theory that guides Destination Weekend activities and the final project for the semester. Experience Design Studio has been offered in its current format since Fall 2017. Over that period, seven to ten students enrolled in Experience Design Studio each semester and traveled for Destination Weekend. An overview of each theory and the assignments that introduce it follows.

Context: Soft Systems Methodology

When designing for experiences, systems thinking and theory are highly applicable—many parts, from external factors such as the weather or political climate to controllable elements like a smartphone app, rely on and affect one another. Peter Checkland and others developed Soft Systems Methodology (SSM) to explore complex scenarios from a systems perspective.¹⁰ While systems could easily be explained by only focusing on interoperable parts and their logistics—SSM recognizes socio-technical systems’ “soft” social aspects. People’s roles and motivations are essential to these systems, and these concerns impact whether the system produces preferred or unintended outcomes. Checkland developed the CATWOE mnemonic to capture each essential element of a system, where “C” represents “Customers.” Not every system involves customers, so a revised mnemonic of BATWOVE has enhanced its utility.¹¹ The “T” in the mnemonic stands for “Transformation” and is

its central concept, representing the goal the system is intended to accomplish/the change it produces. A transformation can be as simple as selling more potato snacks in a city or as complex as increasing voter turnout for national elections.

The remaining BATWOVE mnemonic elements in SSM represent other elements of the system.

Beneficiaries: Who or what gains from the transformation

Actors: Those who do the activities of the system

Weltanschauung: The “world view” that determines the transformation’s value

Owners: The decision maker who is in charge of the system and interested in its operation

Victims: Who or what stands to lose from the transformation

Environmental Constraints: Conditions outside the system that affect its operation and all those associated with it

By isolating these elements, SSM enables planners to examine each independently to determine how they impact the transformation. For experience design students, SSM is a helpful framework for analyzing systems to determine power relationships, weaknesses, strengths, interrelationships, and dependencies. Design teams who can dissect systems using SSM gain insights into ways design can improve a system and enhance the transformation experience.

Soft Systems Methodology is taught when the Experience Design Studio course focuses on systems and contextual factors outside the designers’ control. The Las Vegas and Zion National Park Destination Weekend provides students many opportunities to apply SSM in the real world. Before the travel weekend, students receive the Soft Systems Methodology Field Research Assignment, which requires students must use two systems of their choosing while on the trip and document the rich picture of the experience on a shared online whiteboard. In Spring 2023, students reported hiking Angels Landing, a Park Ranger talk at Zion National Park, a bed and breakfast near the park, and a session at an escape room.

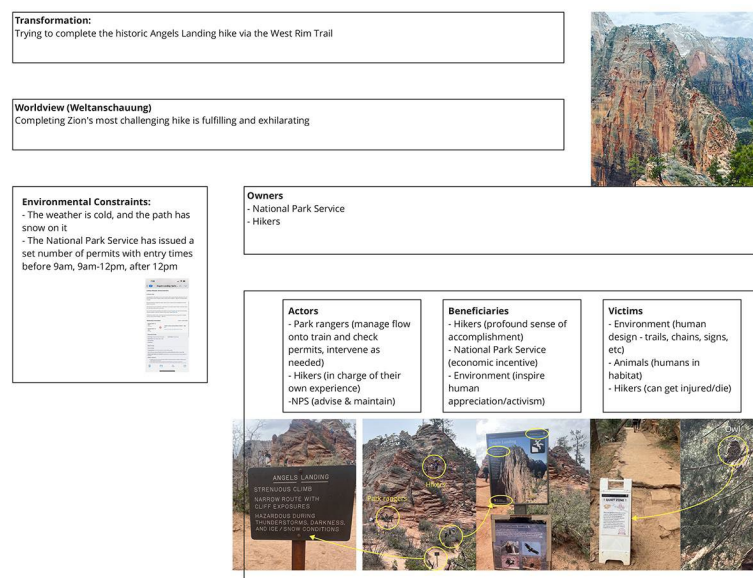


Figure 1. Soft Systems Methodology Field Research Assignment Work by Carolyn Noll Sorg

Using Soft Systems Methodology in the Experience Design Studio course sparked insightful discussions with students about how some transformations can cause unintended consequences. For example, though the natural environment is the main event at Zion, it is sometimes a victim when human impact via tourism wears away trails and can lead to erosion. This realization then led to a

discussion about ways to preserve the natural environment while giving visitors as authentically natural an experience as possible.

People (The Self): Self-Determination Theory

Intrinsic motivation is significant when people use a smartphone app, begin a college degree, or take measures to reduce their carbon emissions. Understanding what drives intrinsic motivation is imperative for experience designers who wish to create outcomes that impact behavior. Richard M. Ryan and Edward L. Deci developed Self-Determination Theory as a framework that studies innate psychological needs that support intrinsic motivation.¹² Their findings revealed that when three basic psychological needs were satisfied, people demonstrated enhanced performance and well-being that amounted to positive intrinsic motivation. Out of a range of psychological needs, Deci and Ryan found three were essential for intrinsic motivation.

Autonomy: People have control and are empowered to make choices for themselves.

Competence: People have developed sufficient knowledge, thinking, and skills.

Relatedness: People feel connected with others.

Ryan and Deci claimed that not only when people such as students or co-workers experienced these conditions were they more motivated, but individuals in roles as teachers or managers are more likely to lead effectively to create an environment that supported positive experiences if their basic psychological needs for autonomy, competence, and relatedness were met.

Self-Determination Theory is taught when the Experience Design Studio topic explores how people's identities or self-concept impact their decisions and experience. During this semester, students travel to Santa Fe, New Mexico. Before the trip, students select a service to analyze for their on-site work. While in Santa Fe, students use the service as a customer and critique how well the service creates a unique cultural experience, paying careful attention to concepts stated in Self-Determination Theory.

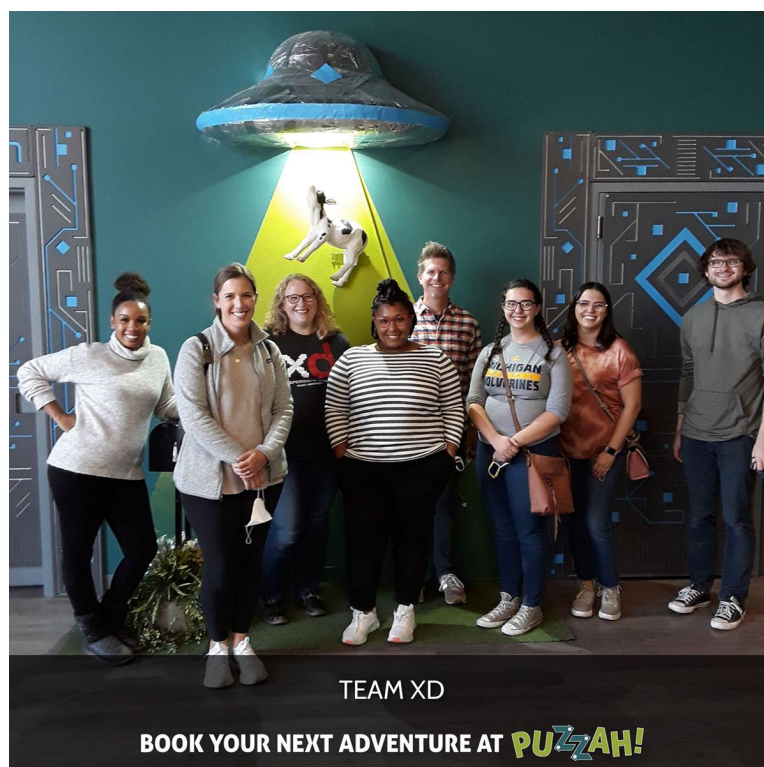


Figure 2. Students pose after completing an escape room game.

In Fall 2022, students documented services, including a Japanese spa, an escape room, various cultural and historical museums, and an immersive art installation for the Culture and Service Design Field Research assignment. After the travel experience, students turned in detailed observations and indicated how design techniques such as branding, service procedures, and interior spaces were designed to facilitate autonomy, relatedness, and competency. By using Self-Determination Theory, students practiced deciphering services for ways they support intrinsic motivation. This skill was central to the *Inside Out Project*, a six-week project where students collaborate to design services that foster intrinsic motivation.

People (Motivation): The Theory of Planned Behavior

People who visit a restaurant for lunch, pay a utility bill online or visit a doctor for knee surgery use products, services, and systems to complete an activity.¹³ Though many steps are involved in any use scenario, the activity being completed is at the scenario's core. When the designed outcomes that people use to complete the activity align with their makeup and help them achieve their goals, they have a good experience. When these designed outcomes are memorable and distinct in a way that makes completing the activity unique, a memory is created, and people are more likely to want to repeat the experience as a repeat customer. For experience designers, a core question is how to design outcomes whose features will align with participants to motivate them to act.

Icek Ajzen's Theory of Planned Behavior (TPB) endeavors to predict human behavior.¹⁴ It outlines the conditions determining whether a person will choose to perform a behavior, such as dancing on the dance floor at a wedding reception or voting in a city election. Experience designers who wish to create products, services, and systems that enable usage can utilize TPB to inform their design decisions and improve experiences. Ajzen's theory indicates that a person's intention to engage in a behavior is a crucial determinant of whether they will perform it. According to TPB, three interrelated conditions determine this intention to act.

Attitude toward the behavior: How a person feels about performing the act

Subjective norm: What a person perceives other people who are important to them will think about them if they complete the behavior

Perceived behavioral control: The degree to which a person believes they can perform the behavior

A person's willingness to engage in an experience, whether donating to a charity or attempting to repair a tire, hinges on conditions inside them at the time and place when they are faced with the decision to act. Designers who wish to create outcomes that will be used and align with peoples' makeup can use TPB to examine barriers that prevent actions and design outcomes that account for these barriers.

Students apply TPB in several ways during the Experience Design Studio course. Halfway through the semester, students read about TPB and complete an asynchronous online class discussion to become more familiar with the theory. Students then complete the *Mapping Behavior to Theory* assignment by selecting something they have never done, then mapping the tasks' steps into an expanded visualization of the Theory of Planned Behavior's elements. In Spring 2021, students selected behaviors including applying for a new job, starting a business, and buying an income property.

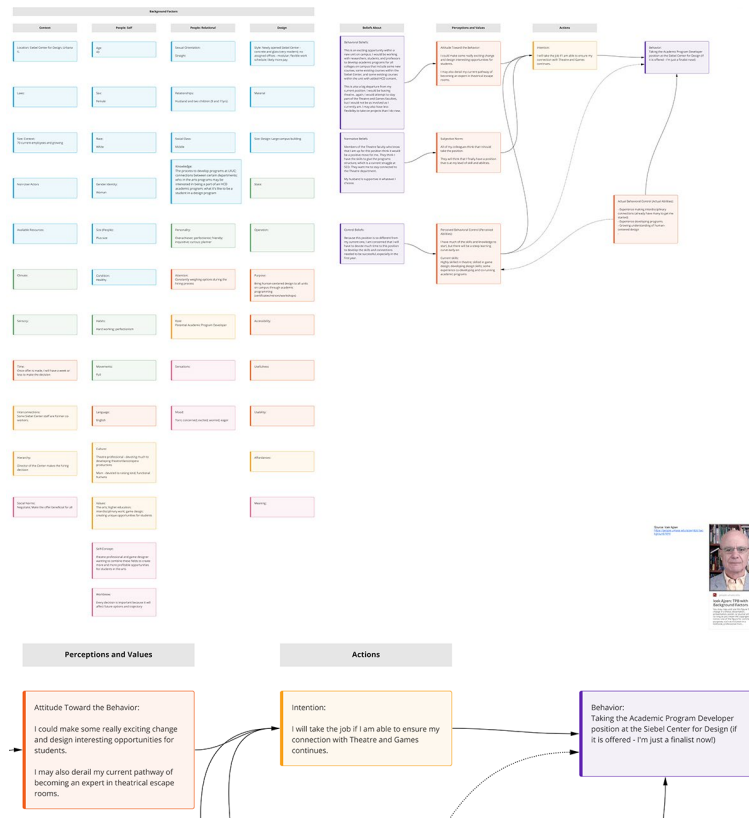


Figure 3. A full view and detailed view of Mapping Behavior to Theory work by Amber Schulz.

When visiting New Orleans for Destination Weekend during this semester, students explore multisensory design through *The Feeling of a City* assignment—observing how partying and live music on Bourbon Street differs from Frenchman Street and exploring ways the city’s varied and dynamic cultural heritage motivates visitors to learn from this richness. Before the trip, each student selects one experience in New Orleans from the instructor's list of 25 options. While on-site, students experience the location as a tourist, document the sensory content of the experience, and apply TPB components to explain how the place motivates action and deeper engagement.

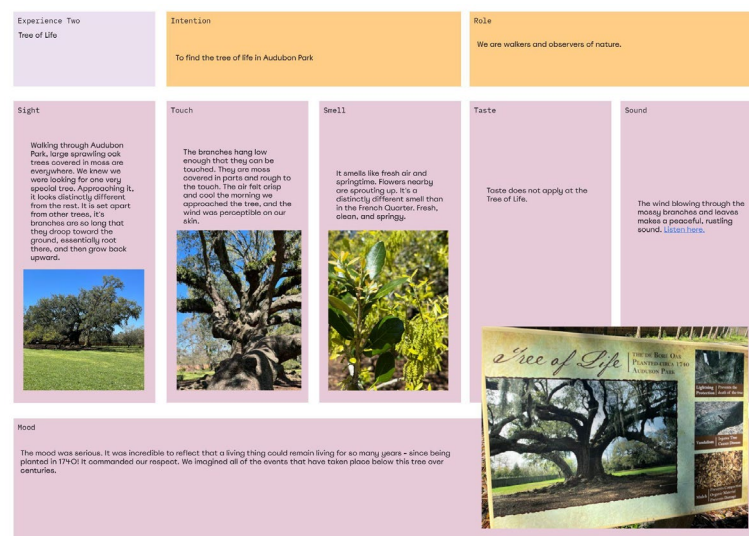


Figure 4. The Feeling of a City assignment by Carolyn Noll Sorg.

As students paid close attention to their senses—recognizing which ones generated a unique experience worth repeating—they made connections between multisensory design and how sensations are strong motivators for people to engage in an activity. After Destination Weekend in New Orleans, students applied their new knowledge by completing the Feeling Moved project, where they employed multisensory design to create emotionally rich, motivating products, services, and systems.

Design: Semiotics

The makeup of products, services, and systems shapes how they operate and their style and communicate messages about the design that people interpret. While semiotics is an academic concept driven by work by Saussure, Barthes, Pierce, and Eco it explains how the format of a design facilitates the quality of interaction with it.¹⁵ For example, color can communicate a meaning like romantic love when used on an image of a heart or hot water when used on a faucet. Designers are responsible for creating signs that communicate messages; when these signs miscommunicate, unpleasant experiences result. During the Interaction topical semester, Experience Design Studio course students develop competency when interpreting and creating outcomes that utilize the following design signifiers.

Word

Image

Sound

Object

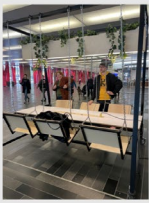
Gesture

Experience designers fluent in the possible meanings that designs convey are likelier to create outcomes like smartphone app buttons, high school classrooms, and logotypes that reduce miscommunication and enable effortless user experiences.

Students in Experience Design Studio explore semiotics on-site during the Destination Weekend in Montréal, Quebec, Canada. Students are given a template in an online whiteboard software three weeks before travel to guide their observations in Montréal. Students observe one instance of each signifier listed above while in Montréal. In the template, students indicate what the signifier means to them and what it could mean to someone else—most notably, how it could be misinterpreted—and reflect on the experience the observed signifier created.

Object: Semiotics

Object: Images from the field



This was a desk with swings instead of chairs we saw after the van Gogh exhibit.

Object Analysis

Signified (to you)	Signified (to other - specify whom)	Sign Type	Payoff
It was inviting and immediately blended work (the desk) with play (the swings) to make the perfect workspace for creativity.	To a person in a wheelchair, it could signify exclusion and inaccessibility since they could not use the space as intended. To children, it could appear like a playground since that is likely the only place they have seen swings.	Icon because it resembles swings and a desk?	While I was excited to see and try it, it could be isolating for an individual in a handicap. Children could get hurt if attempting to use the swings-at the desk how they would use the swings on a playground.

Object: Design Approach

Traditional Design

Figure 5. A detail of the Semiotics Field Research assignment by Jaimie Miller.

Destination Weekend in Montréal challenges students to grapple with the role of language in interactions between people or between people and technology. Because the primary language in Quebec is French, students who are not French speakers must navigate experiences like riding public transportation, attending a live music concert, or checking into a hotel with limited communication abilities. It is a place where signifiers like words or visual symbols are unfamiliar—challenging students to avoid assuming everyone communicates and understands meanings the same way they do.

CONCLUSION

Designing experiences is holistic—mixing usefulness and usability with storytelling and sensory experiences. Using theory, designers can gain new perspectives that allow them to see the scaffolding that supports experiences so new designs can benefit from these structures. Initial results from experiential learning assignments noted in this paper suggest that an effective way to learn how to design experiences is to become a finely tuned experiencer who can sense and interpret real and perceived aspects of experience design scenes, then design outcomes that orchestrate these aspects into a cohesive, holistic whole. Though it's unlikely that designers will refer to theory by name when working with a client, applying it to experience design can give designers invaluable insights for creating transformative experiences.

NOTES

- ¹ Rossman and Duerden, *Designing Experiences*.
- ² The Disney Institute and Kinni, *Be Our Guest: Revised and Updated Edition: Perfecting the Art of Customer Service*.
- ³ Jensen, "Designing for Profound Experiences"; Pine and Gilmore, *The Experience Economy, With a New Preface by the Authors: Competing for Customer Time, Attention, and Money*.
- ⁴ Bredies, Chow, and Joost, "Addressing Use as Design: A Comparison of Constructivist Design Approaches"; Sanders and Stappers, *Convivial Toolbox: Generative Research for the Front End of Design*.
- ⁵ Coxon, "Fundamental Aspects of Human Experience: A Phenomeno(Logical) Explanation."
- ⁶ Rowe, "Design Pedagogy: Higher Education Possibilities for the Twenty-First Century."
- ⁷ Dewey, *Experience and Education: The Kappa Delta Pi Lecture Series*; Kolb, *Experiential Learning: Experience as the Source of Learning and Development*.
- ⁸ Hawtrey, "Using Experiential Learning Techniques."
- ⁹ Lundberg et al., "Developing the Experience Impact Scale: A Qualitative Study Using a Study Abroad and International Internship Program"; Stone and Petrick, "The Educational Benefits of Travel Experiences: A Literature Review."
- ¹⁰ Checkland and Scholes, *Soft Systems Methodology in Action*.
- ¹¹ Bergvall-Kåreborn, Mirijamdotter, and Basden, "Basic Principles of SSM Modeling: An Examination of CATWOE from a Soft Perspective"; Checkland, *Systems Thinking, Systems Practice*; Mingers and Taylor, "The Use of Soft Systems Methodology in Practice."
- ¹² Ryan and Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being."
- ¹³ Christensen et al., "Know Your Customers' 'Jobs to Be Done'"; Norman, "Human-Centered Design Considered Harmful."
- ¹⁴ Ajzen, "The Theory of Planned Behavior."
- ¹⁵ Deely, *Basics of Semiotics*.

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INSPIRATION AND PURPOSE: LESSONS FOR SUCCESSFUL ADULT EDUCATION

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INTRODUCTION

This paper explores theories of inspiration and the Purpose-Centered Educational (PCE) system launched by Audrey Cohen as a basis for adult pedagogy. The PCE system uses student field experience combined with classroom instruction to produce a unique educational framework emphasizing in-depth integration between theory and practice. After exploration of the history and development of Purpose-Centered Education, a new theoretical model illustrates how the learner's experience of inspiration constitutes a critical component of PCE. This paper describes how this educational model—combined with the role of the instructor, lessons learned from fieldwork, and other pedagogical strategies—help to foster a renewed sense of inspiration, including evocation, transcendence, and motivation linked to empowerment, agency, and curiosity critical to adult students learning experience.

Inspiration is a common construct of human experience, with theorists uncovering the concept's meaning, functions, and characteristics in various situations. Greenacre defines inspiration in three ways, first drawing attention to similarities with the image of breath, in the sense of blowing and inhaling.¹ A second spiritual connotation relates to actions resulting from divine influence on the mind or soul. The third definition characterizes inspiration as “a breathing in of some idea or purpose into the mind” —the suggestion of some feeling or impulse, “especially of an exalted kind.”² Thrash, Moldovan, Oleynick, and Maruskin point to traditional notions of inspiration as a stimulus, moving individuals “beyond the mundane towards the extraordinary.”³ Others describe inspiration resulting from individual engagement with particular types of information, generating a unique response.⁴ It is a passage to action, defined by a feeling that leads to doing. The psychological basis is a state of motivation generating feelings of transcendence from exposure to external stimuli. Motivation inspires individual desires to reach or communicate a goal, resonating with their values.⁵

Thrash et al. breaks this down further, labeling the critical stages associated with an experience of inspiration. The initial stage of evocation involves exposure to something external. Insights, a sense of possibility, and perceptions of new visions are called epistemic transcendence. An individual then experiences new levels of motivation to make a change to actualize their new perceptions.

While education involves increasing knowledge and information, this is not all that education is, nor its most important aspect. Hence the famous quote often attributed to W. B. Yeats, “Education is not the filling of a pail but the lighting of a fire.”⁶ However, how rare is this? Moreover, why does it occur?

This discussion explores PCE and links between student experience of inspiration and this model's philosophy, structure, and methods. The PCE system developed by Audrey Cohen, founder of Metropolitan College of New York in the early 1960s, has relevance beyond this institution for others seeking to address the needs of adult, underserved learners. The analysis illustrates the integral relationship between models of the learner's experience of inspiration and the building blocks central to PCE.

PURPOSE-CENTERED EDUCATION

Audrey Cohen began transformative work in education by launching The Women's Talent Corps to cultivate the talent of women in low-income communities. A grant under the Economic Opportunity Act of 1964 and extensive community outreach helped realize this critical goal.⁷ By 1974, a higher education nonprofit institution called the College for Human Services in New York City was formed, with foundations in a Purpose-Centered system. The driving force of the founder was to fill gaps in the educational system. While education was successfully providing skills for some in the United States, Cohen argued that many students found education a meaningless, empty experience with little value in terms of quality of life.

To address this problem, expectations for the educational system needed redefinition. Cohen reframed the purpose of education through links to higher ethical goals.⁸ Students must enhance their ability to use knowledge to pinpoint essential purposes in the real world. In addition, education should stimulate engagement in meaningful change to achieve the purpose. The aim must be to elevate students' recognition of their ability to work towards achieving a better world.

Model of Inspiration and Purpose-Centered Education

Purpose-Centered Education's philosophy developed from recognizing contrasts between transformational education and passive, top-down learning in traditional classroom settings. Many focus on solving problems related to retention and skills gaps in American higher education. Cohen points to the failure of an educational system focusing on teaching students not "how to inquire but how to digest the results of other people's inquiry."⁹ Research previously explored the benefits of experiential education. However, educators need an understanding of practical methods to increase student inspiration, which we present as linked to Cohen's emphasis on "purposes that motivate children to find answers."¹⁰ In Fig. 1, we present a new model linking inspiration and components of the educational pedagogy essential for Purpose-Centered Education to achieve optimal adult learning goals.

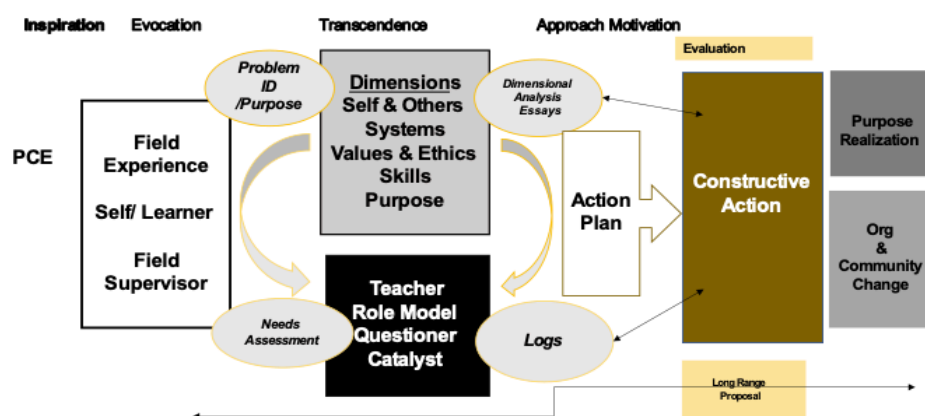


Figure 1. Model of Inspiration and Purpose-Centered Education

Figure 1 illustrates the dynamic model tying three aspects of inspiration (evocation, transcendence, approach motivation) with building blocks in the PCE system. Insights for this come from the authors' combined two decades of experience in the PCE system, Constructive Action student thesis review, and presentations and literature on the PCE methodology.

Inspiration, Evocation, and Purpose-Centered Education

Inspiration involves stimulation through evocation by something external that engenders drive and excitement. Thrash, Maruskin, et al. argue that inspiration comes from exposure to the outside world and efforts to emulate qualities in an object, person, concept, or act.¹¹ Students' experiences that trigger engagement with people and activities involving creativity and imagination play an essential role.

PCE builds on this foundation, emphasizing the importance of merging theory and practice. A rich history documents student stimulation through real-world engagement in organizations throughout the New York City metropolitan area.

The idea that students learn best when they use knowledge and skills to achieve a purpose defines PCE. Field placements, as an essential component of the PCE model, create a dynamic relationship between the college, the organization, and the learner. Institutional support, communication between the field supervisor, teacher, and student, and flexibility to encourage students grappling with exploration are essential. Students apply theory and skills taught in class to experiences that unfold through their experiments in the field.

Constructive Action (CA) is what Cohen calls a "living case study."¹² It is the fundamental component of the curriculum for all students. It serves as a deep dive into the experience of implementing change within the field site organization. Theory and practice are embedded in all aspects of students learning. For undergraduate courses, the CA unfolds during one semester, while in other graduate programs, projects involve three phases that run throughout an entire year. Students write about the organization's history, mission, and structure and probe their own experiences in the organization. Challenges arise from the engagement between the college and field site, including scheduling the initial orientation of supervisors in the field. Sometimes, students enter the college with no field site or supervisor, necessitating college outreach. Field placement disruptions mid-semester sometimes impact the learning flow. Professors also inspire as role models, with those bringing professional, real-world, or years of past PCE teaching experience invaluable in the learning process.

The interdisciplinary nature of Audrey Cohen's original vision rests on the notion that integration enhances creativity. PCE builds connections between different fields, theories, and disciplines. Students learn to delve into complex dynamics at the job or field site. Sequential learning stages are defined by specific "Purposes" each semester. These include substantive areas of expertise, integrating academic learning with external challenges, with potential outcomes beneficial for society. Each also developmentally enhances students' abilities. The PCE model includes classes reflecting five "Dimensions" of learning: "self and others," "systems," "values and ethics," "skills," and "purpose." For example, the early stages of the Purpose dimension seminar focus on planning "Constructive Action" (CA) projects to develop professional competencies. However, they also aim to enhance social justice and empowerment in target audiences and society through the student's experiences in the field. A rich "holistic, integrated approach to learning and life" was the aim, for purposes to be "repeatedly viewed from many directions simultaneously."¹³

Transcendence, Inspiration, and Purpose-Centered Education

Inspiration in education involves a heightened focus on dynamic processes within the learner. The experience translates into learners attaining a new sense of excitement, illumination, and increased awareness, involving transcendence from the previous norm.¹⁴ The transcendence aspect of inspiration relates to curiosity, a natural part of childhood. Unfortunately, our educational system often extinguishes this sense for students—a challenge for many seeking educational attainment in their adult years.

Inspiration relates to an individual reaching a new, higher level of understanding. The sense of grasping new insights, possibilities, or a clearer vision about a goal is critical. This process of goal clarification ties imagination to an engaging learning experience. Einstein noted “imagination is more important than knowledge,” touching on the crucial power of mental insight unleashing critical forces in the human brain. Both internal and external processes stimulate the envisioning of new possibilities. A variety of studies find strong relationships between creativity and inspiration, particularly those examining the experiences of inventors and writers.¹⁵ Loehle¹⁶ explores inspiration, creativity, and research, suggesting childlike innocence and wonder aid creativity and overcoming challenges.

Strategies in the PCE model support findings on links between inspiration, transcendence, and creativity. The process of student action planning after preliminary data collection to assess organizational need involves PCE teachers engaging students in creative visioning, resulting in selections influencing subsequent decisions. Students engage in collaborative learning activities identifying purpose and issue themes for analysis. In initial work on the CA, professors often encourage students to think about their field site issues, passions, and values as sources of empowerment and enhanced inspiration. Encouragement of students to follow their “passions” to help define a sense of purpose in choosing the CA project theme supports the idea of links between strong feelings and creativity. Forward-looking proposals emerge involving future visions for short- and long-term change.

Inspiration, Approach Motivation and Purpose-Centered Education

Approach motivation, the third aspect linked to inspiration, is central to achieving several of PCE’s key expectations. The mission of PCE includes students learning to use knowledge for practical purposes, moving beyond identifying a plan to working to fulfill a significant purpose in the real world. The goal is to enhance students’ ability as citizens to impact change. Engagement in change aims to increase students’ sense of empowerment, personal responsibility, and agency. PCE also aims towards social justice goals, increasing students’ ability to work more effectively with others.

Rajala, Martin & Kumpulanian define agency as “the opportunity, will, and skill of people to act upon, influence as well as transform activities and circumstances in their lives.”¹⁷ De Vignemont & Fournier highlight the importance of the “ability to refer to oneself as the author of one’s own actions.”¹⁸ They tie this to the sense of autonomy and power relations that are critical to the successful transformation of students in their adult years.

Jyrkämä¹⁹ as cited in Hilppö et al.²⁰ highlight six crucial agency components that we relate to inspiration and the learning experience. To want, to know, to be able, to have to, to feel, experience, or appreciate, and finally, to have the possibility. All six relate to the PCE model, with some reflecting motivational aspects of inspiration. For the CA to ensure students’ “want” means thinking about their interests and passions as they consult field supervisors and teachers to identify central themes. Students flesh out research related to their field to inform understanding of their identified needs. The second part of agency links what a learner knows to “know-how.” PCE recognizes that “knowing that” (propositional knowledge) and “knowing how” are different, both necessary for navigating the

complexities of the world. PCE builds knowledge through “skills courses” in the curriculum to enhance specific areas of competence through continually applying concepts learned. Students also continually write “dimensional analysis essays,” linking concepts learned in dimension courses to their CA theme and field experience. Students also make presentations and write reflective logs (diaries) to explore perspectives on their field experience and visions. Each learner formulates a strategy for change embodied in an Action Plan. The plan includes clear goals, objectives, and sometimes specific timetables of activities for change mapped out in advance.

PCE thus involves the sixth element of agency, relating to the need for concrete experience and possibility. Cohen argues that “... it is a sense of purpose that motivates learning, creates a constant interaction between the learner and their environment, and builds the learner’s self-confidence and power.”²¹

PCE clears space to help students proactively act in the world, defining the educational activity’s boundaries and focus. This step helps adult learners to operate more effectively in the professional world. Inspirational education and PCE combine processes of transformative interaction. After identifying and exploring problems in the field site and linking this to knowledge gained in classes in each of the various purposes (semesters), students move past the design stage to a phase of implementing actions in the field. The most exciting work on the CA involves students using innovations and creative ideas to actualize their ten-week CA projects. Students implement various activities, including training, changing policies, procedures, and practices in business and administration, and experimenting with creative new ideas. Sometimes “implementation tracking grids” linking student planning goals and objectives with weekly progress are valuable tools.

The teachers recognize their role as a catalyst for inspiration throughout the learning process. Cohen charges teachers with responsibility not merely for students’ development academically, but also for a more holistic growth of students as serious citizens.²² They must be adept at utilizing various strategies that allow students to explore, delve, and gain emerging insights. Teachers provide essential space, encouraging students to facilitate constructive action in PCE. Orientation and reinforcement help teachers understand their role not solely to “teach” or instruct but also to, in Heidegger’s words, “let” students learn.²³ Organizing one-on-one student/teacher conversations as part of the learning experience encourages space for students to move complex projects in new, exciting directions. Student openness to experimentation, and exploration is critical.

What stands in the way of this in the usual classroom setting? One inhibiting factor is the lack of humility in educators’ minds. The goal of teaching is not necessarily to be “right” but to encourage learners to follow arguments where they lead and not merely use inquiry to confirm preexisting beliefs. Effective education requires (among other things) open-mindedness, risk-taking, decision-making, and willingness to change one’s mind as evidence or circumstances demand. Many teachers want to indoctrinate or have students repeat teacher interpretations. PCE emphasizes a spirit of free inquiry and independent thought.

PCE opens space for deeper learning by encouraging students to try new things, even if they do not always work. Each student’s CA involves firsthand engagement as they grapple with problems in the field site/ work settings, challenges with acceptance of action plans, and cooperation through the implementation phase. Throughout the process, students explore both abilities and limitations. If the plan of action has not worked (and if it has), students assess the reasons, and devise strategies for “workarounds,” and concrete proposals for further change. Students thus also move past implementation to monitor and evaluate project success or failure.

The heart of the process involves students implementing plans of action to solve problems. This process ideally affords students a “clearing” (to use Heidegger’s term), or learning space, which allows students to take risks and try new initiatives. Students are encouraged to learn on the job to

pursue a purpose or passion, whether the plan works or not. In the Business and Public Administration programs, for example, insights come to students in CA projects when their efforts lead to unexpected plan change. For example, a student may grapple with the financial requirements of an entrepreneurial idea and learn that the required startup capital is more than they can produce at this time. This insight still serves a valuable educational and life lesson, particularly for student cultivation of decision-making early in their careers. In the public administration program, students work with complex bureaucratic and policy problems related to employees, supervision, compliance, or effective service delivery. Each term involves innovative ten-week interventions in which students devise and implement initiatives with field clients or coworkers. Each involves new methods of outreach, training, education, policy, or communication and helps students understand complex hurdles related to implementation in bureaucratic systems. Frequent one-on-one teacher consultations about field experiences are essential and are additional sources of inspiration for students. The teacher works to provide safe learning environments for students to try out things. They coach students to understand the value of success and failure, not just in school but also in life. Mistakes often lead to learning and, eventually, success.

CONCLUSION

This analysis suggests that a central quest of PCE was to transform students to become change agents. This goal also addresses ways educational institutions can reinvigorate inspiration in adult learners. Strategies for accomplishing this purpose involve pedagogical aspects of intellectual freedom, humility, and disinterested inquiry to achieve three pillars of inspiration—evocation, transcendence, and approach motivation. CA projects provide students the freedom to try new initiatives to solve problems and, even more importantly, to have an open mind about change to achieve their goals. While presenting many practical challenges, there is value in fostering collaborative learning environments between teachers, students, and external partners to stimulate the process of inspiration, and thus help students achieve a true sense of purpose. More work is needed to explore the PCE/Inspiration model further to add additional data-driven analysis and to review outcomes from specific teaching methods to further make future improvements more precise.

NOTES

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² Greenacre, 6.

³ Todd M. Thrash et al. "The Psychology of Inspiration," *Social and Personality Psychology Compass* 8, no. 9 (2014): 495, accessed October 22, 2021, doi:10.1111/spc3.12127.

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⁹ Cohen, "A New," 791.

¹⁰ Cohen, "A New," 792.

¹¹ Todd M. Thrash et al. "Mediating Between the Muse and the Masses: Inspiration and the Actualization of Creative Ideas," *Journal of Personality and Social Psychology* 98, no. 3 (2010): 470, accessed October 8, 2021, doi:10.1037/a0017907.

¹² Audrey Cohen, "Empowerment: Toward a New Definition of Self-Help," in *Human Services: Contemporary Issues and Trends*, ed. Howard Harris and David Maloney, 2nd ed. (Boston: Allyn and Bacon, 1999), 31.

¹³ Cohen, "A New," 794.

¹⁴ Thrash et al., "The Psychology," 495–496.

¹⁵ Todd M. Thrash and Andrew J. Elliot, "Inspiration as a Psychological Construct," *Journal of Personality and Social Psychology* 84, no. 4 (2003): 872, accessed October 8, 2021, doi:10.1037/0022-3514.84.4.871; Thrash et al., "Mediating," 470.

¹⁶ Craig Loehle, "A Guide to Increased Creativity in Research — Inspiration or Perspiration?," *BioScience* 40, no. 2 (1990): 124, accessed October 22, 2021, doi:10.2307/1311345.

¹⁷ Antti Rajala et al. "Agency and Learning: Researching Agency in Educational Interactions," *Learning, Culture and Social Interaction* 10 (2016): 1, doi:10.1016/j.lcsi.2016.07.001.

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¹⁹ Jyrki Jyrkämä, "Toimijuus, ikääntyminen ja arkielämä: hahmottelua teoreettis-metodologiseksi viitekehikseksi," ["Agency, Aging And Everyday Life: A Sketch Of A Theoretical-Methodological Framework,"] *Gerontologia* 22, no. 4 (2008): 191.

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²³ Martin Heidegger, *What is Called Thinking?*, trans. Fred D. Wieck & J. Glenn Gray (New York: Harper and Row, 1968), 15.

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WHEN CULTURE FIGHTS EDUCATIONAL POVERTY, ENHANCING MUSEUM EXPERIENCE

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INTRODUCTION

The whole world is currently facing many challenges, including new forms of poverty, discrimination, marginalization, to name just a few. To address these challenges, we propose to experiment innovative educational approaches, improving complex strategies to face an intricate, interconnected and changing phenomenon such as educational poverty.

This paper is inspired by the aim of approaching the educational needs of the most fragile children and families through cultural proposals, able to give opportunities for growing up and regain dignity. Through a multidisciplinary approach, which aims to offer a key to face this complex world, the methodological proposal is to make cultural experiences evolve from a passive acquisition process to a participatory learning.

In a scenario of complexity, we need new, more interconnected, strategies. In this sense, we present an experience of contamination for responding to specific social problems through cultural education. From an educational point of view, it is essential to ask how museum experiences can, and should, be directed towards tackling the educational needs of children and parents, especially the most vulnerable ones.

The case discussed in this paper took place in Brescia (North Italy). Civic museums have been discovered as inclusive contexts, capable of hosting educational and aggregative activities for a special audience: families in vulnerable situations, with children aged 0-6 years.

EDUCATIONAL POVERTY: A COMPLEX PHENOMENON

The concept of poverty is open to many interpretations and causes, all united by the weakening or lack of possibilities for children and families. The approach we propose to the issue of educational poverty intertwines both the objectives of the 2030 Agenda for Sustainable Development¹ and those of Global Education² and the rights of minors declared in the Convention on Rights of Child.³ In this perspective, we will investigate the issue of educational poverty in terms not only of lack of opportunities, deprivation and quality of life, but also as moral deprivation, orientations and life prospects, quality of the educational proposal.

The widespread diffusion of this phenomenon, not simply attributable to economic aspects, invokes new approaches, to reduce inequalities of opportunity, especially for the weakest subjects.⁴

Worldwide, in the last year, more than 70% of minors did not carry out any activities, including: going to theaters or concerts, visiting museums, archaeological sites or monuments, carrying out cultural activities.

Educational poverty can be defined as the deprivation by children of the possibility of learning, experimenting, and freely developing skills, talents.⁵

In consideration of the numerous causes of educational poverty, it is important to favor new educational processes, more integrated and capable of generating social participation. Including children and parents in the cultural practice requires a significant change, in the absence of which the participation of these people remains a mere mission statement with no real content.

Human rights are the inspiring principle: children have the right to participate in culture in all its forms and expressions, enjoying it and sharing cultural experiences with family, beyond the economic and social conditions.⁶

In this scenario, places of culture, museums in particular, can represent a strategic guideline in the fight against educational poverty. The following paper explores and reflects upon the role of museums and how they can help to bridge the gap between “deprived” children/families and access to educational, cultural and civic opportunities.

CULTURAL EXPERIENCES

It is impossible to think about tangible or intangible aspects of educational poverty, without considering its existential characteristics and implications.⁷ Cultural experiences help to give meaning to our lives. Art and culture in general, in its various forms, is a vehicular language that gives sense to the world and our experiences inside it. The lack of cultural experiences was most keenly felt during the pandemic. Lockdown restrictions have confined us mostly to our own homes, without socializing outdoors and living complex learning paths. We were unable to visit freely public places and to enjoy cultural services.

In this post-pandemic situation, characterized by the exacerbation of various forms of educational poverty, and the emergence of new forms, an important contribution can come from places of culture. They can promote important educational messages of inclusion, sense of community, dialogue between people, generations, cultures.

The complexity of educational poverty, with its multifaceted aspects and challenges, cannot be understood and solved solely using institutional and scholastic approaches. Alternative approaches and ways of thinking based on cultural education are essential. It is important to discover the educational and social role of places, such as museums, in order to integrate new targets of people and to challenge the conventional way of thinking about these places, improving non-formal education. Assuming the articulated definition extracted from COMPASS we can state that "Non-formal education refers to any planned and structured learning process that involves personal and social education for specific groups of people designed to improve skills and competences outside the formal educational curriculum. Non-formal education should be voluntary, ideally accessible for everyone, organized process with educational objectives, participatory, learner-centred, about learning life skills and preparing for active citizenship, based on involving both individual and group learning with a collective approach, holistic and process-oriented, organized on the basis of the needs of participants".⁸

CONCEPTUAL FRAMEWORK AND METHODOLOGY

Using museums as educational resources as non-formal education settings is nothing new. Within the context of this project, however, there is a desire to render museums places of contrast to educational poverty, according to capability approach.⁹

A paradigm of reference, from an educational point of view, is the pragmatic approach of John Dewey.¹⁰ His way of conceiving experience has made it possible to project practices for encounters

with museums, making them real experiences. Experiential practices involve the following characteristics:

- learners follow their own curiosity and interest
- they learn through direct experience (learning by doing)
- the educator is more a learning facilitator or mediator than the only source of knowledge
- there is no formal evaluation of learning
- the learners reflect on their learning afterwards¹¹

We want to create workshops, capable of providing experiences of direct contact with culture in its broadest sense; but, also, possibilities of confronting meanings that are not only personal but also collective. The aim is to make museums alive, explorable, interactive, dynamic places: real and active learning environments.

From a methodological point of view, in conducting the workshops we apply a mixed and interdisciplinary methodological approach. We have planned an educational path intentionally built around five key steps, shared with children and parents:

- 1) Opening phase: creation of the climate through narration (literary suggestions)
- 2) Exploration phase: activities of active exploration and discovery of the museum
- 3) Reflective phase: artistic-sensorial re-elaboration activity
- 4) Sharing phase, through dialogue and group comparison
- 5) Final phase: final farewell with a mandate/gift, so as to create a bridge between museum and home. We take particular care of this last phase. The experience in the museum ends with a moment of sharing, but also with the delivery of activities and materials allowing parents and children to extend and implement at home what they experienced inside the museum.¹²

This methodological choice aims to consolidate the symbolic bridge built with the museum, giving families an opportunity for proximity and continuity. It is an expedient that wants to make the cultural heritage received visible, especially by those families who usually do not attend these places.

A review of existing educational methods reveals how complex is educational poverty, so that a combination of methodological approaches is necessary. Researchers, educators and museum practitioners embrace cross-disciplinary connections and practical problem-solving. This includes collaborative workshops and interventions, issues connected to art, science, knowledge requiring the creation of collaborative relationships across disciplines.

Finally, a true participation based on active processes is essential: from the methodological point of view this requires to eliminate hierarchical approaches and to involve the beneficiaries of change on a partnership basis.¹³

CASE STUDY: THE CITY OF BRESCIA

We present an experience in which museums can be discovered as inclusive contexts, capable of hosting educational and aggregative activities for a special audience: families in a vulnerable situation, with children aged 0 - 6 years.

This project has been tested in northern Italy, in Brescia, proclaimed the Italian capital of culture for 2023. We craft cultural and educational paths, aimed at contrasting inequalities through access to art and generating social inclusion.

Goals:

- Allowing boys and girls to take part in city's cultural offerings regardless of socio-economic conditions, in order to guarantee everyone the right to culture;
- Promoting the possibility of involving children and families in art, in all its forms and expressions;
- Making children and parents not mere consumers, but active and competent subjects;

- Enabling children to practice cultural experiences and share them with family, educational services and the entire community;
- Empowering the sense of citizenship.

In order to achieve these goals, an interdisciplinary team was formed. It is composed by people who are experts in: childhood education, family education, illustrated books/children's literature, design/art. The name of this group is: E4C ("Education for Culture"). Together, we plan training courses, in order to enhance museums (even the lesser known) as authentic expressions of a territory, places open to the community... starting with the little ones and their parents.

This experimentation has led to the creation of educational paths in several museums in the city of Brescia. These paths are addressed to families with children from zero to six years, to share experiences of research, interpretation, understanding of the world but also to build responsibility and a sense of belonging.

In particular, the following training paths involve families in situations of economic difficulty or educational poverty, also activating collaboration with social services.

The choice goes to museums that are the expression of a local territory. In the case of Brescia the museum are Mu.P.A. (Museum dedicated to teachers Rosa and Carolina Agazzi and their innovative educational method), Museum of Natural Sciences, Paolo VI Collection (a religious collection of a Pope).

- Workshops for families at the Mu.PA. These workshops took their cue from a temporary installation of Masks. We work on the theme of identity and the self (fig.1)



Figure1. Workshop about Masks

- Workshops for families at the Museum of Natural Sciences, on the occasion of the temporary exhibition *Butterflies*. We work on the theme of fragility and beauty. (fig.2)

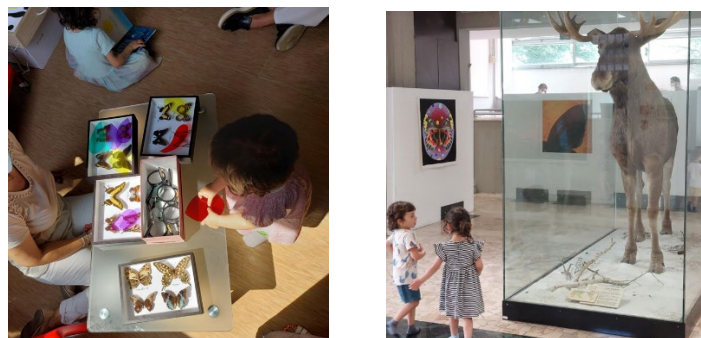


Figure 2. Workshops inside the Museum of Natural Sciences

- Workshops for families at the Paolo VI Collection – collection of religious and contemporary art. We create a workshop starting from a temporary installation on the theme of *Exodus* (The journey) and a second group of workshops on the theme of home and living (starting from an artwork entitled *The nest*) (Fig.3)



Figure 3. Workshop about *The nest*

- We are creating also workshops for fragile and homeless families and parents. These laboratories are carried out at the Museum of Natural Sciences, always starting from the *Butterflies* exhibition, but the themes we are addressing to these users are those of fragility and mimicry.

- We have also created a game: *Little explorers of urban museums* (visit the museum and discover the city). The game is distributed free of charge to families with children aged zero to six years. It is an exploratory game (with dice and pawns), which allows to discover the city of Brescia through its museums (those that are free and inclusive, therefore accessible to all children and their families) (Fig.4)



Figure 4. The exploratory game

- Finally, we made a video-documentary to raise awareness of the importance of enhancing the educational resources of museums, in a community logic (and through the active participation of children and their families).

By means of "cultural explorations", we propose experiences based not on passive uses, but rather on participatory approaches, allowing children (and parents) to actively produce and renew culture. Through the creation of a sort of "mobile laboratory" we test an innovative tool for contrasting educational poverty in various types of museums: scientific, artistic, educational, historical.

Through art works and collections, exhibits and relics, museums enact life, through different forms of narratives (artistic, historical, religious...) and through different representations of nature, laws of physics, achievements of science.

TOWARDS A NEW EDUCATION FOR CULTURE

Moving from the experiences illustrated above, we can state that the fight against educational poverty requires integrated and systematic approaches.

This complex strategy can be summarized in the following guidelines:

1) Investing in culture and people: measures contrasting poverty invest in culture and simultaneously in people. If young families and children gain enough confidence, expertise and commitment, they will move from mere passive position to be at the heart of cultural process and able to address future challenges. An active approach to museums motivates them to become involved in cultural life with immediate benefits which take up the reins of promoting their territory.

2) Interdisciplinary and cross-scale approach: The complexity of educational poverty requires multidisciplinary measures and engagement of several actors to improve both the educational and the cultural environment, to promote social cohesion and to enhance community living standards. The cultural initiatives go beyond individual projects and family limits, as they affect the surroundings with echoes at a community level as well.

3) family values and diversity: Family heritage, traditions and knowledge are key factors in maintaining parents' self-esteem and encouraging more active citizenship. Furthermore, strengthening social and cultural capital is crucial to develop the sense of community in children.

CONCLUSION AND FUTURE DEVELOPMENTS

This research project contributes to the key role of museums in making a child-friendly and family-friendly culture in the educational dimension. In this paper we have discussed the importance of cultural education to young children and their parents, especially the most vulnerable and fragile ones. We propose museums as a way of creating meaning in everyday life and making connections with people and places. We have explored and reflected upon how and why people can feel more connected to these places, spending time in such places and enriching themselves. This in turn can encourage more care towards cultural environments.

Therefore, it is very important to create spaces that provide meaningful experiences for visitors and provide a human connection with place, communicating meanings and evoking emotions. Moreover, this should also support and improve actions to combat educational poverty, and hence the contribution of children and parents.

This kind of experiences works as a means of reimagining the future of marginalized people, especially very young people, aged 0-6. The fight against educational poverty is reached only through integrated and long-term visions for children and families, especially towards specific target groups (fragile families). Every educational or cultural plan can have a much higher impact if it does not divide problems and potential but treats and uses them in a comprehensive way.

We would like to propose the idea of museum, the aim of which is to deliver relevant cultural domains through accessibility, participation, creative attitude; a crucial chance is to provide a framework for activities in which inclusion, sense of belonging, cultural empowerment can develop.

We have tried to make children and families discover the museum not only as a living place, but also as a social place, a place of community. We believe that, in this perspective, museums can perform the educational function of making the community itself growing, contributing to the construction of a sense of community (i.e., an extended sense of ourselves).¹⁴

This is only a small experience, but we want to offer an opportunity to make the museums (especially the lesser known which are expression of a territory) places open to the community, in its broadest and most inclusive sense.

From an educational point of view, we believe that there are dimensions such as beauty, culture, knowledge that have an intrinsic value: they remind us that there is a sort of surplus compared to the mere dimension of profit. If we want to train a generation, after ours, still capable of big dreams, it depends on the education that today we can give to the little ones, especially to those of them who have fewer opportunities.

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MIXED REALITY ENVIRONMENTS: AN EMERGING TOOL IN INTERIOR DESIGN EDUCATION

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INTRODUCTION

As the discipline of interior design adapts to new forms of interactive technologies, designers must think outside disciplinary constructs. Emerging tools like head-mounted devices can now allow designers to communicate and test conceptual design ideas in mixed reality (MR) environments. However, due to the infancy of this tool, investigations discussing adapting BIM models to interactive MR experiences in interior design education are not readily available.

In response, tests are conducted with two MR headsets, Microsoft HoloLens 1 and 2, in conjunction with varying software applications. Each experiment is documented to outline the ability to map the MR experiences to real-world environments and import architectural models, furniture, fixtures, equipment, material, and textures. The potential to use dynamic hand gestures to move, rotate, scale, grab, and rearrange interior elements such as partitions, casework, and other interior components is also discussed.

This investigation outlines suitable methods for producing complex MR experiences, emphasizing workflows that allow for customized interactivity using hand gestures, head tracking, spatial mapping, and material conversion. The research findings offer documentation of the various experimental workflows and provide a preliminary pedagogical framework to implement complex MR experiences in interior design education settings.

Definitions

With many extended reality technologies prominent in architectural fields, we must briefly note the differences between virtual, augmented, and mixed reality (Figure 1). Milgram and Kishino describe virtual reality (VR) as an "environment in which the participant-observer is totally immersed in, and able to interact with, a completely synthetic world."¹ A commonly accepted definition of Augmented Reality (AR) is provided by Azuma, "AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it."² Mixed reality (MR) combines elements of both AR and VR to provide a user environment in which physical reality and digital content combine to enable interaction with and among real-world and virtual objects.³

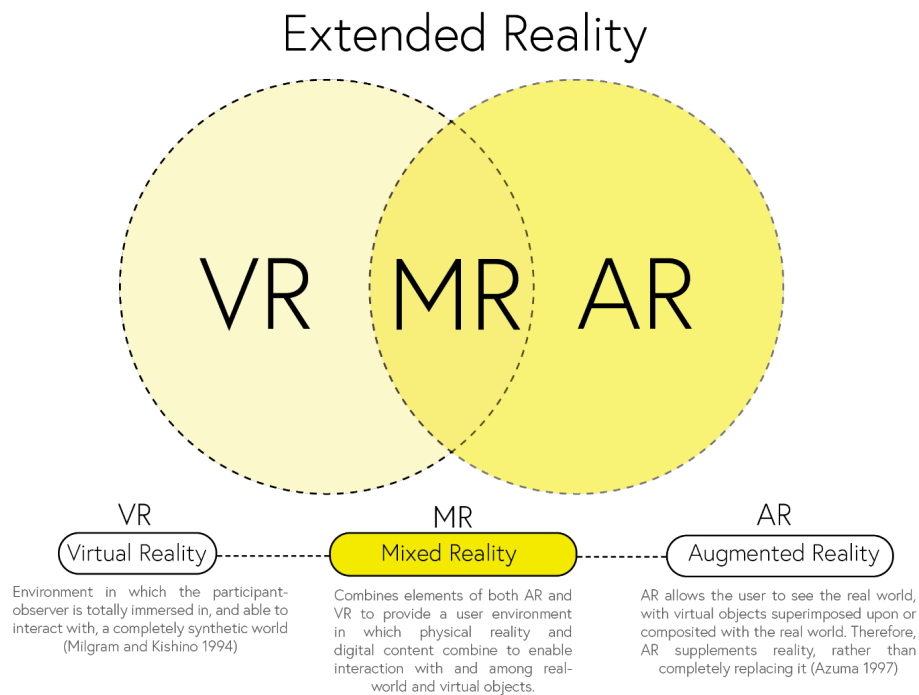


Figure 1. Extended Reality definitions.

Previous Architectural Investigations

Research discussing the applied use of MR in interior design education settings is minimal as this is an emerging topic. However, the potential of MR technology is evident in work by Loffler, noting an increase in commercial adoption and its ability to provide more dynamic and realistic interpretations of spatial volumes. Additionally, it is noted that using game development engines can provide the opportunity for positively transforming design processes in Architectural disciplines.⁴ This notion is reiterated by Moisés, who concludes his study by stating, "the results show that MR-based design review can effectively communicate 85% of the information to the client versus 70% provided by 2D media."⁵

To understand some of the potential restrictions MR technology can pose concerning BIM software, research conducted by Riedlinger compares the use of Google Tango and Microsoft HoloLens to visualize BIM data and outlines eight negative aspects of HoloLens' use for BIM.⁶ Furthermore, Janusz discusses the recent impact of mixed reality technologies as it relates to interior design, noting that with the currently available tools, we can produce effective transfers of AR and VR environments in Interior Design,⁷ but does not discuss the potential outcomes using recently released MR headsets, further emphasizing the need for additional research on MR technologies in interior design.

METHODS OF INQUIRY

A taxonomy is produced to determine suitable software for MR simulations consisting of interior environments. BIM models produced in AutoDesk Revit are initially tested in various MR applications to determine their ability to accurately import existing data based on the model's complexity and vertices count. Through technical analysis of varying workflows, the research suggests the most appropriate manner to translate interior environments into accessible and interactive MR simulations. To assist in this analysis, qualitative data concerning cost, ownership, object reconfigurability, and level of user interactivity help determine the most suitable approach. Graphic

user interface (GUI) and user experience (UX) features in standard architectural applications, such as scalability, rotation, object collision, spatial mapping, and material representation, are also analyzed. MR simulation tests are conducted using two head-mounted devices, the Microsoft HoloLens Generation 1 and Microsoft HoloLens 2. These wireless, transparent mixed reality headsets were selected as they provide "inside-out tracking, which is the ability for the headset to track its environment without the need for external sensors."⁸ Additionally, the lack of wires and static sensors reduces clutter or extraneous setup and allows for the transportability of the device and MR simulation,⁹ which contrasts many tethered VR and AR setups. The preferred workflow is then analyzed to determine its suitability for pedagogical implementation at various design phases and provides a preliminary framework for implementing complex MR experiences into interior design pedagogy.

Mixed Reality Application Taxonomy

Previous research conducted by Huang tests nine MR applications to determine their capabilities and limitations from an architectural perspective, providing an overview of potential applications for interior environments.¹⁰ However, to better understand the most current capabilities and constraints of mixed reality applications in interior design, an initial study was conducted in June 2022 by creating an updated taxonomy of available software.

	3D Viewer	3D Viewer (Beta)	BIM Holoview	VisualLive HoloLive	Unity and Visual Studio
General					
Version	2022	2022	2020	2022	2020
Cost	Free	Free	\$195/mn	\$249/mn	Free
Tested	•	•	•	•	•
3 rd party processing			•	•	
File Tested					
Vertices Count	58945	32154	3,772,883	3,772,883	5,000,000+
File Size (MB)	12	5	46	46	100 +
Application Features					
Scalability	•	•	•	•	•
Rotation	•	•	•	•	•
Grab	•	•	•	•	•
Move	•	•	•	•	•
FF&E separation					•
Bounding Box	•	•		•	•
Object Collision					•
Spatial Mapping	•	•		•	•
Material Representation				•	•
GUI/UX Features					
Wayfinding					•
Customized Prompts					•

Table 1. MR Application analysis chart.

The application analysis (Table 1) builds upon Huang's previous findings and provides additional evaluations of MR applications available in June 2022. However, the noted applications should be considered a preliminary overview for producing MR experiences as more applications and workflows become available and commercial adoption of MR in the AEC industry increases.

MIXED REALITY TESTS

Outlined are six experiments conducted with the Microsoft HoloLens and Microsoft HoloLens 2. BIM models of varying complexity were exported from AutoDesk Revit in FBX format and tested with each application. This initial process would help determine the general suitability of each application for importing detailed interiors.

Test 1: HoloLens 1 – 3D Viewer (Beta)

This test used Microsoft's 3D Viewer (Beta). Immediate issues using this workflow were evident as the software could not provide accurate material translation or import highly detailed models. The most complex file that was successfully imported consisted of 58945 vertices. Additionally, materials did not successfully import, only providing a grey-scale representation of the digital model. However, the software provided highly accurate spatial mapping allowing the digital model to be placed in real-life surroundings, such as a table or floor. This feature is essential because the HoloLens is "constantly tracking its environment and building a 3D model of the area that it is in."¹¹ This allows for full-scale immersive interactions with digital objects and physical space, which is impossible in AR on tablets and smartphones.¹²

Test 1 could not provide any viable means of exploration for engagement in detailed interior design.

Test 2: HoloLens 1 – 3D Viewer

This test used an updated version of the 3D Viewer software. Again, constraints became evident as tests conducted could not import a model consisting of 32154 vertices. While imported architectural models were below the developer's limitations, the model could not be successfully imported into the application. However, this software revision provided a bounding box for each imported model, allowing for increased UX accessibility to scale, rotate, and move objects within the mixed-reality simulation. Test 2 could not provide any viable means of exploration for engagement in detailed interior design.

Test 3: HoloLens 2 – 3D Viewer

Test 3 used the Microsoft HoloLens 2. This head-mounted device is a significant upgrade from the previous revision, as the new hardware provides additional CPU cores and memory.

While the application ran with increased performance, Test 3, unfortunately, provided the same results as Test 2, making this unviable for evaluative or pedagogical purposes.

Test 4: HoloLens 2 – BIM Holoview

Test 4 was conducted using a third-party application, BIM Holoview. Tests using sample models showed that the software could load a test model with 3,772,883 vertices and a file size of 46 MB. While the software could load the most complex model thus far, it could not provide material translation and, unlike other software tested, had an associated monthly cost. Work is also analyzed and embedded into their third-party repository, which could cause ownership, copyright, and archival concerns. The software did not provide spatial tracking but did provide a bounding box for UX accessibility when moving, scaling or rotating the model (Figure 2).

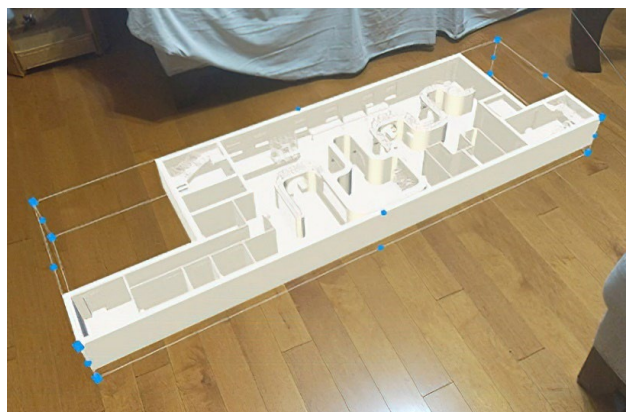


Figure 2. BIM model in MR on the physical floor with object bounding box.

Test 5: HoloLens 2 – VisualLive

VisualLive successfully opened a digital model of 3,772,883 vertices and a file size of 46 MB. The application integrates accurate spatial mapping. The application includes markups, labelling, date/time stamps and communication tools. The application also translates textures to MR simulations without requiring any pre-boarding changes to the BIM model. However, this program offered reduced accessibility as scaling, rotating, and moving the model is more tedious than other programs due to no grab points or object-based bounding boxes. During the testing period, the plug-in was only compatible with Revit 2022. Therefore, if a model is made on later revisions of Revit, it cannot be used with VisualLive. Additionally, a monthly cost is required for the application.

Test 6: HoloLens 2 – Unity and Microsoft Visual Live

This complex workflow provided an accurate and configurable method of importing BIM models into an MR simulation. The work first required installing Unity, Microsoft Visual Live, BIMsmith, and the Mixed Reality Toolkit (MRTK) on Windows 10 OS. This application provides material translation, spatial mapping, detailed model importation, object-oriented programming, and rigid body dynamics to reproduce real-time physics and collision detection to assist in detecting the intersection of architectural objects. This would allow individual aspects of each imported model to be interactive and provide a realistic feel when using hand gestures to alter architectural elements. Using this method, individuals could interact with each furniture, fixture, equipment, and wall components in the model (Figure 3). However, during this test, it was noted that this workflow could be challenging to install as it requires several programs and software development kits.

Additionally, the spatial mapping would occasionally be erroneous when using reflective or dark black surfaces, causing objects programmed with rigid body dynamics to fall through the floor and disappear. However, unlike other programs, Unity is a cost-free solution for deploying fully programmable interior environment models to MR simulations. Unity can also provide unique accessibility and a customized GUI to help orient individuals in MR simulations. Wayfinding features are also programmable and can include information such as arrows, tutorials, text prompts, and other objects to assist in helping the user understand how to navigate the model.

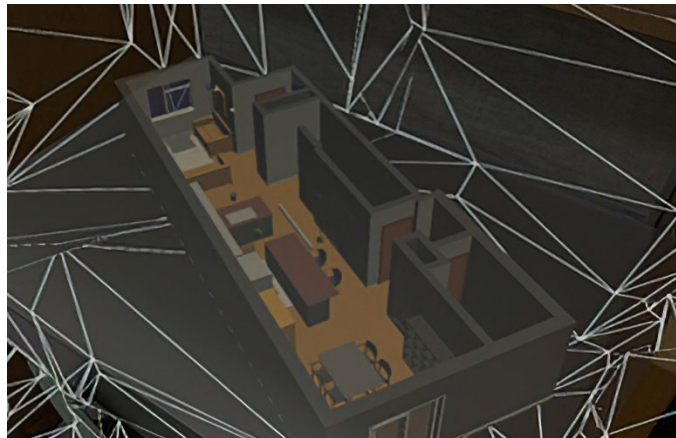


Figure 3. BIM model in MR with material representation and spatial mapping.

Test Summary

General findings from the taxonomy and tests determined that existing or new architectural models can be leveraged for fully interactive MR experiences. Firstly, the designer must export the work to a compatible FBX or OBJ file format to use the preferred workflow. Proprietary file formats like Revit's

RVT cannot be imported directly into most MR software unless the developer offers an associated plug-in.

Initial trials noted that most readily available applications had limitations such as file size, amount of vertices, material representation, UX accessibility, spatial mapping, object-oriented programming, and collision detection. Additionally, some tested applications carry a high licensing cost and use proprietary software or cloud processing.

Test 6 was the only process to load all model elements with applicable textures successfully at no monetary cost. Furthermore, it was the only application to provide customized object-oriented programming to allow individual model elements to be moved and manipulated separately while simultaneously providing spatial recognition, intuitive hand gestures, and collision detection (Figure 4). Additionally, the inclusion of wayfinding objects, such as arrows and text, can provide individuals unfamiliar with MR simulations additional guidance in the virtual world and prompt users on how to interact or engage with particular model elements.

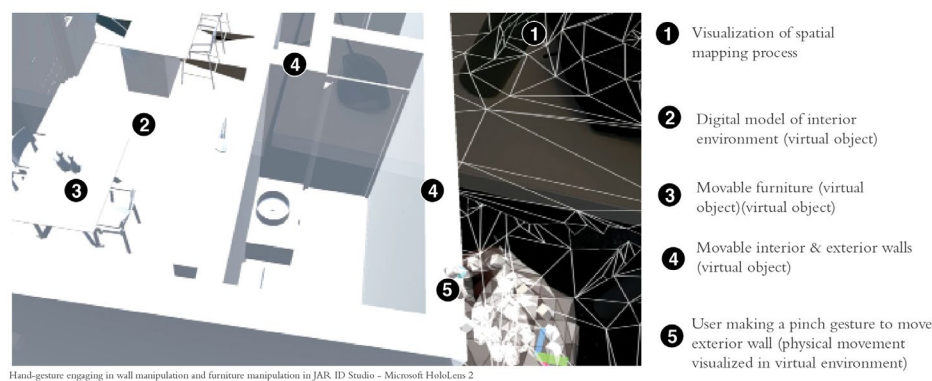


Figure 4. Model interactivity synopsis.

PROPOSED PEDAGOGICAL IMPLEMENTATION

To investigate the integration of MR simulations into interior design pedagogical processes, various design phases, such as the ideation phase, design proposition phase, and design execution phase (Figure 5) were examined for their ability to integrate MR experiences, emphasizing the likelihood of its adoption in creative production and exhibition of interior environments using MR simulations.

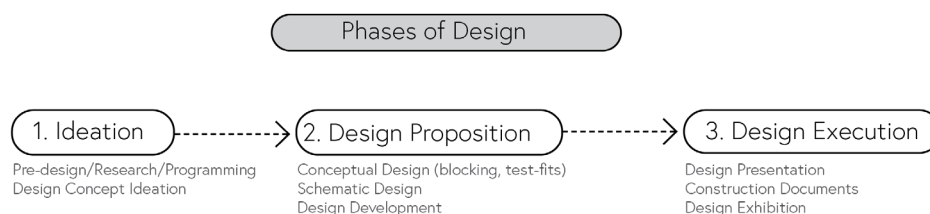


Figure 5. Phases of Design.

The ideation phase consists of pre-design work such as research, data gathering, and programming; this also includes conceptual ideation such as drawing, sketching, and parti diagrams. In this instance, MR has a multitude of applications. Firstly, it can be used to visualize an existing space or overlay FF&E into existing spaces. This can assist in understanding the scale and potential design applications and encourage communication about potential design concepts.

The design proposition phase consists of conceptual design, schematic design, and design development. Conceptual design and schematic design are particularly well suited for integrating interactive MR. Using *Test Method 6*, individuals can move FF&E, partitions, and other architectural features to visualize conceptual approaches and iterative design concepts. This method provides an opportunity to produce test fits and blocking while making real-time modifications to the MR simulation's architectural elements using hand gestures.

In contrast, the design development phase is less suited for this technology as architectural drawings are moving toward construction documents, and changes would likely be completed directly in the BIM model. However, MR can be used as a collaborative tool to allow multiple parties to analyze/engage with the same 3D model, encouraging discussion on design language, FF&E selection, material application, and other architectural elements.

The design execution phase comprises of design presentation, construction documents, and design exhibition. The design presentation phase can leverage MR as an immersive, wireless tool to show potential design ideas and visualize spatial volume. This can be used instead of a physical model, as it provides immersive scalable features and proposed material representation; design exhibition has similar opportunities to the design presentation category.

Construction documents typically consist of technical drawings that are used for construction purposes. Therefore, utilizing mixed reality environments may not be suitable for this phase.

Pedagogical Limitations and Future Explorations

The integration of new technologies is an exciting notion. However, it is not without its limitations. Initial start-up costs for mixed reality devices are often a hurdle for adoption; as of July 2023, the HoloLens 2 is currently priced at \$4,749 CDN per headset. Furthermore, the current workflow requires understanding applications atypical to the discipline of architectural design. This includes understanding basic game development to deploy MR simulations with object-oriented programming for interior elements. Additionally, as interior design places a significant focus on the integration of material, it was noted in our tests that material conversion from existing BIM models might often require additional steps or supplementary applications software such as BIMsmith or Autodesk 3DS Max.

Additional studies need to be conducted on this emerging technology due to increased public adoption and other commercial hardware, such as the upcoming Apple mixed reality headset in 2024.¹³ Other game development engines, such as Unreal Engine 5, have begun to provide more documentation and compatibility with MR environments, providing different methods to explore the potential this technology can bring to Interior design. Multi-user experiences using multiple HoloLens devices is also an intriguing notion, with research previously conducted by Li et al.; this method uses Photon Unity Networking (PUN) and Microsoft Azure Spatial Anchor to allow multiple people to engage in the same MR environment.¹⁴ Additionally, utilizing 3D scanned LIDAR or photogrammetry and converting 3D data to MR simulations could provide a new method to visualize existing interior environments. To initiate this study, tests using various 3D scanned spaces into MR simulations will be conducted at the University of Manitoba's FABLAB in August 2023.

CONCLUSION

Mixed reality provides designers with new methods of visualizing existing and newly created 3D architectural models. When using an appropriate workflow, this emerging technology can provide an opportunity to modify and visualize the design of new and existing architectural models in a MR environment by providing material representation, spatial mapping, accurate scaling, and wayfinding. Furthermore, when appropriately integrated, object-oriented programming and user-controlled hand

gestures can allow students, instructors, and professionals to engage with new technologies in an immersive 3D and tactile exploration of interior environments. As MR capabilities progress and public adoption increases, we must continue investigating the opportunities and challenges of integrating MR experiences into interior design pedagogy.

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HOW DO PARTNERSHIPS BETWEEN ACADEMIA, COMMUNITIES, AND ORGANISATIONS FOSTER “REAL WORLD” LEARNING?

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INTRODUCTION

Education takes place within dynamic and multifaceted complex systems. The Business School at Edinburgh Napier University has developed an innovative and impactful Employability Skills Programme (ESP) that all undergraduate students undertake. Recognising the volatile-uncertain-complex-ambiguous (VUCA) environment, the digital transformation of the higher education sector calls for a novel approach to curriculum and employability. The ESP was created based on consistent employer and stakeholder feedback that students graduated with subject and sector knowledge but lacked in understanding themselves and the skills they have to offer the ‘real world’. A collaborative approach to the design and delivery has ensured this programme’s success, with the ESP team consisting of academic representatives from each subject area, our entrepreneurial support team, and our careers and skills development service. The programme focused on the 4 Cs – Communication, Collaboration, Curiosity and Critical Thinking. Second year of a four-year Honours’ Degree, students used Forage, a digital platform to enhance students' skills gap using digital internship projects as part of our ESP.

This study aims to identify if engagement with Forage as a virtual internship could foster access and inclusion to learners' needs to prepare them for the complex ‘real world’. A thematic analysis was conducted on students’ reflective commentaries to analyse the rich narrative and determine the themes which contribute to this study. This paper contributes twofold. First, we reinforce the importance of digital platforms which can enhance students' career readiness. Second, we present findings from the thematic analysis, which enables learners to progress using virtual platforms to improve their soft and hard skills. Therefore, this paper considers the value of digital internship as being a proxy for physical internship through recognising and involving the partners in the learners’ journey.

THE DIGITALISATION OF HIGHER EDUCATION INSTITUTIONS (HEI)

As context for the introduction of the Forage internship and the ubiquity of opportunities offered to students, we first explore the wider digitalisation of HEIs. The 4th Industrial Revolution (IR), or Industry 4.0, refers to the exponential advancement of disruptive technologies blurring the boundaries between the digital and physical realms.¹ This drives fast changes in industries, technology, societal practices and patterns ² and endorses a superior level of quality and efficiency through the advent of

e.g. big data analytics.³ However, there is nowadays a paradigm shift from Industry 4.0 to Industry 5.0,⁴ a more human-centric solution whereby humans and ‘cobots’ driven through fast developing artificial intelligence collaborate in a shared workplace setting.⁵ Similarly, Society 5.0 is ‘smart’, where all can benefit from a comfortable and high-quality life.⁶ Therefore, Industry 4.0, 5.0 and Society 5.0 are redesigning the means, media and platforms through which companies operate and relate to their stakeholders,⁷ such as organisations and society.

The digital revolution implies significant readjustment across industries, sectors,⁸ businesses, and people as well as education, giving rise to the term Education 4.0.⁹ To maximise the advantages of emerging technologies and their fast proliferation in all spheres of human activities, organisations including HEIs must reinvent their existing models and processes and embrace a paradigm shift to alter their culture to ensure the progression and institutionalisation of digital transformation.¹⁰ Forage is the exemplification, in this case, of a disruptive innovation in HE providing opportunities in increasingly ‘smart’ societies.

EDUCATION 4.0 AND THE DIGITAL LEARNING SPACE

Universities have undergone a multitude of transformations in recent times, as stimulated by the socio-cultural and technological drifts towards digitalisation and changing learners’ needs.¹¹ Technological adoption by HEIs is linked to a paradigm shift whereby technology is perceived as an interconnected, complex space facilitating digital learning.

Technological emergence and contemporary technologies have introduced the Do-It-Yourself trend in learning; combining conventional and virtual spaces; rendering teaching hybrid;¹² and steered the adoption of e-learning.¹³ While blended-learning paradigms and online education were common across HEIs, the Covid-19 pandemic and lock-down globally generated a disruptive shock for HEIs, mandating them to institute pedagogical innovations, communication technologies, and deep organisational and pedagogical rethinking for establishing digital learning space overnight.¹⁴ The conceptualisation of space has evolved with the digital transformation. Bygstad et al.¹⁵ explain that a HEI is conventionally a place. However, the concept of ‘space’ is far more abstract, comprising cognitive, discursive, material and existential spaces.¹⁶

The Digital Learning Space (DLS) is not confined to any specific geographical environment. It provides incorporated learning and communication resources through digital devices produced by widescale technical digital infrastructure.¹⁷ The emergence of virtual experiential platforms such as Forage provides a further digital space for learners to not only engage with learning but develop real-world skills through completing a virtual internship with a global organisation. Forage offers the opportunity to gain work experience, regardless of background, geography, connections, or time. It fosters the ‘do it yourself’ approach with learners being in control of which internship/s they choose and what timescale they work to.

From a pedagogical perspective, the DLS is a sub-space of the universal learning space. That is, learners acquire knowledge in heterogenous spaces, which are frequently used in combination – the physical, hybrid and digital spaces.¹⁸ McLeod and Graber¹⁹ purport that the learning spaces are not a collection of learning tools but are rather an integrated learning ecosystem enabling problem-based, experiential learning as well as deeply personalised learning. DLS promotes new learning methods;²⁰ assists collaborative learning by offering appropriate instruments for complex peer exchanges;²¹ and boosts situational awareness²² which may be illustrated in engagement with the business world through virtual internships. Contemporary learners embrace challenges, team discussion and interactive learning spaces, such as the virtual business world.

From an organisational perspective, the DLS transcends the institutional and physical boundaries of the HEIs. While HEIs have at all times integrated with other segments of society, the campus is

likewise a capsule. The DLS uncovers new opportunities for HEIs as well as the learners, for instance, closer collaboration with other entities such government, broader communities and organisations.²³ According to Fisk,²⁴ one of the nine trends linked to Education 4.0 is that learners encounter more applied learning by way of [physical or virtual] field experience, for instance internships. Through HEI partnerships with organisations like Forage, learners can access a close replication of real-world internships and connect with companies around the world. On average, a student who completes a Forage programme is 4x more likely to receive an offer of employment from the company whose programme they complete.

CAREER READINESS

In today's VUCA world of work, characterised by hybrid, fully online and global work teams, students should be equipped with professional hard and soft skills to meet increasingly challenging demands.²⁵ HEIs aspire to develop students' work readiness.²⁶ Work readiness is here defined as an individual's capability to undertake work accurately and to target.²⁷ This is essential for students to compete for and potentially secure their targeted job, initiate their careers and excel in their chosen fields. Sagita et al.²⁸ outline the indicators of work readiness as organisational acumen, personal characteristics, social intelligence and work competence. Similarly, career readiness designates the exercises vital for people to act on the expertise, skills and knowledge assimilated via both education and experiences to strive in the workplace as well as advance local and global communities.²⁹ With the empowering nature of the internet, powered by the digital revolution and the shift to hybrid, and online learning and workspaces, the Forage platform provides access to initial insights for potential career pathways. Digital platforms enhance career readiness through skills development.

Employers desire business students (graduates' employees) with attributes in cognitive skills – problem-solving, creativity, critical and systems thinking, social responsibility and self-awareness.³⁰ These can be linked to flexibility, communication, and resilience.³¹ This develops the over-arching research theme: can student engagement with a digital internship such as Forage act as an appropriate proxy for a physical internship?

METHODOLOGY AND ANALYSIS

Exploratory qualitative research was conducted using the reflective commentaries submitted by second year Business School students.³² The students' perceptions, feelings, motivations, and reflections on the digital internship experience were valuable to obtain rich data, reflecting their deep thoughts. Data was collected, complying with the University's ethical standards, by accessing student reflective commentaries with their express informed consent. Student's non-credit bearing reflective submissions utilised Gibbs' reflective cycle model³³ to describe their feelings, evaluation, and conclusions about what happened during the digital internship. These written reflections were used to conduct a thematic analysis, whereby the process of coding, codifying and classifying was employed.³⁴ The initial codes emerging from the first stage of the data analysis process are illustrated in Figure 1.



Theoretical Context – First Phase: Before the Digital Internship

“I was excited at the prospect of being able to work for companies which would traditionally take years of experience and exceptional grades to gain experience from.” Alice

Figure 2 is a visual summary of the feelings and emotions of the learners before undertaking the digital internship.

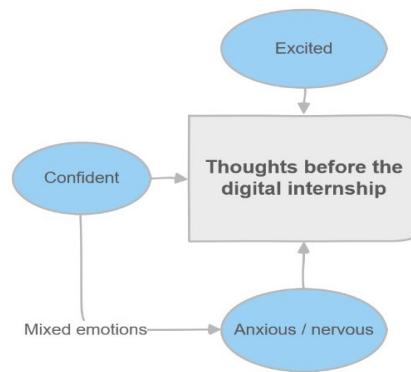


Figure 2. First phase: before the internship

Second Phase – During the internship: The Soft and Hard Skills for the VUCA world
 Through Gibbs' reflective model,³⁶ students surfaced, as before, a mixture of benefits and challenges from the Forage digital internship, as reflected in Figures 3 and 4 respectively.

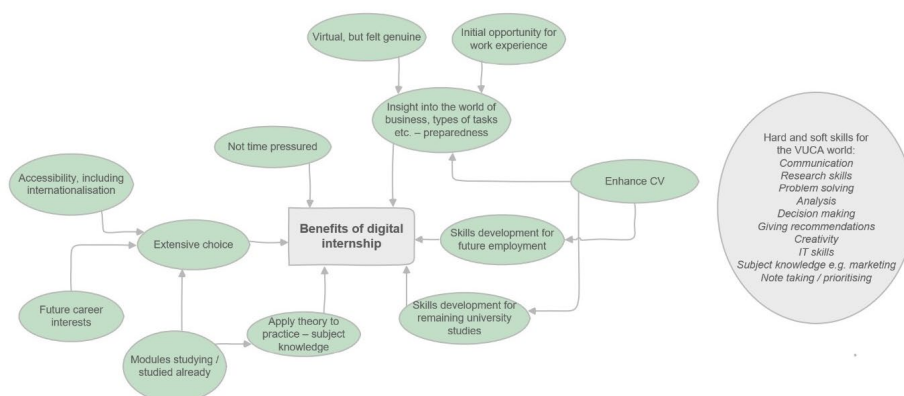


Figure 3. Second phase: during the internship, perceived benefits

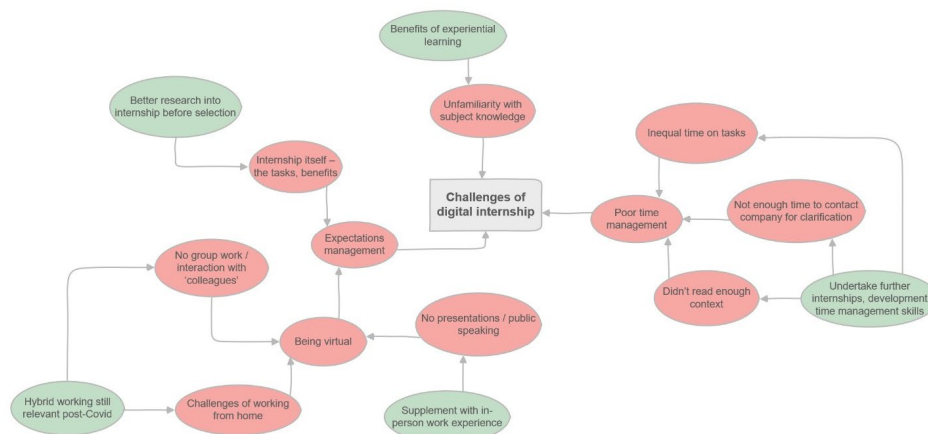


Figure 4. Second phase: during the internship, perceived challenges

In common with physical internships, as detailed in Jackson³⁷ and Jackson and Chapman,³⁸ and aligning with the higher-order cognitive skills,³⁹ students identified skills development in the following areas:

Problem-solving (including reasoning, analysing, diagnosing and decision making)

“I gained technical skills in analysis and investment management, skills such as analysis, research, rationalisation and problems solving are all transferable skills which the internship has equipped me with.” Charlotte

“I chose to complete the JP Morgan Investment Banking internship on the forage platform. The goal was to complete the tasks to the best of my ability, gain an understanding of the role and take onboard any new information. This was achieved by analysing the information that was given to fully understand the problem, then to use this information to identify a way to tackle it.” Derek

Creativity (including enterprise thinking, lateral thinking, initiative, and change management)

“I also learnt how to broaden my imagination and develop my creativity skills when brainstorming business ideas whilst doing the tasks.” Eva

Critical thinking (including conceptualisation and evaluation)

“To use critical thinking of how a client may not benefit from some of the terms in the contract. This task seemed more genuine and therefore attempting it felt realistic.” Fred

“The internship [has allowed me to] develop critical and practical skills necessary to progress professionally in the financial sector.” Greta

Data analysis and systems thinking (including numeracy, technology, information management)

“Good thing is that I needed to use commonly used programs such as Word, Excel, PowerPoint, and PDF” Helen

“The performance analysis and insights (data analysis) task were the most challenging, as it required me to analyse a heavy dataset and draw conclusions from the data created. I found most of this task rewarding.” Ian

The impact of these findings is a commonality in skills development between a physical internship,⁴⁰ and the Forage digital internship completed by these second-year business students. Irrespective of whether physical or virtual, students identified the authenticity of the tasks undertaken within a professional business environment.

“The Citi Global Consumer Banking Virtual Reality Intern Experience has made it clearer what working for a global financial institution looks like.” Johanna

“This task seemed more genuine, and therefore attempting it felt realistic.” Ken

This supports the move towards digital platforms, within the context of Industry 4.0, in reinventing the processes and models used in HE for developing career readiness as a graduate attribute.⁴¹

However, of the skills which students identified as most in need of improvement was time management which has variously been described by Jackson,⁴² Jackson and Chapman⁴³ and Valentine and Keating⁴⁴ as self-management and self-awareness. Whether this can be attributed to remoteness from the company and its physical setting is potentially worthy of further investigation.

“The project would have greatly benefited from more time for research and implementation of ideas. This is an area I definitely struggle with, and therefore something I will improve on in the future by

dedicating more time and organising tasks based on completion at least a few days before any significant deadlines.” Laura

Overall, there is evidence of a strong basis of skills development in line with physical internships and as Jackson,⁴⁵ Jackson and Chapman⁴⁶ have identified, developing professionalism is a key outcome from any engagement with employers. Whilst time management was seen as an area for improvement, the reflection shows evidence of learning, with professional development also being contextualised. Professionalism has also surfaced through a realisation that personal resilience will be needed reflecting potential multiple failures occurring in a dynamic workplace context.

“The internship mimics the structure of daily activities of an intern at one of the Fortune 500 companies and allows to identify one’s strengths and weaknesses in a professional environment.” Mark

“I had to be resilient during this task as mistakes were going to be made.” Nadia

Third Phase – Thoughts after the digital internship

Reflection after the internship through Gibbs’ model has presented a conflation between the benefits found through the process and the takeaways afterwards, including a desire to enhance discipline specific knowledge and a re-evaluation of careers aspirations.⁴⁷ These outcomes are supported by Valentine and Keating⁴⁸ who identified the experiences from any engagement with the workplace embeds a graduate identity and encourages enhancing discipline specific knowledge to ease the transition into the workplace. Valentine and Keating⁴⁹ also expressed, and this is supported by our findings, that experience in the work environment re-evaluated and clarified their own professional career aspirations through the prism of a confident and engaged student who has enjoyed a rewarding and worthwhile experience.

“The virtual internship experience at Deloitte has reinforced my desire to pursue a career as an accountant. Being able to take the knowledge I have learned from first year and apply it in a real-world situation was a very enjoyable and insightful opportunity.” Oliver

After the digital internships, the learners found the virtual experience rewarding, worthwhile, insightful for future career decisions and their skills development as illustrated in the Figure 5.

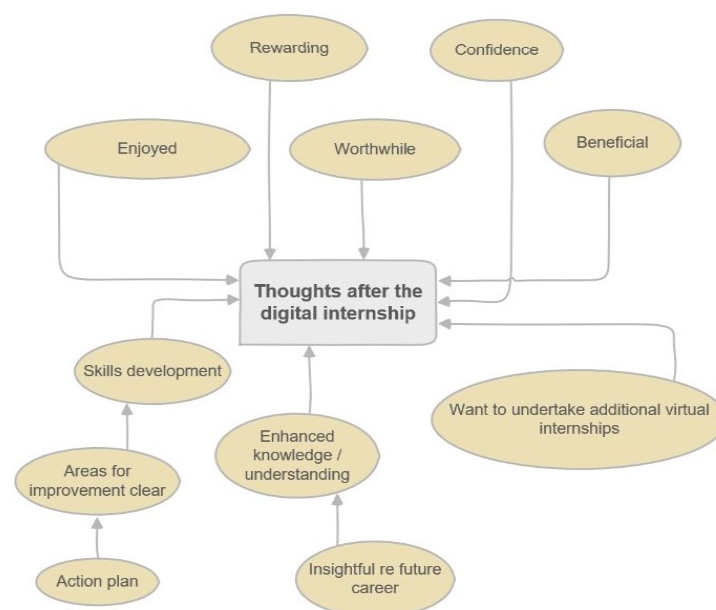


Figure 5. Third phase: after the internship

CONCLUSION

This study has shed light on vital insights into the digitalisation of internship experience in HEI. Overall, we find that a digital internship through Forage is comparable in introducing and developing skills to a physical workplace experience as the principal benefit for the student. Exposure to the workplace can now take place within a psychologically safe place and serve as a basic apprenticeship for further industry experiences such as work-based learning and/or internships. Students will build confidence from going through a virtual introductory process which reflects that of a real experience of pre-departure fears; exposure to benefits and challenges within the internship; and a reflective processing period after, again building on the psychological safety of their first encounter with industry.

The primary benefit of digital transformation for HEIs is providing greater access to workplace experiences, such as Forage, for a greater number of students. These students have the potential to embed career-ready, professional skills, and acts as a solid bridge between the classroom learning environment and the world of work. Whilst there was overall a strong skills development, self-management was identified as area for improvement which needs to be addressed by either/both educators in preparation for the virtual placement and Forage itself, illustrating a need to signpost independence and resilience in preparatory guidance for students. Further, providing mutual benefits for both individual students and HEIs is the ubiquity of access provided by free online internships which promotes widening participation to workplace experiences where there are financial or other circumstantial implications for participants.

Areas for future research which have developed from this study include both conceptual and applied potential studies. We have only utilised Gibbs' Learning Cycle as a conceptual model when asking students to reflect on their practices and experiences. However, other reflective models might be investigated, and their impacts examined. For example, Kolb identifies that cognitive, affective and behavioural learning is achieved through experience, underpinned by attempting to transform what has been learnt in a specific environment.⁵⁰ Further research might examine this transferability to digital learning. Additionally, a longitudinal study would allow for investigating students' evolving preparations and readiness/confidence for 'real-world' placement and internship experiences after their initial virtual experience for Forage and pedagogic enhancements. Finally, a broader range of students, from diverse cohorts/schools, would provide more insights into their relative experiences and perceived value gained from their Forage experience as they move towards aspirational career destinations out with the Business School environment.

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EDUCATION POLICY, DIGITAL LEARNING AND (INVISIBLE) ENERGY USE IN UK SCHOOLS

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INTRODUCTION

Digitalisation processes have been transforming schooling posing significant but often unrecognised implications for energy consumption. Notably, the uptake of digital working practices and roll-out of related infrastructures represent an important area of energy demand growth globally, potentially undermining efforts to meet net-zero commitments and address climate change.¹ This process of change is complex, and its effects have been uneven throughout the world. Schools to varying extent have come to rely on digital teaching practices to support virtual and distance learning and to help pupils develop the ICT skills needed to work in emerging sectors.² While there has been much debate on the benefits and potential problems of digital learning, less attention has been paid to the links between digitalisation, schools' policies and digital strategies, and energy demand.³ This paper examines the impact of policy and wider strategy on the uptake of digital practices in schools as a way in to provoking deeper conversations on the role of education policymaking in advancing low-carbon transitions.

Recent energy research has begun to examine the interrelations between 'non-energy' policies, practices and energy use related to universities and schools.⁴ Authors argue that these policies function as 'invisible energy policies' because they are not designed to target the governance or use of energy, but pose inadvertent implications, nonetheless.⁵ For example, Gormally et al. show how neoliberal higher education agendas promoting 'productivity' can drive the expansion of departments, resulting in 'more kit, more research, more travel and thus more energy consumption'.⁶ This paper adds to this emerging discussion by examining the relationships between policy, digital learning practices, and energy demand in secondary education. It presents preliminary findings from research that aimed to explore the energy impacts of education policymaking in English secondary schools. The next section introduces the research context and discusses the mixed-method qualitative research approach.

RESEARCH CONTEXT AND METHODS

UK secondary schools consumed just under 200 GWh of electricity for small power applications in 2021.⁷ Earlier government research identified a link between increasing small power use and the growth in computer-based learning and administrative spaces, which was especially pronounced in the secondary education sub-sector.⁸ This signals the significance of secondary schools for thinking about the relations between policy and digital practices.

The UK government's longstanding strategy to promote digital learning in schools makes it an important context for education and energy researchers to learn from.⁹ Nevertheless, the provision of schooling in the UK is complex and policymaking varies considerably between the different nations. The empirical research focused on England because it has been transformed over the past twenty years by substantial education reforms, known as the Academies Programme.¹⁰ During this programme, or 'academisation,' traditional state-run schools have been encouraged to convert into publicly funded but privately run 'academy schools' that are governed by independent Trusts rather than local government.¹¹ This change is noteworthy because it transfers considerable decision-making powers in areas such as the curriculum, building use, and procurement to privately-run Trusts. Academy schools now represent the dominant school type in England, making their role in policy enactment crucial for examining the growth of digital learning practices.¹²

The research for the results presented here involved a document review of national and local policies and 35 semi-structured interviews. A methodology informed by social practice theory and temporal qualitative research methods was adopted to explore stakeholders' experiences of changing policies and practices.¹³ It aimed to explore how policy and energy use practices have changed during the main expansion of the Academies Programme post-2010. The results presented here focus on changes in digital learning and working practices.

I interviewed stakeholders that worked in different job roles (such as teaching and learning, ICT, catering, finance, and external partners) and at different decision-making levels to probe different perspectives on changing energy demanding practices in secondary academies. Most interviews were conducted with executive and school-level employees at four large academy trusts that operate in different regions in England. The interviews were conducted in three phases between September 2021 and April 2023. A labelling process has been used to refer to the different participating stakeholders. The following section describes the different links identified in the research between the digitalisation of schooling and energy demanding practices. It reflects on these evolving links to problematise the advance of digitalisation in schooling.

RESULTS AND DISCUSSION

The research found that education policies and digital strategy have played a role in shaping energy use in secondary academy schools, with the COVID-19 pandemic representing a significant accelerator of the uptake in digital working practices. I will discuss three key intersections between digitalisation and energy issues: 1) digital learning/energy consumption; 2) the digital divide/access; 3) remote working/travel. After this, I reflect on the lively debate among interviewees between the merits of analogue and digital learning as a way into problematising the advance of digitalisation in secondary education.

Digital learning

Stakeholders reported that computer-based learning had been gradually increasing throughout their careers working in different types of secondary schools. These experiences of change were predominantly attributed to the apparently gradual, almost natural, advance of digitalisation in society, including secondary schools. Some accounts drew attention to the role of government strategy and learning requirements in exam board specifications in supporting this process of change. Few actively reflected on the energy implications of the digital transition beyond the academies' estates teams.

Notably, the advance of digital learning can shape energy use in schools directly by necessitating electricity consumption for devices (such as computers, whiteboards, and laptops) and auxiliary equipment (such as servers and routers). It also created additional cooling needs as ICT suites and server rooms required air-conditioning to ensure the equipment did not overheat. More recently,

academies have started to move to cloud-based systems, which has seen Chromebooks replace ICT suites, and server rooms closed as storage moves to external data centres, externalising electricity use for power and cooling. All of these changes pose an indirect impact relating to the life cycle emissions of upgrading equipment and infrastructure.

Stakeholders identified the coronavirus pandemic as an important accelerator of the uptake of digital learning. For example, an ICT Director at a Multi-academy Trust (I-3) described their procurement strategy during the pandemic, as follows:

“We went from no Chromebooks at the start of COVID, where now we’re probably got 35,000 devices. Some of them Department for Education provided, but majority of them procured as an organisation to help support children learn outside of school”

The director is referring to a government scheme in 2020 to provide devices to education institutions to loan to pupils to ensure that schooling could continue throughout the pandemic, in total 1,955,623 laptops and tablets have been delivered during the scheme.¹⁴ The proliferation of devices in the sector during the pandemic allowed teachers to record and livestream lessons for pupils at home. As such, the pandemic policy response increased access to digital devices in schools, enabling a form of technological lock-in whereby classwork and homework could more readily be set, completed, and marked digitally. Equally, the proliferation of laptops and tablets reduced the need for sedentary desktops, allowing Estates directors to decommission traditional air-conditioned ICT suites in favour of bringing a trolley of more mobile devices directly into the classroom.

The transition to use devices with cloud-based storage systems, accelerated by the policy response to the pandemic crisis, reduced the need to manage data onsite. This enabled Estates directors to remove or reduce physical server capacity on their school premises, reducing electricity consumption for equipment and cooling. However, the shift to cloud-based digital learning meant that ICT Directors became less concerned about data demand management. For example, when asked ‘has there been any changes in the total user storage?’ since the move to cloud based systems, an ICT director (I-1) responded:

"Okay, I don’t know, only because where beforehand we were always limited to how much storage we had on our servers. With I think, I don’t know if Microsoft do it, but with Google for Education it’s unlimited storage. So we have no interest in, what, you know, I’m Jim in year 7, I don’t really care how much data you’re using, because it’s not my ... I can check but I don’t really care because we’re not paying for it. It’s the same as the Media Department, where before they would have all these videos and video files all over the place, all the IT managers panicking how do we keep all of this? But actually I don’t care."

Notably, the schools' data usage is now managed offsite, and as the organisation is allowed ‘unlimited storage’ there is little incentive to try and manage or reduce their data. Yet, recent research shows that data centres and data infrastructures represent an important area of energy demand growth,¹⁵ which makes the lack of data demand management on school premises an unacknowledged challenge.

Overall, this section traces the growth of digital learning in secondary academy schools. It reveals how digital learning contributes to onsite energy use in air-conditioned ICT suites and server rooms. It also describes how the coronavirus pandemic policy response has accelerated the uptake of cloud-based learning, which has reduced energy use onsite while increasing energy use offsite by contributing to the need for additional energy use in offsite digital infrastructure. While energy end use data is collected in relation to secondary schools’ facilities, no data is collected on the life cycle emissions of these changes or externalising data management. This is a particularly important issue as Trust executives seek to implement cloud-based ICT procurement strategies that preference more affordable equipment with pre-determined lifespans to further support the advance of digital education.

The digital divide

The rise of digital learning in schools can result in additional energy consumption as Trust executives seek to address the digital divide in schools. Trust executives reported that it was easier for private schools or academies with fewer disadvantaged pupils to roll-out remote learning provisioning during the pandemic. For example, an ICT director remarked (I-3):

‘I think what COVID taught us as an organisation was there was an inherent digital divide amongst our communities.... What you saw in the academies was mixed. Some flipped quite quickly across because they had equipped staff with the right equipment, and they knew which children had access and who didn’t have access and they could quickly get equipment to them. Some teachers didn’t have equipment, and students didn’t have anything, and that was much more problematic.’

Academies that were either less well funded or served disadvantaged communities faced three major issues for scaling-up remote learning during the pandemic, including access to equipment, connectivity, and electricity.

Stakeholders reported how Trust laptop loan schemes began by targeting families that did not have access to equipment at home, followed by larger families with multiple children and access to one shared device. Further, many disadvantaged families could not afford to pay for Wi-Fi at home, which resulted in Trusts procuring mobile sims to provide connectivity for children to complete their lessons and work at home. Lastly, certain pupils could not charge their new device at home due to cost or lack of reliable electricity; this problem was exacerbated by the energy crisis and the related high prices which were affecting communities between 2021 and 2022. Significantly, the education policy response to the coronavirus pandemic has helped to address the digital divide between pupils in different communities. However, these changes also speak to the role of schooling in configuring daily life in ways that produce or entrench additional energy and data consumption.

Remote working and travel

The pandemic also acted as a catalyst for the uptake of virtual meetings for parents and staff. Most meetings between parents and the school (such as parents’ evenings or meetings for behaviour and attendance) were conducted via telephone or a videoconferencing platform to adhere to safety guidelines during this period. While remote meetings had been taking place prior to the pandemic, this period normalised virtual or hybrid meeting allowing these practices to become routine in schools. Significantly, this created an inadvertent opportunity to lessen emissions related to transport demand by reducing the frequency in which caregivers are required to travel to school.

Second, the response to the pandemic disruption also helped to normalise virtual meetings between school and executive level staff. This poses noteworthy implications for reducing travel in the context of geographically spread-out Multi-academy Trusts. Previously, state-run secondary schools were governed by a single local authority; whereas newer Multi-academy Trusts are not necessarily geographically confined and, so, Trust executives can govern schools in different regions of England. Three out of the four Trusts that participated in this research were based in at least two different regions of England, with one of these Trusts operating in all regions of the country. Therefore, the shift to online working during the pandemic has helped to reduce how often various executive employees need to visit each academy, for teaching and learning supervisions, site inspections, finance or operational meetings. This highlights how new digital working practices can reduce the transport emissions relating to geographically dispersed configurations of schools.

The digital leaning debate

There was debate between different stakeholders about the relative merits of using digital learning equipment to deliver the curriculum. Some stakeholders found certain devices helpful teaching aids; whereas others questioned how effective or strictly necessary the use of internet-enabled equipment was for teaching in the classroom. For example, a head of department remarked when asked about the shift to using a tablet to teach from (ST-6):

“Oh, I love the iPad so much more. It just allows you to live scribe... we have booklets for a student and I can project their booklet onto the screen. Any literacy words I can annotate what those words mean and they could copy what I’m writing on the whiteboard, they can see and then copy it into their booklet straightaway. It’s taken away the element or reliance of maybe a PowerPoint. We do have normal whiteboards and pens so we still use those and we’re encouraged to use those as another visual aid. Yeah, 100% I prefer using the iPad and to having something that I can write on live and then it saves time on an app called Notability on my iPad so I can bring it up from the previous lesson anyway as to what we’ve discussed in my previous notes.”

On the other hand, a teacher cautioned against allowing pupils to use electronic equipment during a lesson by saying (ST-9):

"Yeah, I don’t know if this is just me, I always find that booking a Chromebook room for a lesson, you spend more time getting logged on and things like this and then kids who are not getting on with their work and you spend more time going around than actually delivering any content. I don’t think in the last five years I’ve been at this school I’ve actually used computers in my classroom, I just find it more of a distraction, that if I need to tell the kids something I’ll tell them, there’s very few things at Key Stage 3, 4 and even Key Stage 5 where a student will need to research it that I wouldn’t already have on hand... I don’t necessarily think you’re missing anything with that..., it’s not, it’s just a different way of teaching."

This pedagogical debate on the uses and efficacy of technology in the classroom is significant because it contradicts the apparently settled discourse in favour of digitalisation at the executive and national decision-making levels. The debate among practitioners at the school level signals that the use of technology may not necessarily lead to improved educational outcomes for pupils. This discussion on the efficacy of new technologies is also alive in the education literature. However, the education and digital strategies of Trusts and the Department for Education promote digital learning in a way that makes it seem a natural progression for the classroom. Although the development of ICT skills is necessary for supporting pupils along pathways into the increasingly digital workplace, it is important to probe if all activities inevitably require the use of technology, and what is lost if school systems pursue this universal digitalisation of education.

CONCLUSION AND RECOMMENDATIONS

This paper presents findings on digitalisation in schools from research that explored the ‘invisible’ impacts of education policies on different features of the energy system in England. It shows how education policies and digital strategy at different decision-making levels have supported the uptake of digital practices in academy schools, with different consequences for energy use and justice. This includes creating new and/or additional forms of energy and digital consumption, addressing access issues relating to the digital divide within communities, and potentially reducing travel requirements. It also shows that the debate on the educational merits of using technology in the classroom between education practitioners is far from settled, with teachers perceiving it as a timesaving, pedagogical aid and, conversely, a possible distraction. The debate is significant because it contradicts the narrative at higher decision-making levels that digital education practices will inevitably replace analogue methods. The disagreement on the relative merits of using technology in the classroom creates space

for a meaningful conversation on the future direction of digital strategy and the apparent inevitability of universal digitalisation of school practices. In particular, this paper recommends that education policymakers and those involved in policy delivery make the sustainability implications of using new technologies visible in national and local digital strategies. It also recommends that policymakers devise sustainability strategies that identify pedagogical practices that support education delivery in a way that is less reliant on escalating energy and data demand. These policy recommendations could help to foster more nuanced conversations among local decision-makers and practitioners on the relative merits and appropriate applications of digital and non-digital practices in schools.

NOTES

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TOWARDS SUSTAINABLE TEACHING METHODS IN DESIGN STUDIOS

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INTRODUCTION

The emerging demands of our times that is influenced by global changes, economies and politics determine the changes needed in education. Design education- in particular- requires constant change to cope with the emerging technologies and the contemporary design industry. The COVID-19 epidemic has significantly disrupted the educational sector, especially in the practical fields such as design where the major learning happens through hands-on experiences in studios. Consequently, design educators had to adjust to new teaching and learning techniques when universities and colleges made the transition to online education.

This paper examines post-pandemic educational approaches in a Furniture Design course offered as part of the Interior Design Program at University of Bahrain. The course is offered mainly to third year students, who spent their first couple of educational years in quarantine and have just returned to the physical studios. This paper explores a set of hybrid educational methods that aim to enhance the students' learning experience. These methods were applied through three main projects offered in the Furniture Design course, which were tailored according to the literature findings on the emerging topics within the design industry today.

LITERATURE REVIEW

The literature review of this research is divided into three parts: The first part summarizes how the pandemic has affected furniture design education and the methods teachers have used to continue teaching during the challenging times of the pandemic. The second part explores the current challenges facing furniture design practice that can determine the scope of design education today. The third part demonstrates reflections and current post-pandemic approaches in design education. The literature establishes the basis of the methodological approach of the paper reflected in the design curriculum to adapt more sustainable tools in furniture design studios.

Design Education Challenges During the Pandemic

One of the major obstacles to furniture design education that emerged during the pandemic is the absence of traditional workshops and physical studios. Many academic institutions were forced to close their physical locations, restricting the students' access to the resources they require for making their furniture designs.¹ This has compelled educators to use innovative techniques to teach furniture design, such as developing virtual workshops and design simulations using software and digital tools.

Maintaining student involvement and motivation in a remote learning environment has been another challenge; furniture design is a practical activity that requires physical interaction as well as collaboration, and this might be challenging to recreate in an online environment.² Teachers had to adopt new teaching techniques to overcome this issue, such as giving students frequent feedback, employing video conferencing tools to allow group discussions and critiques, and developing online communities where students may collaborate on their designs.³

Having said that, many furniture design educators have coped with these challenges by adapting online distance learning, some have even prospered in the current environment despite these challenges. For example, some teachers used the pandemic to explore new teaching and learning methods, such as adding sustainability and digital fabrication into their curricula.⁴ Others have concentrated on establishing stronger relationships with their students to give them the resources and support they require to be successful in a distance learning environment.⁵

Although the institutional shift to remote and online formats resulted in many challenges, especially in the field of design education, it also opened new possibilities for integrating online learning even after returning to the physical studios and classes. As the world is recovering and has already moved towards a post-pandemic future, there is a growing interest in hybrid approach to design education that combines the benefits of in-person and online learning. There are many key considerations and potential benefits of the hybrid approach; one of the main benefits is the flexibility and accessibility that it offers to both students and educators.⁶ On the one hand, students can choose how they attend class to better suit their learning style. With online education, students can attend classes when they are not able to be present in the physical class due to transportation, expenses and other obstacles that limit the access to education. On the other hand, educators have the access to diverse teaching methods and technologies that can enhance the learning experience. Online education offers opportunities for international collaboration, exchange and exposure that was not possible before due to funding or difficulties in travel.⁷

In addition, a hybrid approach can inform students' learning experiences by enabling a more diversified and engaging pedagogy. By utilizing a variety of instructional techniques and technological tools, for example, theoretical parts or individual assignments can be executed online while practical work can be achieved in person. It can also offer an alternative kind of interaction between students and their peers or instructors, which can promote a sense of community and connection.

In conclusion, the COVID-19 epidemic has posed substantial difficulties for the study of furniture design. Despite these difficulties, educators continue to provide their pupils with a high-quality education by utilizing new technologies and teaching methods.

Current Challenges Facing Furniture Design Practice

The practice of furniture design nowadays faces various difficulties which can be summarized as follows:

1. Sustainability: Furniture designers are under pressure to design products with a smaller carbon footprint as consumers grow more aware of the environmental impact of their purchases. According to a study by the Ellen MacArthur Foundation,⁸ the furniture business contributes significantly to climate change, emitting 1.3 billion tons of greenhouse gases annually. Consequently, various approaches are being investigated by furniture designers to reduce the environmental impact of their products. Some of these approaches include using sustainable materials such as bamboo, cork, and recycled plastic, as well as designing products that can be easily disassembled. Some designers are also experimenting with "circular design principles", which create closed-loop systems where materials are reused, and waste is minimized.⁹

2. Digital technologies: The development of digital technologies has created innovative possibilities for furniture design and manufacturing. For instance, 3D printing enables designers to produce intricate patterns and structures that are challenging to make using conventional manufacturing methods. In addition, designers can now create immersive experiences that help clients envision how furniture will look in their homes using virtual reality and augmented reality features. Although these tools offer new opportunities for personalization and effectiveness, they also create issues related to intellectual property and labor laws. Not to mention the growing concern it creates regarding the role of designers in the digital age and the potential loss of craftsmanship and the tactile aspects of the design process.¹⁰

3. Ergonomics: Concern about the health effects of poor ergonomics is growing as individuals spend more time using computers and spend lengthy periods of time sitting at desks at home or workplaces. In response, furniture designers strive to produce items that promote proper posture and lower the possibility of repetitive strain injuries. This includes items that encourage movement throughout the day, such as height-adjustable desks and ergonomic office chairs.¹¹

4. Cultural diversity: As globalization continues to blur national boundaries, furniture designers are increasingly called upon to create products that reflect diverse cultural traditions and aesthetics. This necessitates a thorough knowledge of many design languages as well as the capacity to creatively combine them. To preserve cultural heritage and advance sustainable practices, some designers are also attempting to include ancient crafts and processes in their work.¹²

These issues present challenges as well as opportunities for furniture designers. By embracing new technologies and exploring sustainable materials, techniques, and cultural traditions, designers can create beautiful and functional products while contributing to a more sustainable future.

Towards Hybrid Approach in Furniture Design Education

In relation to the previous sections, certain strategies can be adapted in furniture design education to create a sustainable model that can cope with the constant demands of the field. These strategies can be summarized into three main categories: Content, resources, and methods. With regards to the content, design education needs to address the current environmental, economic, and social issues. When it comes to the resources, embracing technology needs investments from institutions and building infrastructure that can facilitate remote learning.¹³

As for the teaching methods, design educators need to provide a balance between online and in-person learning experiences by developing effective teaching methods. Such methods need to be engaging and stimulating for students to ensure they remain motivated and driven in a hybrid learning environment. This may involve using a variety of teaching tools and methods, such as flipped classrooms, project-based learning, and peer-to-peer collaboration.¹⁴ The teaching methods still need to prioritize in-person interaction and collaboration to foster creativity and create a sense of community. Overall, a hybrid approach to design education has the potential to offer a flexible, accessible, and engaging learning experience that prepares students for the challenges and opportunities of a rapidly changing world.¹⁵

METHODOLOGY

The methodological approach of the research focuses on the three main categories of hybrid teaching strategies concluded from literature: Content, resources and methods. The following is a detailed explanation on how the research addressed these categories.

A. Content

Overview of Course Structure:

The Furniture Design course was offered in the first semester of the academic year 2022/2023 and runs from September until January for third-year students from the Interior Design program at the University of Bahrain. The course emphasizes on innovation and creativity while designing furniture pieces that are aesthetically pleasing and functional. Students learn the application of appropriate materials, sustainability and detailing the pieces of furniture. A total of 89 students enrolled in the course.

The Course Intended Learning Outcomes (CILOs) of the Furniture Design course are:

1. Demonstrate understanding of human body dimensions and movement along with space dimensions related to furniture design.
2. Demonstrate understanding of a range of furniture fabrication methods.
3. Design creative furniture solutions that fulfil their purposes by considering their aesthetic, function, user preferences, situation, climate condition and cost.
4. Propose suitable materials and the making process to produce the designed furniture piece.
5. Express furniture solutions using technical drawing, realistic renders and physical models.
6. Design furniture solutions considering the elements and principles of design.
7. Demonstrate creativity in designing furniture solutions that meet the demands of users.

Course Assessments:

Following on the current emerging topics in furniture design practice, the course assessment has been modified and new projects have been introduced. The following three projects were given to students during the course without any overlapping in timeframe between projects:

Project 1 focused on designing modular furniture for more flexible home space, and students were advised to work in pairs. The project was divided into two parts: The first part (1A) involved research and idea generation of modular furniture for more flexible home spaces, while the second part (1B) focused on the development and detailing of the chosen modular furniture.

Project 2 emphasized on designing a workspace furniture piece that could be uploaded to an open-source platform and produced locally using a CNC machine. Students had to use plywood for the project and produce a physical model of the design they developed using a CNC machine in a suitable scale decided by them. The project was also divided into two parts (2A and 2B), and students had the option of working in pairs or alone for this project.

The Final Project addressed sustainability by designing a coffee table. Students worked individually on this project and focused on research, idea generation, development, detailing, and rendering of the sustainable coffee table in Part A of the Final Project. In Part B, students had to make a physical model of their coffee table to be showcased in an exhibition.

B. Resources

The course took place officially in classrooms and studios to benefit from the studio culture when it came to practice and project feedback, while most of the materials were made available online via Microsoft Teams and Blackboard. To make use of the hybrid approach, for example, a live stream from CNC Machine factory was organized to allow students to learn more about CNC technology and ask questions as the factory was not able to host all 95 students. The online learning platforms allowed to connect students to designers outside the country and invite them as guest speakers. It also allowed for course materials and recordings of projects briefs to be available to students at any point when needed.

C. Methods

Teaching Methods:

To create a sense of community, the outcomes of the final project was showcased through a public exhibition, to offer students public exposure and enhance their confidence. In its first edition, it was organized at the University of Bahrain to showcase the work of the 89 students. Each student presented an A2 poster and a physical model of their sustainable coffee table that was produced on a 1:1, 1:2 or 1:4 scale. The exhibition was held for two days at the University of Bahrain and was open for students and faculty. Setting up the exhibition was part of the students' responsibility and project brief. Students were also required to be present during opening times to talk about their designs. At a later stage, selected work was chosen to be exhibited in Arts Centre in Manama in collaboration with Bahrain Authority for Culture and Antiquities which was targeting wider audience.

Evaluation Methods:

Two methods were used to evaluate the student's work and the efficiency of the projects in meeting the learning outcomes. The first was the evaluation of the course assessment report, and the second was the students' survey to evaluate their learning experience of the course. After obtaining the results, the instructors used reflective practice to conclude with future recommendations.

DISCUSSION AND RESULTS

The course projects were problem-based, focusing on awareness of social needs and local market to create appropriate solution for user and environment. To relate the projects scope to literature findings, the first project, designing reconfigurable furniture or modular system that accommodates domestic needs relates to (post-pandemic) design approaches. While in the second project students were asked to focus on the manufacturing method for flat-pack furniture that is appropriate for open-source. Students experience the material properties in a way to reduce material waste, empower local makers, and make design accessible to the masses. In the third project, students were encouraged to take risks, and to think of all aspects of sustainability (environmental, economic, or social). Figures 1, 2 and 3 show selected examples of all three projects.



Figure 1. Two examples of students' work in Project 1

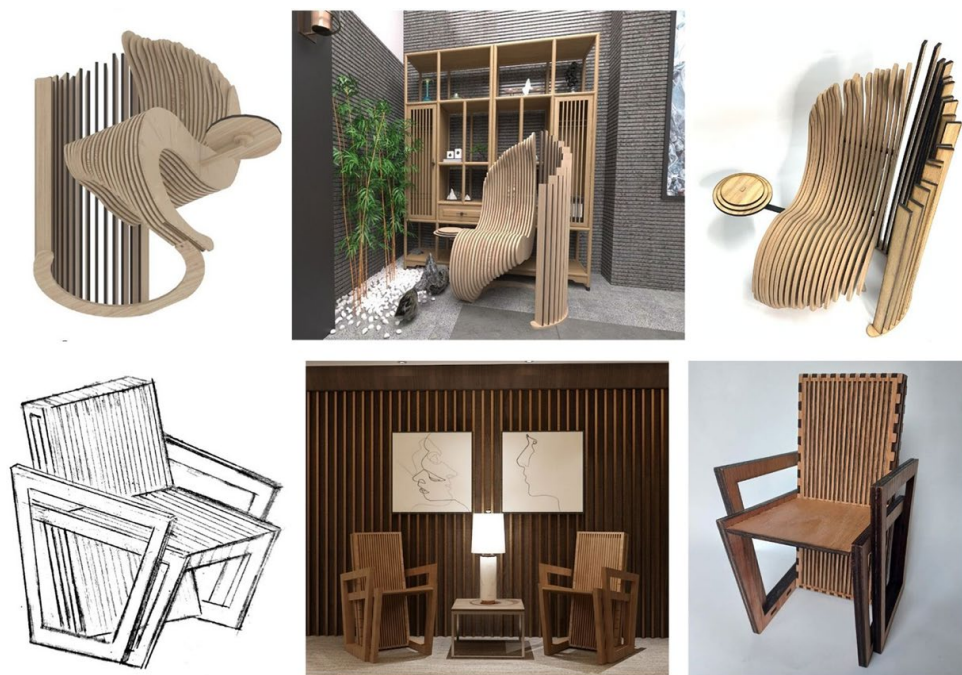


Figure 2. Two examples of students' work in Project 2



Figure 3. Two examples of students' work in the Final Project

Course Assessment Report

After mapping all the CILOs with each criterion graded in each project given in this course and adding all 89 students' data and results, a report was generated to see the effectiveness of achieving the CILOs. The results confirmed that all the CILOs were achieved by 91% or more apart from CILO 2, which is related to the understanding of furniture fabrication methods as the score was 89%. The CILO that scored the most (97%) was related to demonstrating creativity in designing furniture solutions that meet the demands of users. Figure 4 shows students' achievements in relation to all CILOs.

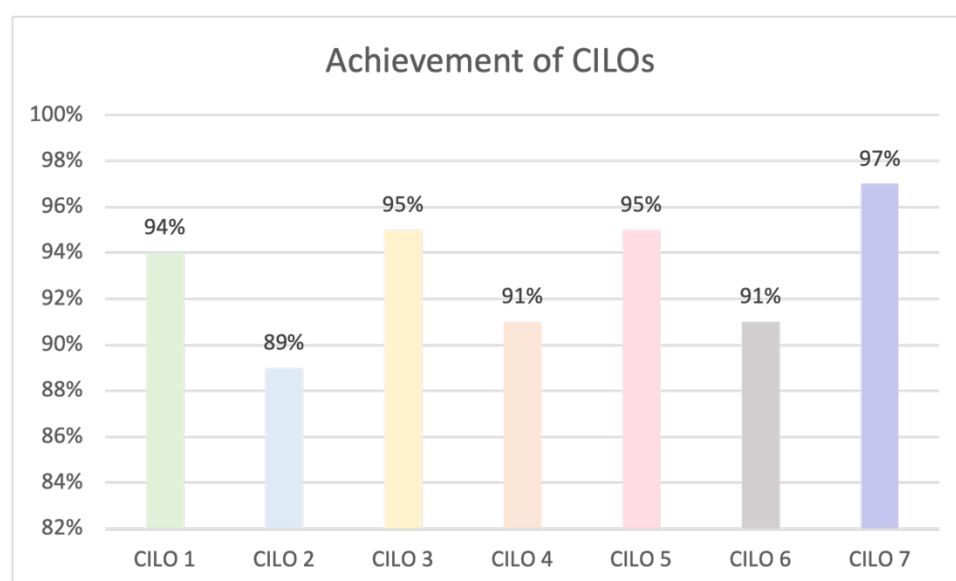


Figure 4. Results of meeting the Furniture Design course CILOs retrieved from the course assessment report

Furniture Design Students' Survey

After completing the Furniture Design course, all 89 students were invited to undertake a digital survey, and 69 students completed it representing 77.5%.

The results of the survey were generally positive about each project. Most students agreed or strongly agreed that Project 1, Project 2, and Final Project helped them in being more creative (84%, 75.3% and 71.1% in order). Students reported that the projects enhanced their learning by doing (88.4% for Project 1, 86.9% for Project 2 and 82.6% for the Final Project). Most students reported enjoying the projects (76.8% for Project 1, 73.9% for Project 2, and 79.7% for Final Project).

Based on feedback from most of the students, the three projects in ascending order were successful in applying knowledge about materials (78.2%, 75.4% and 89.9%), joints (82.6%, 81.1%, and 86.9%), furniture fabrication methods (63.7%, 71% and 73.9%), and ergonomics (82.6%, 81.1% and 84%).

When comparing projects against each other, the Final Project was ranked number 1 for four criteria: Application of materials, ergonomics, fabrication methods and enjoying it. Project 1 was ranked first when it came to creativity and learning by doing. Most students (86.9%) thought that Project 2 was the best for applying joints as students had to produce a physical model using CNC machining. Table 1 summarizes the results for each project in detail.

	Ranked number 1			Ranked number 2			Ranked number 3		
More creative	Project 1			Project 2			Final Project		
	84%	13%	3.00%	75.30%	20.30%	4.30%	71.10%	10.10%	4.30%
Learning by doing	Project 1			Project 2			Final Project		
	88.40%	8.70%	2.80%	86.90%	13%	0%	82.60%	14.50%	2.90%
Enjoyed it	Final Project			Project 1			Project 2		
	79.70%	7.20%	13%	76.80%	14.50%	8.60%	73.90%	17.40%	8.70%
Application of ergonomics	Final Project			Project 1			Project 2		
	84%	13%	2.90%	82.60%	10.10%	7.20%	81.10%	15.00%	2.90%
Application of Materials	Final Project			Project 1			Project 2		
	89.90%	10.10%	0%	78.20%	18.80%	2.90%	75.40%	15.90%	8.70%
Application of Joints	Project 2			Final Project			Project 1		
	86.90%	10.10%	2.90%	82.60%	4.30%	2.90%	81.10%	14.50%	4.30%
Application of fabrication methods	Final Project			Project 2			Project 1		
	73.90%	14.50%	11.60%	71%	11.60%	17.40%	63.70%	24.60%	11.50%

Strongly agree or agree

Neutral

Strongly disagree or disagree

Table 1. Summary of the students' rating of the three projects given according to seven criteria

97.1% of students agreed/strongly agreed that Project 1 helped them understand modular furniture. When it comes to Project 2, 92.7% agreed/strongly agreed that Project 2 allowed them to understand more about CNC machining. The Final Project allowed students to understand more about sustainability, as 85.5% of students agreed/strongly agreed. Figure 5 contains more information about these statistics:

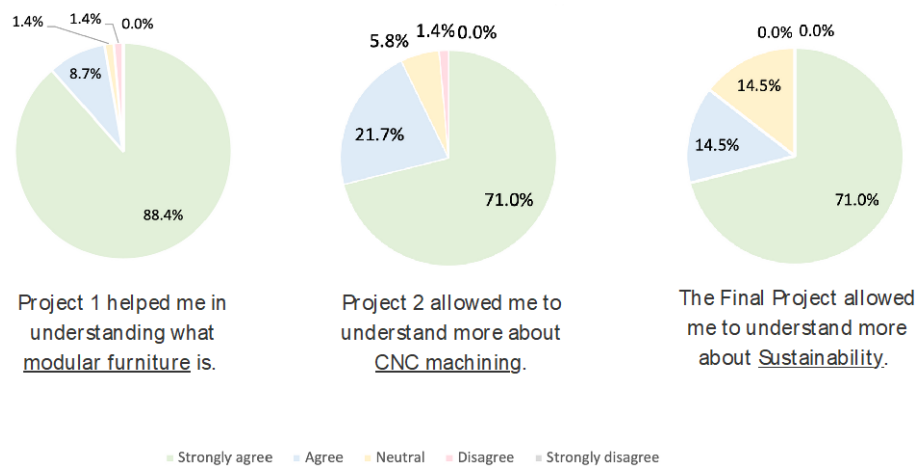


Figure 5. Results of how each project met the intended brief from students' perspective

Overall, the exhibition had a positive effect on students' learning experience. 82.6% of students agreed/strongly agreed that they enjoyed having the exhibition experience. During the exhibition, most students managed to network, which boosted their confidence while 11.6% disagreed/strongly disagreed. This could be due to their introverted nature or not having visitors particularly interested in their design. 72.5% of students agreed/strongly agreed that the exhibition offered great exposure to their work. Some of the students were even contacted to sell their furniture pieces, so students started to believe more in their work. While this exhibition was the students' first experience participating in an exhibition, most students (79.7%) recommended having the exhibition for future students undertaking this course. More details could be seen in Figure 6.

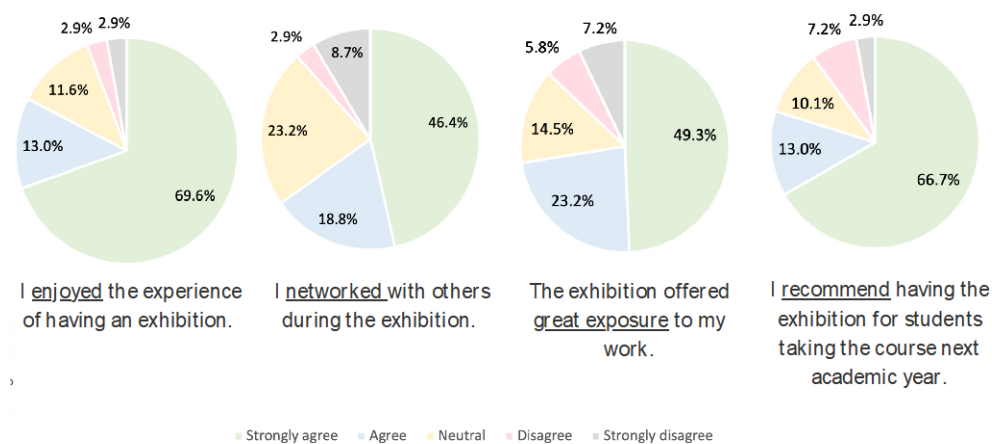


Figure 6. Summary of students' feedback on the exhibition held for the Final Project

75% of students reported that making physical models in the Final Project was beneficial as it gave them a better sense of how the final furniture piece will look like. Interestingly, 66.7% of students mentioned their confidence increased after participating in this exhibition. Figure 7 demonstrates those results.

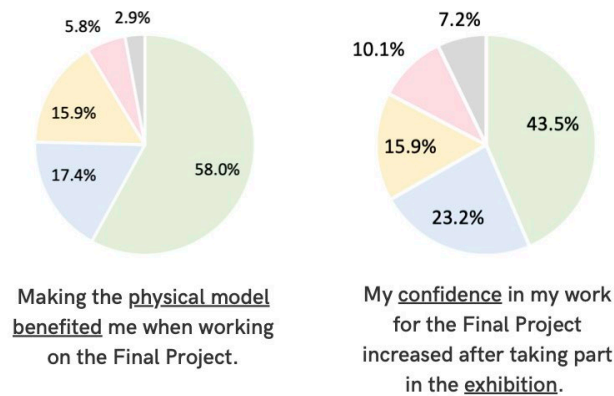


Figure 7. Students' opinion about producing a physical model for the Final Project and confidence after the exhibition

CONCLUSION AND RECOMMENDATIONS

The three projects given to students as part of the Furniture Design course went well overall. Most students enhanced their application of ergonomics, materials, joints and fabrication methods. Most students also learnt by doing, improved their creativity by taking more risks and enjoyed working on all three projects.

To conclude, there are few recommendations that are proposed which can be summarized as follows: Firstly, is to continue using the hybrid approach as it allows benefiting from advantages provided by face-to-face and, at the same time, provides the accessibility and opportunities offered in the online approach when the physical resources are limited.

Secondly, is to keep linking the course with the current and emerging design issues that are essential for students to learn about, such as sustainability, digital fabrication, and modularity.

Thirdly, is to continue integrating exhibitions as an educational platform and as part of the course curriculum to allow students to showcase and network outside the borders of the university, promote their creative ideas, and enhance their learning experience.

NOTES

- ¹ Birgül Gürsoy. "The Impact of COVID-19 on Furniture Design Education: Challenges and Opportunities." *Design Principles and Practices: An International Journal* 15, no. 4 (2021): 19-29
- ² Matthew Cohen. "Hybrid Learning in Design Education: Challenges and Opportunities." *Journal of Interior Design* 46, no.2 (2021): 73-78.
- ³ Birgül Gürsoy. "The Impact of COVID-19 on Furniture Design Education: Challenges and Opportunities." *Design Principles and Practices: An International Journal* 15, no. 4 (2021): 19-29
- ⁴ Andreas Müller. "Sustainability and Digital Fabrication in Furniture Design Education During the Pandemic." *Journal of Design Education* 16, no. 2 (2021): 109-116.
- ⁵ Matthew Cohen. "Hybrid Learning in Design Education: Challenges and Opportunities." *Journal of Interior Design* 46, no.2 (2021): 73-78.
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- ⁷ Chris Evers. "Post-Pandemic Design Education: Opportunities and Challenges." *Design Issues* 36, no. 4 (2020): 3-9.
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- ¹¹ Paul Higgs. "The Future of Furniture Design." *Modern Furnishings*. Accessed April 1, 2023.
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<https://www.architecturaldigest.com/story/5-furniture-design-trends-for-the-next-decade>.
- ¹³ Chris Evers. "Post-Pandemic Design Education: Opportunities and Challenges." *Design Issues* 36, no. 4 (2020): 3-9.
- ¹⁴ Thomas Goldsmith. "Hybrid Teaching and Learning in Art and Design: A Review of the Literature." *Journal of Learning Design* 14, no. 1 (2021): 52-67.
- ¹⁵ Robert Schmitt. "Learning in the Hybrid Mode: The Future if Design Education." *Design Studies* 73 (2021): 1-15.

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ADAPTIVE REMIX: LAYERED COLLABORATION THROUGH ADAPTIVE REUSE

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INTRODUCTION

The United Nations has set ambitious targets of reducing carbon emissions by 45% by 2030 – and has highlighted the architecture industry as a pivotal cause for change.¹ Adaptively reusing existing buildings can contribute greatly in achieving those goals, however, reuse offers greater benefits than just reducing CO2 emissions. Adaptive reuse also uses fewer natural resources, reduces construction waste, lightens urban sprawl, and improves quality of life by sustaining cultural and social values in existing buildings.² As we prepare architecture students to explore adaptive reuse in a more critical manner, it is crucial we move the sustainability discourse beyond a bolt-on technical response. Despite some missed opportunities to integrate existing buildings creatively into the academic curriculum, student's aspirations have never been higher to explore sustainable issues in a deeper capacity.³

In music, the creation of a new song can result from an author rearranging, recombining, or reinterpreting an existing recording, shifting the experience between the new and old. This artistic process is commonly referred to as a “remix”. The prefix *re* (Latin, “again, back”) implies significance in the relationship back to the origin.⁴ A remix can receive numerous adaptations by multiple authors in sequential interventions in a style called a “re-edit”, which is a remix of a previous remix. The resulting intelligible layers deepens a listener's experience through emergent interpretations to that of the original. Today, remix offers the perception of participation that empowers both the author and audience.⁵

Is it appropriate and valuable to use the analogy of Remix in the field of Architecture? Can we shift our academic and societal thinking to engage buildings as “recordings” destined to be creatively interpreted in remixes by multiple authors over time? Could this shift in perception affect the way we think about the lifecycle of buildings, and promote a new and constructive way to produce sustainable architecture? If so, how might this approach be taught?

To respond to such questions, I have analyzed two projects that I consider to be exemplary adaptive reuse projects. The first case study involves interventions completed over 250 years on the Bristol Old Vic Theatre, the oldest continually operating theatre in England. The second is the Exhibition Centre project by Architect Héctor Elorza inside an arched loggia of the historic 1933 Nuevos Ministerios building in Madrid by the original Architects Secundino Zuazo. Does bringing the idea of “remix” to these projects offer a new and constructive way to think about adaptive reuse and architecture in general?

Based on these findings, I am in the process of developing an experimental project called “Scratch”. Over successive years, students at The School of Architecture at Dalhousie University, Nova Scotia, Canada, will be participating in producing a compositional “remix” of an abandoned bunker structure in Crystal Crescent Provincial Park, Nova Scotia, as part of a design-build studio. The first of the series of studios will take place during the summer semester of 2023.

ARCHITECTURAL REMIX

Opening May 30, 1766 as The Theatre Royal, the now Bristol Old Vic Theatre is the oldest continually operating theatre in the English-speaking world.⁶ The theatre’s auditorium was constructed behind a row of terraced houses fronting King Street in the downtown city of Bristol, England. Due to the theatre not attaining the required Royal License upon opening - and thus not wanting to draw unnecessary attention - audiences accessed the auditorium from the main street by means of a discrete door. Patrons were then led down a narrow corridor that passed through the ground floor and courtyard of one of the terraced houses owned by the proprietors before connecting to stairs that accessed the various levels of the auditorium.⁷ As additional houses were made available to purchase, additional corridors were added, and throughout the 250-year lifespan, the forepart of the Georgian theatre has undergone notable changes with those alterations recorded onto the auditorium’s stone wall.

The first significant adaptation occurred at the beginning of the 19th century when the terraced houses were replaced with a new purpose-built building. While the design provided a new two-storey façade for the theatre it retained the strategy of separate entrances and passageways to access the concealed auditorium via the courtyard circulation: the gallery level passage, the dress circle and upper boxes passage, and the pit passage. The original auditorium door and window openings wall were reused or repurposed to suit the mostly reinstated circulation strategy.

The next adaptation occurred in the 1970’s to address the desire for a unified single entrance and grander foyer space, leading to the acquisition and conversion of the adjacent neoclassical Cooper’s Hall building. The terraced houses were demolished along with the initial auditorium courtyard circulation, and the theatre entrance relocated to Cooper’s Hall, allowing for a new experimental studio and administrative space to be placed at the original entrance location off the main street. The relocated entrance required a new circulation strategy that navigated first through Cooper’s Hall and then laterally into the courtyard where new floor levels provided large foyer spaces along the entire exterior of the auditorium elevation, fully enclosing the auditorium wall for the first time. Existing window and door openings in the auditorium wall were rearranged to suit the new foyer layout and circulation strategy, infilling existing openings or introducing new openings where needed. While the original theatre received Grade 1 Listing status from Historic England in 1959, the entire complex was granted the prestigious honour in 2000, which included the modern 1970’s work. This category of listing is reserved for the most exceptionally significant buildings in England, and accounts for a relatively small fraction of protected heritage buildings.⁸

The most recent adaptation concluded in 2018 with the reintroduction of the entrance back to the original location and inclusion of a large and flexible foyer space, which required the demolition of the listed 1970’s work. A new delicately suspended stair circulation strategy and Juliet balconies were woven into openings of the now fully exposed auditorium wall. Architects Haworth Tompkins conceived of the new foyer as a covered forecourt space that reinterpreted the existing layers of history and reorganized the relationship with a new synthesized intervention, stating “the centerpiece of the space is the much-altered façade of the Georgian auditorium, visible from the street for the first time, illuminated by a large light well and punctured by new openings to overwrite the visible evidence of historic alterations.”⁹

As part of the design proposal to relocate the entrance and foyer back to the original location, English Heritage submitted a report limiting the historical significance of the 1970's work by Architect Peter Moro, writing "The auditorium and Cooper's Hall are of the highest architectural and historic merit, and while the Peter Moro work is undoubtedly of high significance, its relative level of significance when taken on its own is less than that of the auditorium and Cooper's Hall."¹⁰ Diminishing the historical significance of the 1970's work permitted the destruction of that fabric and in doing so revealed the original 18th Century stone auditorium wall to the public for the first time, enhancing the visitor's relationship with the historical value. Success in the work by Haworth Tompkins Architects is not in the making visible the historically significant auditorium wall but in adding to the legibility of multiple recordings in relation to the original auditorium wall.

In the book *Remix Theory: The Aesthetics of Sampling*, Eduardo Navas states that the creation of a new song can result from the rearranging or reinterpreting of an existing recording; forming a "cultural glue".¹¹ Navas argues that beyond the creation of a new artifact (the song) the art of remix functions as a form of cultural discourse. We can see similar actions of remix in The Bristol Old Vic project: discursive cultural glue evidenced through re-ordering, rearranging, and reinterpreting the existing auditorium wall. Remix acknowledges architecture to be adaptive, reinforcing the understanding that buildings are never complete.¹² Approaching this project as a remix helps us to appreciate how Haworth Tompkins Architects has situated this project as part of a continuum rather than as a static product. It reinforces the idea that things are always in flux and that the architect is a collective narrator rather than the single author of a building.¹³ The remix analogy communicates to students as a radically different way of thinking of their own projects, including but not limited to adaptive reuse projects.

In the *Contemporary Stamp of Incompleteness*, Experimental Preservation Architect and Theorist Jorge Otero-Pailos notes that contemporary preservation is an act of selective destruction that reorders (or as I suggest, remixes) the existing context to allow for newer and ever-expanding interpretations – an approach that visitors themselves can engage with during occupation. Otero-Pailos states "Instead of attempting to make buildings fit into preconceived "historical" categories, contemporary historic preservation begins by physically probing the building, destroying parts of it (from paint chips to foundations or entire walls), until it finds something unfamiliar to the present."¹⁴ Thus, remix can be seen as a particular type of demolition that informs the design process.

Referring to the Exhibition Centre project in Madrid by Architect Héctor Elorza (original Architect Secundino Zuazo), Otero-Pailos expands upon the element of deconstruction inherent in the making of remix. Elorza, commissioned to create a new lecture hall in the existing space inside the arched loggia of the historic 1933 Nuevos Ministerios building, began cutting out sections of the floor to increase the floor to ceiling height and in doing so discovered a de-mapped subway train tunnel below. Demolishing the floor removed the prescribed historic boundary, and, what Otero-Pailos says, set "the limiting horizon of history clear and set historical interpretation in motion".¹⁵

Elorza's design response includes a sensitive penetration through the recently discovered tunnel's vaulted ceiling to suspend a delicate single steel stair on to a new polished concrete structure inserted into the found space, which leads to a U-shaped concrete room. The concrete walls and floor that define the room are suspended away from the existing floor and walls. The existing ceiling that once divided and concealed this train tunnel is now entirely removed, allowing natural light from above to pour down onto the historic walls for the first time. The natural lighting illuminates scars on the walls from the hammers used during the destruction process.

Otero-Pailos makes an important distinction here: the new intervention is not inserted into an existing context but rather it generates a new context – one that reorders the existing categories of interpretation.¹⁶ He suggests a methodology in which "cutting edge historic preservation is the

process of keeping the old “open” for interpretation, and of holding out the possibility that its work is never finished; indeed cannot finish”.¹⁷

Just as the deconstruction of an existing recording is necessary to a Remix, selective demolition of Elorza’s Exhibition Centre allows for its historical significance to be preserved while simultaneously creating a meaningful adaptation. In architecture, remix involves destroying physical material as a way of transcending it – and in so doing, making something visible from an early time that would have otherwise remained invisible. Two words interest: a demolition process in the present intersects with existing substance of the past. The architectural project reveals how one world can be used to reinterpret the other, and vice versa, and demonstrates how frictions (or discords) between the two worlds can become the inspiration for a new composition.

To explore these ideas, I have developed an experimental multi-year design studio project called “Scratch” initiated in the summer of 2023 in Nova Scotia, Canada. Scratch is an exploratory design-*destroy*-build project to adaptively reuse an existing structure situated within Crystal Crescent Provincial Park. The existing structure, 6x6x3m reinforced concrete, is an abandoned World War II Observation Post. In addition to a side door and a rear window opening, the structure contains a large opening that spans across the façade -with returns on either side – providing an unobstructed view to the Atlantic Ocean. The site offers views that overlook the surrounding landscape, inhabited by wildlife and hikers on nearby trails.

In successive years, students from The School of Architecture at Dalhousie University will explore the notion of conceptually dismantling and reordering the existing building, including the work done at the site by students from previous years. Through a process of selective destruction students will be encouraged to discover elements that are unfamiliar to their present understanding of things. These unfamiliar elements will provide the material for newer and ever-expanding interpretations of the existing structure and site. Where demolition simply removes and disposes of material, selective destruction will be motivated by its ability to reveal the immaterial and stimulate the imagination.

The result of the annual design-*destroy*-build studio will be an evolving compositional “remix” on the site that celebrates the differing interests and attitudes of the studio interlocutors as they grapple with the question of an architectural continuum.

CONCLUSION

There is a need for a methodological process in adaptive reuse that keeps the old open for adaptation and interpretation. Remix acknowledges architecture as an incomplete “recording” that is to be continuously adapted and reordered. This approach dramatically contrasts with the static preservation of an existing building belonging to one particular time-period. Rather than a building being conceived by a single author at a single point in time and for a single purpose, architecture, from its moment of inception, is seen as a mutable environment that is perpetually evolving through interventions made by collective narrators over periods of time: in effect, a new form of architectural “collaboration”.

NOTES

- ¹ “For a Livable Climate: Net-zero commitments must be backed by credible action”, United Nations, accessed February 9, 2023, <https://www.un.org/en/climatechange/net-zero-coalition>
- ² Sheida Shahi, “A definition Framework for Buildings Adaption Projects” *Sustainable Cities and Society* 63 (2020): 1
- ³ “Students Told to Ignore Existing Building – survey reveals retrofit teaching gap”, *Architect’s Journal*, accessed January 20, 2020. <https://www.architectsjournal.co.uk/news/students-told-to-ignore-existing-building-survey-reveals-retrofit-teaching-gaps>
- ⁴ Margie Borschke, *This is Not a Remix: Piracy, Authenticity and Popular Music*. (New York, New York: Bloomsbury Academic, 2017), 33
- ⁵ Margie Borschke, *This is Not a Remix: Piracy, Authenticity and Popular Music*. (New York, New York: Bloomsbury Academic, 2017), 68
- ⁶ “250th Birthday”, Bristol Old Vic Theatre, accessed April 10, 2023, <https://bristololdvic.org.uk/archive/250th-birthday>
- ⁷ “King Street Houses”, Bristol Old Vic Theatre, accessed April 10, 2023, <https://bristololdvic.org.uk/archive/king-street-houses>
- ⁸ “Listed Buildings Identification and Extent”, accessed November 6, 2023, <https://historicengland.org.uk/advice/hpg/has/listed-buildings>
- ⁹ “Bristol Old Vic, 2018”, Haworth Tompkins Architects, accessed April 12, 2023, <https://www.haworthtompkins.com/work/bristol-old-vic>
- ¹⁰ “Planning Application Document”, accessed November 7, 2023, <https://pa.bristol.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=MWLTTTDN06900>
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- ¹³ Lucie Fontein, *Knock Knock*. (Lulu Press, 2011), iii
- ¹⁴ Jorge Otero-Pailos, “The Contemporary Stamp of Incompleteness.” *Future anterior* 1, no 2 (2004): iv
- ¹⁵ Jorge Otero-Pailos, “The Contemporary Stamp of Incompleteness.” *Future anterior* 1, no 2 (2004): iv
- ¹⁶ Jorge Otero-Pailos, “The Contemporary Stamp of Incompleteness.” *Future anterior* 1, no 2 (2004): vi
- ¹⁷ Jorge Otero-Pailos, “The Contemporary Stamp of Incompleteness.” *Future anterior* 1, no 2 (2004): vi

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INTEGRATED MULTI-DISCIPLINARY APPROACHES IN HIGHER EDUCATION TO CONCEIVE FUTURE MOBILITY AND TRANSPORT DESIGN PRACTICE IN EXTREME SCENARIOS

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INTRODUCTION

The complexity of contemporary society and mobility imposes the rethinking or adaptation of well-established ways of designing products, services and infrastructures which are no longer effective in supporting or tackling systemic and sustainability provisions or problems. Concurrently, developing experiential learning in this regard is required to adopt novel teaching methods and strategies in higher education, enabling students' effective collaboration and co-creation whilst supporting their design thinking and skills formation.

This paper sets out to critically reflect on collaborative, research-based, and industry-informed integrated approaches to higher education through two distinct, but complementary project case studies, developed respectively at Northumbria University and the Politecnico di Milano. An analysis is provided to illustrate how students approach projects through design (thinking) and innovation methods alongside their developmental skills, which are used to deal with complexity, and propose well thought-out solutions.

The two case studies explore future mobility scenarios where autonomous vehicles (AVs) are enabled by artificial intelligence (AI) to either respond to extreme situations (the first case study) or ensure inclusion and accessibility for impaired users (the second case study).

Key design and educational considerations are derived from an evaluation of how technologies and development methodologies may enable graduates to proactively face the challenges of the fast-evolving transportation design sector.

THE ROLE OF ENVIRONMENT AND TECHNOLOGY IN SHAPING MOBILITY AND EDUCATION

In the field of mobility, the transition towards a 'Net Zero' emissions (NZE) landscape by 2050 is driving crucial decisions in all areas of transportation.¹ For this reason, producing education capable of tangibly considering and applying some of the 17 United Nations (UN) Sustainable Development Goals (SDGs) is becoming increasingly crucial.² The two featured case studies align with the objectives of the SDGs which focus on inclusivity, sustainability, industrial innovation, urban infrastructures, and communities (numbers 3, 4, 9, 11, 12, 13 and 17).

2030 AGENDA FOR SUSTAINABLE DEVELOPMENT. PEACE AND PROSPERITY	
THE 17 GOALS (SDGS)	
1. No Poverty	9. Industry, Innovation and Infrastructure
2. Zero Hunger	10. Reduced Inequalities
3. Good Health and Well-Being	11. Sustainable Cities and Communities
4. Quality Education	12. Responsible Consumption and Production
5. Gender Equality	13. Climate Action
6. Clean Water and Sanitation	14. Life Below Water
7. Affordable and Clean Energy	15. Life on Land
8. Decent Work and Economic Growth	16. Peace, Justice and Strong Institutions
	17. Partnerships for the Goals

Figure 1. United Nations Sustainable Development Goals (adapted from United Nations). Highlighted are the goals considered within the two case studies.

Current transportation design practice does not only focus on the aesthetic elements or appearance of vehicles, but also on the user and the ergonomics-related aspects, which have a direct (or indirect) impact on the usability of mobility products and services. This type of education, often referred to as vocational, is extremely focused on teaching and practicing a very specific skills set – creativity, drawing ability, feel for form, physical and digital model making, graphic presentation techniques – to enable students to develop those capabilities and be competitive in the employment and careers marketplace.³ Nonetheless, conceptual and critical thinking skills must still underpin those other skills and processes.

What clearly emerges is the need, in both the industry and design education, to train university students not only to develop (for instance) vehicle exteriors and interiors, but also to be acquainted with technical developments such as Artificial Intelligence (AI) and disciplines such as service design and interaction design.⁴ Higher education and academic training should prepare students for the complexity of the multifaceted transportation design field, in which industrial practices, Information and Communication Technologies (ICTs), sustainability, and service-related factors become intertwined, generating fast-evolving and socially influencing systems.⁵

The complexity of the mobility and transportation field in this age of technological advancement and social change⁶ requires a more focussed user-centred design approach to avoid inequalities and exclusion.⁷ It also necessitates a more holistic set of project methods which do not strictly revolve around the actual design of (for instance) the respective vehicle right from the outset of the project. In this regard, the ability to work in multi-disciplinary teams is key to undertake all relevant research about trends, user behaviours, travellers' needs, and to subsequently make sense of those findings and insights through the application of design thinking methods.

CASE STUDY 1: FURTHERING MOBILITY FOR TOMORROW'S SOCIETY

The MA/MSc Multi-Disciplinary Innovation (MDI) is a unique programme which enables students from diverse (disciplinary and place of origin) backgrounds to work together on 'live projects', in a simulated agency environment, to address societal, technological, organisational or commercial issues through the application of design-led innovation methods and practice.

Multi-Disciplinary AV + AI Mobility Research Project

The selected design-led innovation project was a 12-week exploration activity that involving six Northumbria University's Multi-Disciplinary Innovation postgraduate taught students (Amarjit Deo, Avanti Sukma, Charlie Richardson, Charlotte Knott, Joe Iacomo, Josh Robson, and Yan Shum) working in a team, alongside academics and industry collaborators (Innovation SuperNetwork, Innovate UK, Creative Fuse North-East, Orange Bus, Urban Foresight, Great Exhibition of the North). The aim was to further mobility for tomorrow's society by exploring future mobility scenarios in which artificial intelligence (AI) could play a crucial role, within a fully autonomous vehicles (AVs) environment, to enhance people's lives.

The MDI cross-disciplinary team was initially tasked to explore smart cities and AI as an initial research task to gain deeper understanding of ICT-enabled city environments (as well as some more rural commuting hinterlands) and a range of self-driving passenger's experiences. This design-thinking informed investigation helped develop insights in both future society trends, personas profiling and e-mobility developments alongside what AI means on a personal user's level, by considering the benefits and risks involved in a social and mobility context.⁸

To understand the role of AI and AV within tomorrow's society in connection with mobility, emerging mega trends such as AI applications, data economy, demographic shift, rapid urbanisation, and mobility futures were also investigated and analysed.⁹

This design-led research approach enabled the student team to define the project aims further, in a clear and focused manner.¹⁰ These were to:

- Explore society's emerging and evolving relationship with mobility.
- Build understanding through personas, workshops, and scenario mapping.
- Propose a new set of user journey scenarios for 2030 and beyond, augmented by AVs and AI to enhance individuals' lifestyles.

Despite the complexity of data and insights gathering, the fundamental user-focussed guiding principles were kept in mind around the use of space, time, and wellbeing. This initial research was instrumental in the mapping and definition of both pain points and areas of opportunity, to design a set of future journeys and user experiences leading to a series of value propositions and recommendations for stakeholders by placing human factors at the centre stage.

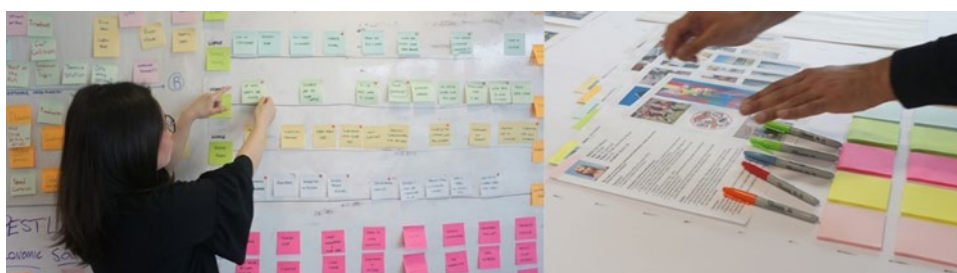


Figure 2. Mapping of research findings and insights.

Considering the extended project timeline, the adopted methodology enabled the team to construct and define a *problem/opportunity space* which then led to the creation of well-thought-out *solution space* outcomes.¹¹

The project was structured in a way that enabled the team to hold several key reviews to share, discuss project progress but also to test concepts and scenarios through co-creative workshops involving academics, industry, and stakeholders in the explorative process.

EXTREME SCENARIOS



Pregnant woman in an AV



Bus crash during rush hour



Peloton on a country road



Border Control

Scenario	Rationale
<i>Pregnant woman in an AV</i>	How should an AV react when placed in a situation where an emergency requires you to drive radically? What affordances need to be in place? How do you inform other road users around you?
<i>Bus crash during rush hour</i>	In a bus crash, how would an AV handle this? Could it connect with the city to talk to other vehicles, or route medics to the situation?
<i>Peloton on a country road</i>	How does an AV navigate a road with a group of cyclists, how does it signal intent and ensure other road users are safe?
<i>Border control</i>	What can an AV do to aid, enable frictionless borders? What data can be handed over and where else could this data be actioned? (ie: car parking, tolls, congestion zones)

Figure 3. Extreme Scenarios Board tested in situational simulations.

This method of enquiry and concurrent scenario development placed the team and other research participants in a more challenging position, to ask first and then seek answers to a set of difficult and uncomfortable questions which related prominently to privacy, passenger safety, legislation, and morality. Co-creative workshops proved to be effective in developing those severe scenarios which were conceived to test users' behaviour, in relation to the AV response in connection with AI and within the surrounding mobility infrastructures and services. To better appreciate this speculative work, some key questions associated to each scenario are captured in the table below.

The mere act of simulating those scenarios in a scaled-down version of a printed city and road environment, using people and vehicles as chess pieces, added an element of gamification to the scenario building exercise. Consequently, the created workshop environment was instrumental in the live discussion of each situation whilst making this activity lively, dynamic and focussed. Some of the main generated ideas which could be also applicable to other scenarios, provide some interesting guidelines to the future application of AVs.

Ideas	Insights
<i>Emergency stop button / Dead man's Handle</i>	A user must be able to stop an AV, either through an emergency stop button or dead man's handle.
<i>Collision mesh</i>	To reinforce safety, a detection zone is needed by default and is able to be commandeered by emergency services to get through traffic.
<i>"Ambulance mode" conversion</i>	A user must be able to convert their AV into an ambulance mode when appropriate and legal to do so.
<i>Retrofit for legacy vehicles</i>	AVs lack anthropomorphised features, and it's hard for legacy vehicles and other road users to read an AV's road intent; a retrofit would help understand intent, and help reduce anxiety.

Figure 4. Ideas generated from reviews and workshops.

The rationale behind those recommendations was based on the conducted workshops talking points in which the following questions were argued first and then identified as being critical to answer.

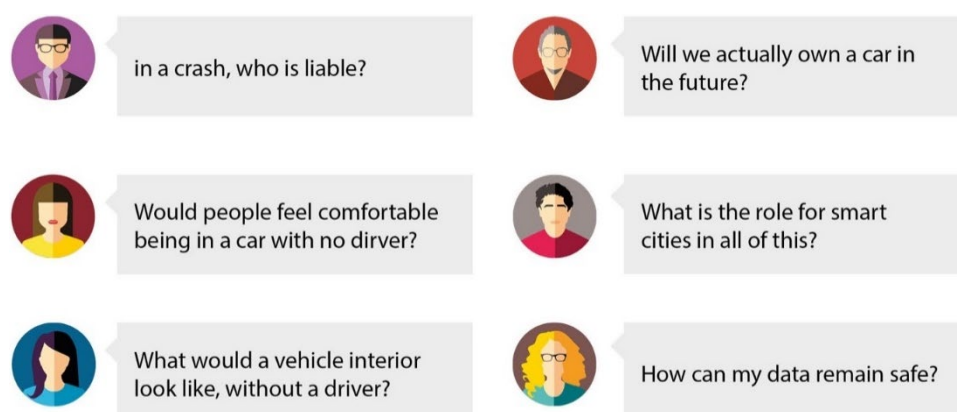


Figure 5. Summary of gathered key insights from workshops converging into concerns of trust.

Value Spaces

This project stage highlighting areas of opportunities within mobility through the adoption of AVs was tackled with the aim of considering positive approaches towards improving users' daily lives. Generating value spaces was instrumental in the way it allowed the team to produce outputs within a defined framework but also provided the necessary flexibility to develop and evaluate ideas without too many constraints apart from those embedded into the brief and research summary.

As the applied scenarios were used to test ideas and concepts, the process used to validate workshop outputs and generate value spaces, once again, enabled the team to concentrate on an investigation where objectivity and intellectual rigour represented fundamental principles of the entire process.

The team identified value propositions situated within two value spaces, namely commuting and emergency services, as spaces where AV and AI can play a role in enabling mobility to improve users' lifestyle.

Project recommendations

The value propositions produced by this project to position future user journeys in an AV environment, aided by the onboard AI, in predefined extreme scenarios were shared and discussed through workshops and presentations. The outcome of those research activities led to the definition of how passengers would experience and behave in inconvenient situations, with the support provided by the AV+AI.

Strategy development, as a final project stage, took place by mapping ideas across a strategic roadmap, which included a delivery timeframe and relevant project stakeholders. This plan was then broken down into a series of specific policy recommendations for governments and city municipalities, alongside another set of recommendations for vehicle manufactures, as concisely and graphically illustrated in the next few pages.



Figure 6. Set of recommended design principles for AV journeys.

Designing new AI-enabled products requires revised or innovative design methods that are transparent in their intent, and opaque to their inner workings, to ensure they are reliable, trustworthy, socially responsible, and ethically sound. Consequently, a range of user-centred design principles have been identified and proposed as an initial guide for any organisation seeking to design a future autonomous journey.

CASE STUDY 2: FURTHERING INCLUSION THROUGH URBAN MOBILITY SOLUTIONS

The Master programme TAD of the Politecnico di Milano has been running since 2008 as a specialising postgraduate taught course managed by the POLI.design¹² consortium. The course aims to provide graduates in Industrial Design, Architecture, and Engineering with a scientifically rigorous

training programme, allowing them to become competent transportation and car designers. This is achieved through:

- Industry-informed practice in collaboration with automotive design partner companies.
- Studio-based activities, which involve fundamental and advanced field-specific design practices carried out both individually and within teams. Such contents focus on the ideation, visualisation, and digital/physical prototyping stages of the design process to mirror most of the typical activities of an OEM Design Center.
- Research and practice-informed studio activities, which are delivered and facilitated by academics and experts from the automotive industry.

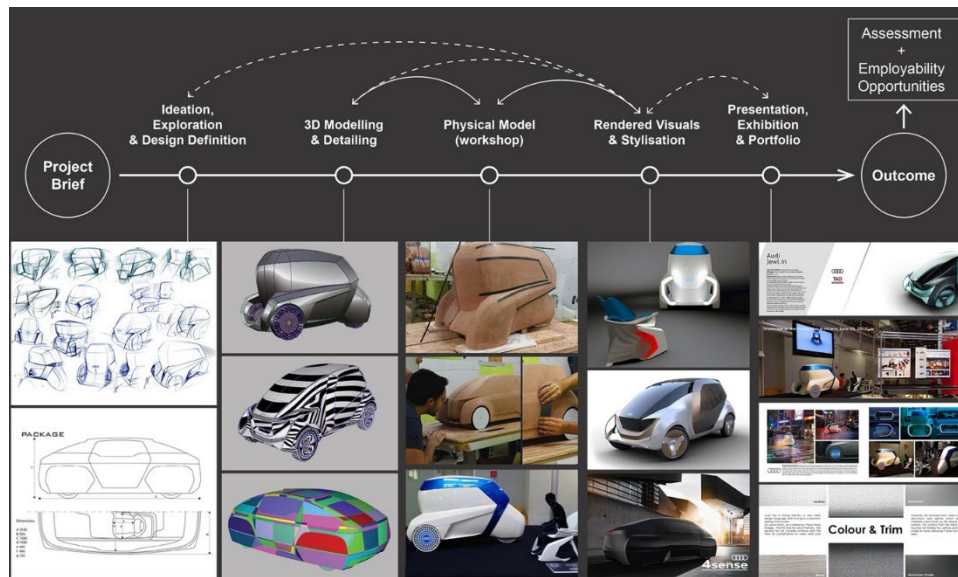


Figure 7. Key activities taking place within the TAD Masters course.

The integrated process applied within this course intends to mimic the field-specific industrial practice, and to train students on the most typical activities that happen within transportation and car manufacturers design centres. For this reason, teaching spatial awareness about complex forms is a key aspect of the course, and students are supported by the multi-disciplinary staff team throughout the process.

In line with the well-established transportation design practice, where multi-disciplinary teams collaborate towards the creation of complex projects, students are required to work in teams and to consider all the required stages that inform the conception, detailing, and communication of their project.

Three projects meeting specific customers' needs

The selected projects have been created in different editions of the TAD Masters; nonetheless, they share a common framework, which is characterised:

- by the collaboration with the same car manufacturing brand – that is Audi.
- by the type of technology – that is electric powertrain and fully autonomous drive.
- by the main goal – that is to address specific needs of people with impairments that reduce their ability to use current vehicles.

4 Senses

The first project is the vehicle which has been developed in 2015-2016 by a three-student team (Fabrizio Buonomo, Giuseppe Romano, Pasquale Smimmo). The name stems from the project aim to address the needs of passengers affected by visual impairments. The goal was to use the opportunities that will be available with fully autonomous vehicles to imagine a car of the not-so-distant future that can provide blind and visually impaired users with mobility opportunities through a specially designed vehicle.

Through several iterations, discussions within the team, and tutor-led design refinements, the concept was developed both in terms of vehicle architecture, interior configuration, and exterior design language with consideration of the end user.

As a result, the exterior features a Braille-based texture, running all around the car, designed to guide the passengers approaching the vehicle and to facilitate their access by guiding them towards the doors.

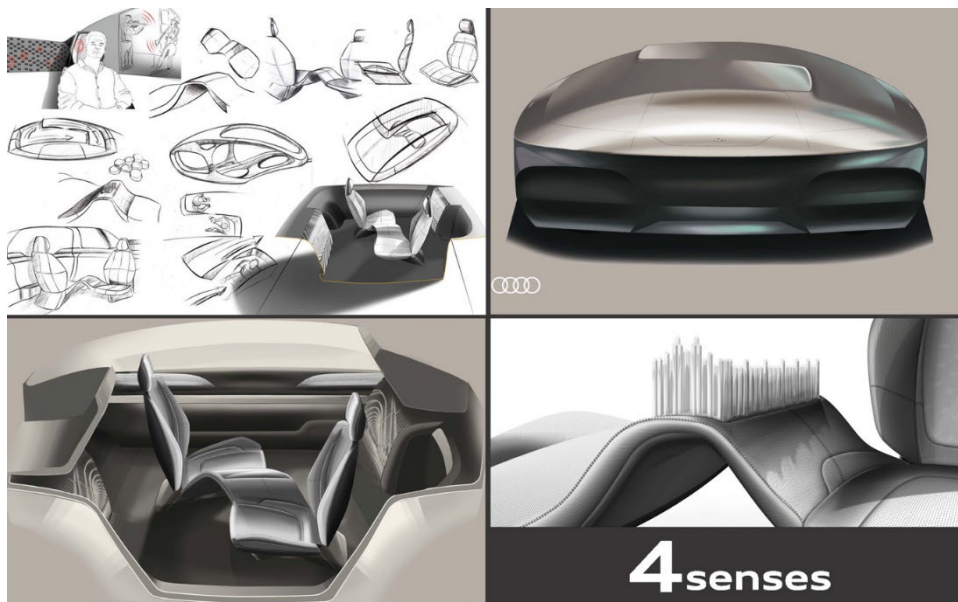


Figure 8. 4 Senses Initial sketches, exterior, interior layout, and tunnel haptic detail.

Given the freedom of interior design resulting from the fact that it is a full AV, the central idea was to design with the importance of touch in mind to enable blind people to feel, understand and perceive their surroundings. Based on this guiding theme, the interior of the vehicle was designed around two opposing seats with a central interactive tunnel, as this seating configuration allows passengers to have more direct frontal physical contact and better voice communication while providing easy access space for a service dog and luggage. The central tunnel reimagined the user interface as a haptic system that could also provide additional key information about the surroundings.

Audi_IN

This project was developed in 2017-18 by a four-student team (Daniel C. Busima Wamono, Edoardo Capi, Turgut A. Tutumlu, Ruhollah Kashfi Seyed). The name stems from the idea of comfortably entering the vehicle with a dedicated and purpose-built wheelchair. The goal of this project was to enhance the vehicle's flexibility, and to meet the needs of passengers with mobility impairments who need to use a wheelchair.

The result of the project is a dual vehicle concept: a self-driving car that can accommodate a wheelchair in a completely rethought way in which the user will no longer need to move from the wheelchair to the car and back. At the same time, the wheelchair can serve also as a last-mile mobility vehicle. The functional key element of the design is the front access point, which allows the user to comfortably both enter and exit the vehicle.



Figure 9. Vehicle's exterior and interior design, with integration of personal mobility device.

A secondary objective of this project was to address the negative preconceptions linked to a personal mobility device. It follows that the custom-designed wheelchair had been shaped as a customised personal mobility device but also as a sleek and smart product, able to address the current social stigma connected with such type of devices.

Jewl.in

This project was developed in 2017-18 by a three-student team (Gianluca Raciti, Giancarlo Temin, Esteban Wittinghan Quiñones). The name stems from the values of the project which intended to provide customers with a design which offers a support for mobility to elders giving them some status symbol-related design features at the same time. The proposed vehicle was designed for mature and elderly users – possibly travelling with children – and considered physical limitations that may impact their movements.

A special focus was dedicated to the design of side doors and main seats to reach a comfortable solution able to be easy to access and being perceived as a luxury item. The key choice was to redesign a 2+2 seating configuration in which the two main seats are located at the rear side of the vehicle, while the two front seats are dedicated to younger and more agile passengers.

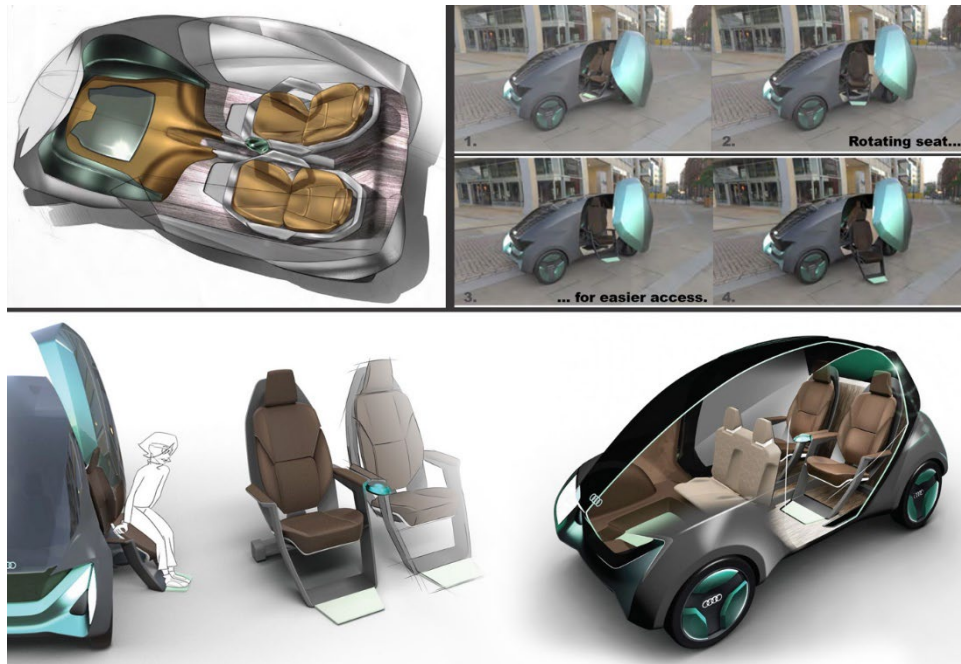


Figure 10. Design solutions facilitating the access to the vehicle.

CONCLUSION

The case studies presented above offer two distinct and different pedagogic, research and design approaches to mobility. As the first case study (from Northumbria University) was developed by team members from various backgrounds and not just design, more emphasis was placed on research and design-led innovation practice to produce coherent design proposals which do not rely particularly on vehicle aesthetics or other traditional transportation design skills. In the second case study (from the Politecnico di Milano) the situation is partly reversed as the proposed design work was executed to an elevated level of professionalism in terms of vehicle design development and presentation skills but, was also the outcome of an investigation where user needs were considered throughout the whole process.

The two different postgraduate taught courses and embedded approaches offer a wealth of interesting, valid considerations and lessons to be learnt in the area of future mobility and transport design education. First, to create ground-breaking solutions, the traditional subjective vehicle designer's mindset should be challenged through multi-disciplinary approaches to research. This would contribute to a more holistic analysis of specific issues or opportunities as well as the creation of credible design scenarios, which would better inform the ideation process, and lead to a deeper understanding of current and future mobility needs.

Junior designers in the field of transportation design should be trained to become mobility strategists, especially if they show a particular interest and ability in this subject matter. In addition, the integration of real-world professional practice within the learning experience is crucial to address the key teaching areas of brand values, concept ideation, user needs, CAD/physical modelling and visual presentation.

Passion and purpose should go hand in hand towards innovation practice, as long as design thinking and objective approaches are duly applied. A preliminary investigation about contemporary and future societal, user and industrial needs is necessary to achieve genuinely good and purposeful design. Especially for postgraduate taught courses, action research is needed to inform the core values of each

project and to answer some topical questions prior to the aesthetic approach to design. This will allow students to achieve inclusivity and empathy towards users and relevant stakeholders.

Effective mobility solutions should be informed by real-world challenges relevant to the UN SDGs, which identify a variety of challenging global and national local issues. Disruptive proposals should embed ground-breaking technologies, such as AI applied to AVs, alongside sustainability-related design principles such as Net Zero, and a deep understanding of target users.

It is worth pointing out that mono-disciplinary approaches can be quite limiting. To embrace and propose meaningful change in an increasingly complex world, including mobility, an interdisciplinary approach towards investigation and development is necessary alongside a solid design skill set. In this respect, higher education has a key role to provide students with a solid and practice-informed skill set, alongside real-world experience that will be essential in their future as specialised and yet also laterally thinking professionals.

NOTES

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TOWARDS A PROCESS-BASED MODEL THAT INCORPORATES PROFESSIONAL PRACTICE IN THE TEACHING OF ARCHITECTURAL DESIGN, WITH REFERENCE TO DESIGN STUDIO SIX

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INTRODUCTION

The training of students in the design studio differs from professional practice as it eliminates important issues when focusing on solving hypothetical problems instead of articulating real and pragmatic architectural problems.¹ Despite the changes occurring in the professional practice, the education of architectural students in schools is focusing on educational models which have grown more and more distant from the demands of the professional practice.² There is no direct link with professional practice in the design studio as students interact mainly with other students and teachers at school in addition to rarely performing joint activities with real professionals.³ According to some research, students experience both physical and formative isolation leading to a distorted perception of professional reality.⁴ The Design Studio's model architect has certain limitations that need to be addressed as they hinder the training of students to meet current professional requirements.⁵ One of these limitations is that it eliminates important issues when focusing on solving hypothetical problems. Instead of expressing practical and realistic architectural issues.⁶ Architectural schools with awareness of these mentioned problems are working on developing new strategies in the teaching of the design studios to enhance their education system.⁷

In late architectural design studios, particular attention should be paid to the necessity that the students be introduced and exposed to the needs and nature of the professional practice. The academic staff makes efforts to prepare project guidelines for each design studio each semester. Most of the design studio projects' outlines are hypothetical and do not necessarily reflect real challenges and needs in professional practice. Consequently, students work hard throughout the whole semester to fulfill the project requirements, and instructors make great efforts in guiding and helping them.

Architectural competitions have a dual educational purpose of merging theoretical knowledge with professional practical experience for both engineering and architectural students.⁸ Angela Brady, RIBA President 2011 – 2013, states that architectural competitions are a successful procurement model that improves the quality of architectural buildings and projects, spurs creativity and innovation, and generates a variety of ideas that expand options.⁹ Moreover, these competitions serve

as intellectual gatherings that enhance self-learning, inspire creativity, and promote skill development through investigation and competition, thereby enhancing knowledge.¹⁰

The present study aims at developing a process-based approach to teaching advanced design courses while referring to professional practice in an attempt to respond to the aforementioned challenges. This method replaces the hypothetical project outline of the design studio with an international competition, defined by leaders in the professional practice, that suits the main purpose of the design studio, its learning outcomes, and the semester timeframe. In the belief that Design, in general, is a competition, this method introduces students to international prestigious competitions and a systematic design process that they can pursue in their future professional lives. This method also motivates the students and widens their perspective by exposing them to the idea of competing with international students instead of competing with one another. In this study, the course outline of Architectural Design 6 in the Future University in Egypt (FUE) is replaced by the outline of the Fentress Global Challenge competition by Fentress Architects. The proposed method is divided into three phases. The first phase involves the staff members of the design studio. The second phase involves both staff members and the students. Both phases took place in 2018. The third phase involves the staff, researchers and the students in a questionnaire to investigate the student's perspective of the course after graduation (took place in 2013).

This model has been applied and developed in the fall, of 2018 in 'Architectural Design Six' in the Department of Architectural Engineering, FUE. FUE students undertake 'Design Six' in their eighth academic semester where only two design courses are left to graduation, namely "design seven", and "graduation project". This design studio was chosen to represent an advanced design studio course. The course lecturer is a practitioner with several years of experience in the professional practice field. 'Design Six' aims at enhancing the awareness of students of architectural futuristic visions and their impacts on society, state-of-the-art technologies, materials, and systems. In addition to enhancing students' imagination. Students are asked to propose different projects that demonstrate different visions of futuristic architecture. Many futuristic concepts are introduced to them in an attempt to provide guidance and clarification of the required project. Examples of these futuristic concepts are "hyper architecture", "designing in server environments", 'vertical cities', 'biomimicry in architecture', 'responsive architecture', and 'virtual architecture'. Students are assigned projects similar to the magnitude of the following projects: a virtual museum, a floating city, an intelligent responsive house, and other similar projects. This magnitude is thought to suit their advanced level.

For 'Architectural Design Six', Fentress Global Challenge 2018/2019 competitions were chosen to substitute the course project guideline. Fentress Global Challenge is an annual competition by Fentress Architects. Fentress Architects is a global design firm that has five branches in the United States located in Denver, Washington, D.C., San Francisco, CA, Los Angeles, CA, and Houston, TX. The firm pursues with passion the creation of sustainable and iconic architecture. Their main intention is to work together with their clients to create inspired architecture to improve the human environment.¹¹

The duration of the academic semester is sixteen weeks. Two lecture hours and six tutorials are conducted every week, where in this case, both lecture and tutorial hours were conducted weekly on a single day. The Facilities used for teaching and learning are design Studios, drawing Boards, and Presentation Boards. library, computer data show projector, and an internet connection for students and staff to surf the internet using their laptops. The number of students was six, with one doctor and one teaching assistant.

The proposed process

The proposed method is divided into three phases in which the first phase involves the course staff, the second phase involves the course staff and the students, and the third phase involves the course instructors, researchers, and the students. Figure 1 shows the developed method.

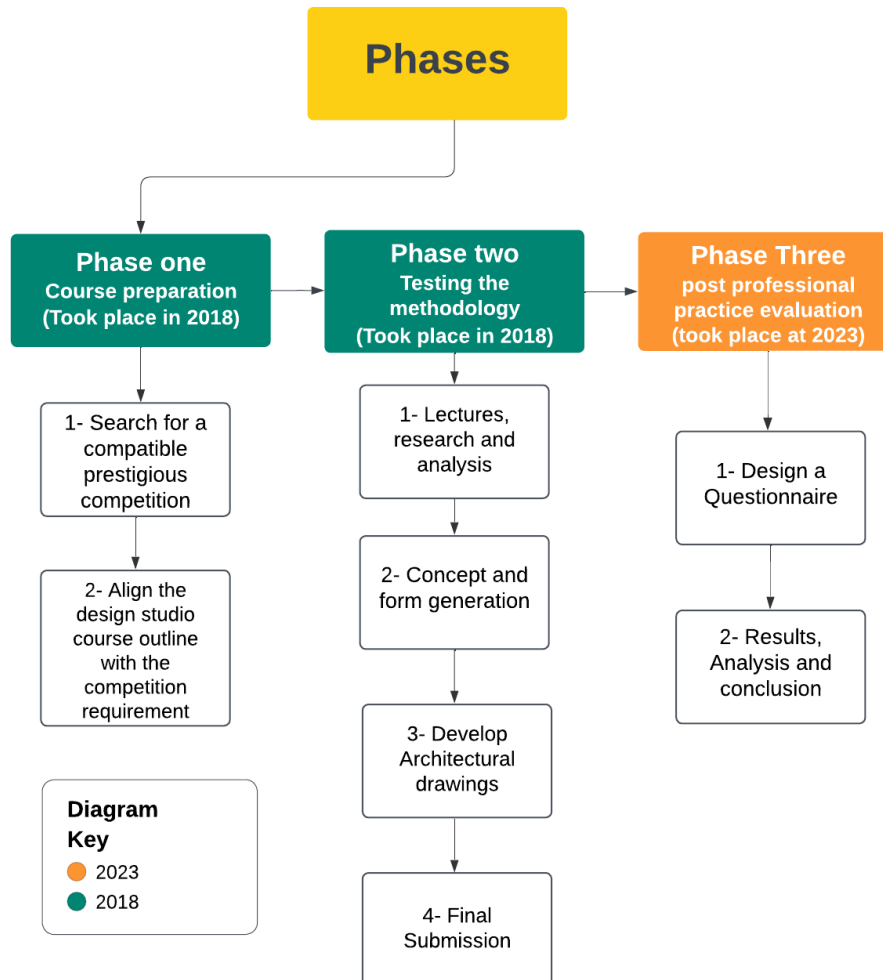


Figure 1. Shows the three phases of this study.

Phase One

The first phase took place in 2018 before the start of the academic semester. This phase involves the instructors of the design studio and the department council. It aims at incorporating the academic course specifications of the chosen design studio with an equivalent competition. The first step is to search for an international competition that suits the intended learning outcomes (ILOs) available in the course specifications and the strict academic timeframes. This step is challenging due to the difficulty of finding a competition that starts at the beginning of the semester and remains open till the end of the semester while having the same theme and scale of project required in the design studio.

Step I: Searching for a compatible prestigious competition

The first step is to study the course description including ILOs to be able to choose an appropriate competition proposed by a professional practice body with a high profile. Architectural competitions are crucial in both professional and academic settings, as they have been utilized throughout history to

generate innovative solutions and unconventional building designs that promote creativity, resulting in the creation of superior designs and the introduction of new trends that enhance the built environment's development and advancement.¹²

The 'Architectural design studio six' course is mainly concerned with the future of architecture. The intended learning outcomes of the course are divided into four parts. The first part is concerned with enhancing the knowledge and understanding of the students as they will have the ability to deal with complex multi-functional design projects on a large scale, identify different architectural functions and circulation patterns, and identify appropriate form and structure systems for different functions within the project. The second part is concerned with intellectual skills as by the end of the course the student should be able to deconstruct the multipurpose complicated projects into simpler parts that are interrelated to each other's and could be managed easily, in addition to comparing different design objectives and working on them according to their priorities. Analyze urban sites, environmental contexts, and features. The third part is concerned with the professional and practical skills where it is to ensure that students are capable of developing a design program that meets different multifunctional aspects of a given project, in addition to transforming this complex program into an appropriate architectural form with a proper structural system. Also, ensure their ability to produce and present their design projects with the appropriate manual and digital tools. In addition, enhance their ability of understanding and criticize similar projects of their colleagues. The fourth part is regarded as the general and transferable skills, where students will be able to develop teamwork and cooperative skills, communicate effectively, and to be able to meet deadlines of submission where they are managing tasks and resources.

After an adequate search, Fentress Global Challenge was chosen because it is proposed by a prestigious architectural design firm. In addition, its main theme aligns perfectly with the main theme of design studio 6 which is 'futuristic architecture'. It also has no restrictions concerning the validation and accreditation of participating students. As FUE is a private Egyptian university that is not accredited by any international bodies such as RIBA, NAAB, or UIA. Moreover, its time frame was well suited to the academic time frame as the call is annual and the submission is in July and the semester ends at FUE in June. Furthermore, it has no fees which is one of the choice criteria to ease the process of submission as the students will not have money as a constraint if they wish to submit their project.

Step II: Align the design studio course outline with the competition requirements and format

To meet the competition requirements without missing any of the course intentions, the competition outline was adjusted. For example, the number of boards was kept the same with the same proportions while adjusting the size only to a greater one. This allows the student to easily adjust the size of boards after finishing the course and make minor edits to submit to the competition. The purpose is to ease the submission process as students will not have enough energy after the end of the semester to make major edits.

Another example is that the competition offers various airport terminals to the competitors to choose from. Since all airports are located in different countries, there was an intention of limiting the selection to just one case study to help students focus and understand a complex problem outside their context. The research was conducted by the instructors before the start of the semester that investigated different airports to select only one of them. Heathrow Airport was chosen as the case study among different terminals.

Phase Two

This phase introduces an international competition proposed by high profile practitioners to the students. This phase aims at exposing students to real world challenges in addition to direct them to explore previous winning projects by international students. This helps in changing the perspective of students from competing with one another to competing on an international level, thus helps elevate their performance to a higher quality. A schedule of the second phases is presented in Table 1.

Weeks/ Dates	Lectures	Tutorials	Grades
Week1 22/09/2018	<ul style="list-style-type: none"> Course orientation, and lectures that include presentations for futuristic architecture design and airport terminals precedents. In addition to the work of previous winners in Fentress Global Challenge competition. 	<ul style="list-style-type: none"> Undertake research that includes the studying and presentation of three precedents. This stage included a visit to the university library in the tutorial hours. 	0
Week 2 29/09/2018	<ul style="list-style-type: none"> Submission and oral presentation of the research. Developing the futuristic concepts' themes and first draft for the site analysis and zoning. 		2.5
Week 3 6/10/2018	<ul style="list-style-type: none"> Vacation 		
Week 5 20/10/2018	<ul style="list-style-type: none"> Submit airport architectural program including areas in addition to studying the existing terminal airport and determine the land area. Present the selected airport terminal in London Heathrow airport and the justification of the choice (terminals' history+ year of demolition + current situation + contextual analysis + climate analysis + how does it affect the city and how is it affected by the city). Site analysis and regulations of London Heathrow airport. Concept theme, studies, and the Study model with an appropriate scale. Site analysis of a futuristic city. 		5
Week 6 27/10/2018	Midterm: project submission	Final submission for the Concept theme, site analysis and justifications, study model and the layout.	15
Week 7 03/11/2018	Ground floor plan, masterplan, Landscape and site plans in addition to a full detailed program and zoning		
Week 8 10/11/2018	Project architectural drawings (All plans + section and elevation)		
Week 9 17/11/2018	Project drawings (All plans + section and elevation)		
Week 10 24/11/2018	2 nd Mid-Term Exam: project submission (All previous requirements in addition to a detailed digital model and other sections and elevations).		10
Week 11 01/12/2018	<ul style="list-style-type: none"> Boards that include all previous requirements. 		<ul style="list-style-type: none"> .5
Week 12 08/12/2018	<ul style="list-style-type: none"> Rendered projects 		<ul style="list-style-type: none"> .5 bonus
Week 13 15/12/2018	Pre-Final Submission of the project.		<ul style="list-style-type: none"> 0
Week 14 22/12/2018	<ul style="list-style-type: none"> Beginning of the Final Exams at the University. 		<ul style="list-style-type: none">
Week 15	Course final exam	<ul style="list-style-type: none"> Follow up of the final project 	<ul style="list-style-type: none"> 0
Week 16 29/12/2018	Final Submission of the Project		<ul style="list-style-type: none"> 5

Table 1. Schedule of the semester (Phase Two)

Step I: Lectures and research.

At the beginning of the course, the lecturer, who is also an experienced practitioner, presented examples of precedents to the students that include the work of pioneer architects along with winners in prestigious competitions. The main focus was to show students the theories and concepts used and applied in professional practice by high-profile architects.

Engaging in small-group problem-solving exercises facilitates the development of multiple solutions to a single problem, and fosters collaborative learning, negotiation, and collective decision-making among students, while also offering them a chance to receive analytical feedback on their work and tackle challenges in a supportive yet critical setting.¹³ In this stage, students were asked to divide themselves into groups out of two to undertake research that includes collecting data about the selected site. Despite that the competition includes many sites to choose from, London Heathrow Airport was selected for students to focus on gathering data and be able to help each other's to understand a complicated case study.

Step II: preliminary, developed and final submission of the project

This stage includes the development of the project from the initial stage (concept and preliminary sketches) to the final architectural drawings. First, students were asked to develop their projects' program and land area using airport terminals' precedents (previous projects designed by pioneer architects). These precedents included futuristic approaches. This stage also considers the site analysis and regulations of London Heathre airport. Second, 3-d study model with appropriate scale was required along with detailed program and bubble diagram. Finally, architectural drawings including Ground floor, Masterplan, typical floor plans, Landscape and site plans, sections and elevations were required. All these stages included communication of outputs through presentations in studios.

Phase Three

The third phase relies on testing the applicability and feasibility of the proposed model. It occurred after five years of course completion to assure that the results are accurate and relevant to real professional practice experience. Previous research evaluated educational models through several methods such as observation and questionnaire.¹⁴ The third phase includes two steps, designing the questionnaire, and then collecting and analyzing the results. The questionnaire consists of five sets of questions (see Table 2). The first is demographic to identify respondents' age, gender, graduation semester, current position and working place, previous position and workplace, and years of experience. The second assures student enrollment in both the academic course and the professional practice competition. Additionally, it identifies the reason behind not submitting a student's project to the competition (if this happened). The third set of questions tested students' perceptions regarding integrating professional practice competitions into the academic curriculum. The fourth set gathers the student feedback concerning the overall experience during the academic semester. The fifth set collects students' feedback after getting involved in the professional practice field.

<p>Dear</p> <p>We are a research group from Future University in Egypt (FUE). We are currently conducting academic research on “Towards a Process-based Model that Incorporates Professional Practice (PP) in the Teaching of Architectural Design, with Reference to Design Studio Six.” This research is conducted based on the experience of involving the Fentress Global Challenge 2018 2019 competitions within the curriculum of the Architectural Design 6 course in Fall 2018. As a registered student in this above-mentioned course, We are inviting you to participate in this research study by completing this questionnaire. The following questionnaire will require approximately less than 5 minutes to complete. There is no compensation for responding, nor is there any known risk. These survey answers will only be used for study purposes to ensure that all information remains confidential. If you choose to participate in this project, please answer all questions honestly.</p> <p>Thank you for taking the time to assist us in our educational endeavors. The data collected will provide helpful information regarding the study.</p> <p>Yours</p> <p>Research Team</p>	<p>Respondent,</p> <p>sincerely,</p>				
<p>Demographic Data</p> <ul style="list-style-type: none"> • Name (optional) • Age • Gender • Graduation Time (Please answer as this example: (Fall 2019, Spring 2020, Summer 2020...etc) • Current Position • Current working place • Previous Positions • Previous Workplaces • Years of experience in professional practice (1-2 years – 3-4 years – 5-6 years – more than six years – if the student started working while studying). 					
<p>Course and Competition Enrollment</p> <p>Question 1: Did you register Architectural Design 6 course in the Fall 2018 semester?</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Yes</td> <td style="width: 50%; text-align: center;">No</td> </tr> </table>		Yes	No		
Yes	No				
<p>Question 2: Did you pass the course?</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Yes</td> <td style="width: 50%; text-align: center;">No</td> </tr> </table>		Yes	No		
Yes	No				
<p>Question 3: If yes please select your grade group, knowing the fact that each grade group includes all subdivisions of grades eg. A grade group includes A+, A, and A- Grades.</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">A</td> <td style="width: 25%; text-align: center;">B</td> <td style="width: 25%; text-align: center;">C</td> <td style="width: 25%; text-align: center;">D</td> </tr> </table>		A	B	C	D
A	B	C	D		
<p>Question 4: Did you submit your final project to Fentress Global Challenge 2018 2019 competitions platform?</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Yes</td> <td style="width: 50%; text-align: center;">No</td> </tr> </table>		Yes	No		
Yes	No				
<p>Question 5: If you didn't please specify the reason:</p> <ul style="list-style-type: none"> • I didn't find enough encouragement from the staff. • I was not interested. • I didn't think that my project may be able to compete. • Others (Please mention). 					
<p>Students' perception regarding integrating PP competitions into the academic curriculum Question 6: I noticed advanced experience in this course when compared to other regular courses.</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">4 Strongly Agree</td> <td style="width: 25%; text-align: center;">3 Agree</td> <td style="width: 25%; text-align: center;">2 Disagree</td> <td style="width: 25%; text-align: center;">1 Strongly Disagree</td> </tr> </table>		4 Strongly Agree	3 Agree	2 Disagree	1 Strongly Disagree
4 Strongly Agree	3 Agree	2 Disagree	1 Strongly Disagree		
<p>Question 7: The staff members helped me to understand competition regulations.</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">4 Strongly Agree</td> <td style="width: 25%; text-align: center;">3 Agree</td> <td style="width: 25%; text-align: center;">2 Disagree</td> <td style="width: 25%; text-align: center;">1 Strongly Disagree</td> </tr> </table>		4 Strongly Agree	3 Agree	2 Disagree	1 Strongly Disagree
4 Strongly Agree	3 Agree	2 Disagree	1 Strongly Disagree		
<p>Students' feedback for the whole experience</p> <p>Question 8: Did you face any technical problems when you were inrollment in Architectural Design 6?</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Yes</td> <td style="width: 50%; text-align: center;">No</td> </tr> </table>		Yes	No		
Yes	No				
<p>Question 9: If yes please mention:</p>					
<p>_____</p>					
<p>Students' feedback after getting involved in the professional practice filed</p> <p>Question 10: After getting involved in professional experience, I can deal with real design problems because of this course.</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">4 Strongly Agree</td> <td style="width: 25%; text-align: center;">3 Agree</td> <td style="width: 25%; text-align: center;">2 Disagree</td> <td style="width: 25%; text-align: center;">1 Strongly Disagree</td> </tr> </table>		4 Strongly Agree	3 Agree	2 Disagree	1 Strongly Disagree
4 Strongly Agree	3 Agree	2 Disagree	1 Strongly Disagree		
<p>Question 11: Please mention any professional experience/benefit that you gained from working according to competition regulations (if there any)</p>					

Table 2. Questionnaire (Phase three)

The responses were collected between May and August 2023. 75% of enrolled students responded to the questionnaire. Regarding respondents' demographic data, gender statistics were 75% male and 25% female. 50% of the respondents were aged twenty-seven while the remaining percentage were

aged twenty-six and twenty-eight equally. The respondents' graduation status was 50% graduated in Spring 2020, 25% graduated in Summer 2020 and 25% will graduate in Fall 2023 (the delay in graduation happened due to medical issues). 75% of respondents are obtaining professional practice positions which are related directly to the scope of the competition. The respondents' experiences vary between three to four years (50%) and one to two years of experience (50%). Referring to the completion of the course; 75% of respondents passed the course while 25% withdrew the course due to medical issues. The respondents assured that there were no critical changes in their grades in the architectural design 6 course compared to the previous-registered design courses. Which negates the negative impact of the proposed model on the student's academic progress. 25% of the students submitted their projects to the competition. Most students (75%) mentioned that the reasons behind not submitting their projects to the competition were busyness with exams and lack of interest. Referring to respondents' perception regarding integrating professional practice competitions into the academic curriculum, 75% of respondents assured the positive impact of this integration on the facilitation of the course. Furthermore, they ensured that they managed to facilitate real design problems in the professional practice based on the experience they gained from the application of the proposed model in "design studio 6". Moreover, the respondents listed their gained experience from the application of this model as dealing with the requirements of international competition, creative thinking in terms of futuristic approaches, taking design decisions based on on-site analysis, and involving design solutions that enhance the sustainability factor. Figure 2 (left side) represents the relation between graduates' current professional practice experience, years of experience, and their evaluation of the proposed model (after getting involved in the professional practice life). As represented in Figure 2, most graduates ensure the proposed model's positive impact on their professional practice life. Moreover, Figure 2 (right side) demonstrates the status of the competition's submission whereas 25% of respondents submitted their projects to the competition. Finally, the questionnaire investigated the trends of future research from the respondents' perspective. The respondents suggested applying slight improvements to the design process in terms of the quality of deliverables and evaluation.

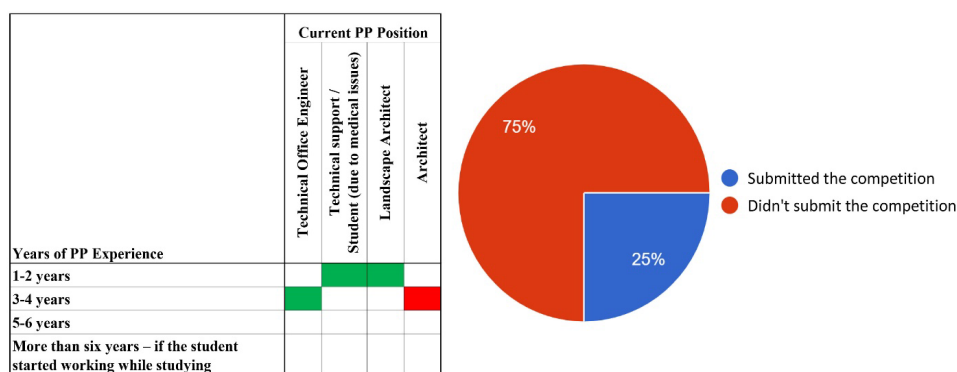


Figure 2. Left: The correlation between the graduate's current PP position, years of experience, and the impact of the proposed model on their PP experience (Whereas: The green filling refers to the positive impact, and the red filling refers to the neutral impact on the PP experience; PP: Professional Practice) – Right: the status of competition's submission

CONCLUSION

In response to the gap between theory and practice, a process-based model for teaching 'Architectural Design 6' was proposed in this study. The model aimed at replacing the hypothetical designed course outline with competition from professional practice. To achieve this, three project-based phases were employed. The first one involves the instructors only before the semester starts. The second one involves instructors and students during the semester. Afterward, (with a time gap of five years to assure the accuracy of the results) a post-professional practice evaluation phase was implemented to validate the feasibility of the proposed model. The major results of this research demonstrated that the proposed model succeeded to eliminate the gap between academia and professional practice. Moreover, it had major positive impact on the student practical life.

Future studies may investigate the possibility of forming groups of students/students and staff members to upscale the percentage of the submitted projects to the targeted competition. Furthermore, Future studies may also consider testing the same proposed model in a regular semester with a sufficient number of students to reach more accurate results.

NOTES

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A SHIFT IN TEACHING ARCHITECTURAL DESIGN STUDIO: ADAPTATIVE REUSE AND RETROFIT AS THE MAIN FOCUS TO PREPARE STUDENTS FOR COMPLEX CHALLENGES OF A CHANGING PROFESSION

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INTRODUCTION

In 2007, Carl Elefante declared, “The greenest building is... one that is already built.”¹ In recent years, sustainability in architecture has focused on understanding and leveraging the potential of the existing built environment. This trend was further reinforced in 2021 when Lacaton & Vassal were awarded the Architecture Pritzker Prize. Their design philosophy is rooted in the mantra of “Never demolish, never remove or replace, always add, transform, and reuse!”² Given the significant paradigm shift in the profession, it becomes imperative to adjust our teaching to equip students with specific tools to navigate this complex scenario. Re-use and retrofit are never an easy task, and the constraints the existing building generates are an expression of the complex changing world. Since 2018, an interdisciplinary research and teaching group comprising academics and professionals based at the University of Hertfordshire has comprehensively explored the topic to help students to improve and decode the world while preserving cultural value.

REUSE AND RETROFIT, A CONTEXTUALISED ANALYSIS

Adaptive reuse and retrofitting have roots in the history of architecture, where updating an existing building was a common practice that did not require differentiation from the usual design process. On certain occasions, particularly for significant or religious structures, building atop of an existing one was an opportunity to reassert the importance of a particular location for a community, city, or site at large. One notable example is the Syracuse Cathedral in Sicily, an exceptional display of “successful harmonisation of so many dissimilar elements into a perfected work of art”³, a Greek temple embedded within a Christian edifice, re-designed throughout the centuries. In its present form, the structure retains the DNA of every era: a magnificent emblem of the site’s long history.⁴ In other cases, the practice of adaptive reuse has extended beyond reappropriation of building remains. The study by Carlos Marti Aris on Hagia Sophia in Constantinople (360-537 AC) is particularly fascinating in comprehending how reuse has been instrumental in generating new architectural forms: a structure that blends and reuses two of the principal Roman typologies of the Massenzio’s Basilica and the Pantheon, giving rise to a new central-plan church typology. This typology ultimately established itself in Constantinople and became the model for Ottoman mosques designed by Mimar

Sinan at the zenith of the Ottoman Empire.⁵ In other cases, the process of reuse was more direct, focused on material reuse, whereby abandoned buildings were stripped down to reuse their construction materials for building new structures. In all of these cases, the reuse was driven either by the very meaning of it or by the convenience of reusing something that was already in place, be it a building or its materials, rather than building anew.

Nowadays, the catalyst for us to prioritize reuse after a long period where new construction was considered more expedient and convenient is the urgent need to address climate change: we can no longer afford to generate more waste, and we must make more prudent use of our resources to preserve our planet and ourselves. As professionals, architects have been at the forefront of this issue. In 1974, Alex Gordon, the president of the RIBA, emphasized the importance of designing buildings with the principle of “Long life, loose fit, low energy.” More recently, in 2007, Carl Elefante (who would later become the president of AIA in 2017) stated that “The greenest building is... one that is already built.”⁶

In her book “Building for Change – The Architecture of Creative Reuse” (2022) Ruth Lang further highlighted that, according to the UN's net zero carbon emissions target, 80% of the buildings that will exist in 2050 have already been built.⁷ Lang's statement is in line with the 2017 UK Green Building Council report: 80% of the UK building stock by 2050 already exists, and 34% of the UK's carbon emissions will be caused by the operational energy of existing buildings.⁸ Further, the World Resource Institute⁹ concludes that retrofitting buildings offer the most significant opportunity for the reduction of emissions at a ‘lower’ cost. Taken together, these suggest that retrofitting buildings to increase energy efficiency plays a critical role towards reducing the carbon footprint and achieving net zero targets by 2050.

There are other significant benefits to extending the lifespan of existing buildings: the embodied carbon of a brand-new building can be equivalent to the operational carbon emissions from the building for the next 20 years. Considering the increased performance of new builds, this ratio could double to 40 years.¹⁰ This would suggest that if net zero is to be achieved by 2050, retrofitting the existing stock has a much greater impact than new construction being energy efficient.

While industry must adapt to meet market needs, at the same time, architectural education needs to adapt to meet the realities of the profession shift associated with the climate emergency and to better equip students with skills relevant to contemporary practice.¹¹

The curriculum should be structured to be adaptive, evolving and aligned to industry to address present and future challenges. Collaboration between industry and academia would yield significant growth in developing effective climate-responsive strategies.¹² In this context, RIBA's “The Way Ahead” new Education and Professional Development Framework set out the climate emergency as a new direction for the whole sector. On the other hand, other initiatives leverage collaboration to foster retrofitting practices via a bottom-up approach. London Energy Transformation Initiative (LETI),¹³ a network of built environment professionals founded in 2017, has made significant contributions by raising awareness of the urgency of retrofitting existing buildings, formulating practical guidance and advocating for changes to building regulations and standards to support sustainable practices.¹⁴ Likewise, the UK-based Architects Climate Action Network (ACAN), founded in 2019, aims to take collective action against the climate and ecological crisis and has had a significant impact on architecture education,¹⁵ alongside its student arm Students Climate Action Network (StuCAN).

To emphasize the increasing significance of retrofitting, the prestigious Pritzker Prize, awarded to architects who profoundly influence the field through their designs, was presented in 2021 to Anna Lacaton and Jean-Philippe Vassal. Their guiding principle of “Never demolish, never remove or replace, always add, transform, and reuse!”¹⁶ and their incorporation of adaptive reuse as a fundamental element have shaped both their architectural approach and manifesto.

TEACHING STRUCTURE AND MODULE CROSS-CONNECTIONS

The semester-long Integrated Design Studio, designed for Year 3 students in the BA (Hons) Architecture programme, comprises two modules: Final Project Studio (FP) and Advanced Design Skills (ADS). While FP forms the backbone of Year 3, ADS provides a comprehensive understanding of Sustainability, Technology, and Professional aspects of design. Throughout the first semester, students will develop crucial awareness and reuse skills pertinent to the built environment, which are highly relevant to their future careers.

Given the brief duration of this studio and the students' initial exposure to the topic, it is imperative to ensure that they receive a comprehensive understanding. To achieve this, students engage in team-based learning during the ADS module, in which they collaborate as design teams of four individuals to develop different design solutions to analyse the strengths and weaknesses of each solution collectively. Meanwhile, in the FP module, students work independently on their design resolution.

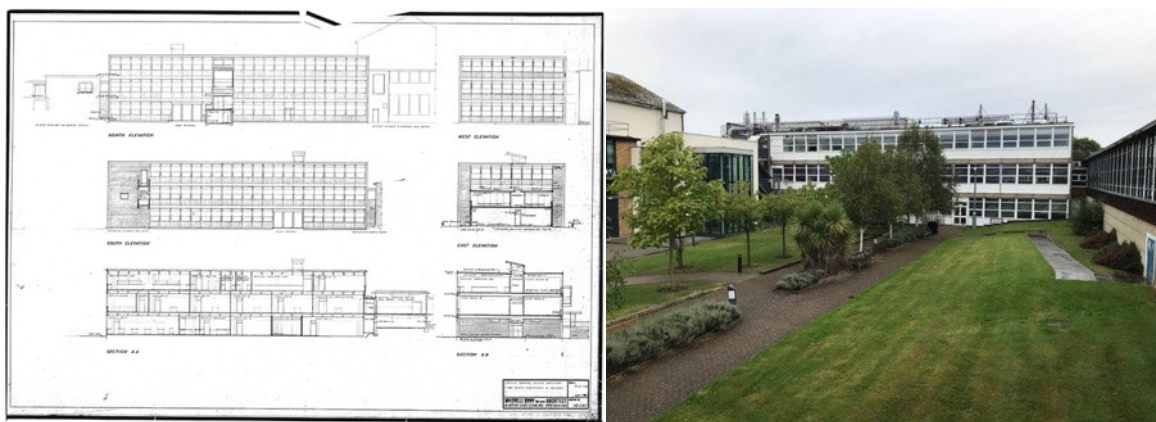


Figure 1. Old Science Block: original drawings from 1958 and its current state

The building assigned to students is a simple 3-storey 1958 concrete structure measuring 17 x 42 meters and 10.5 meters in height. Situated within the University campus and 2-minute walk from the architecture studio, the building provides students with opportunities for frequent surveys. The University Estate Department acts as an advisor and client. Guided to concentrate on retrofit strategies, students are required to maintain the current building functions (classrooms, offices, and labs) while reimagining 3 specific spaces to unleash the building's potential:

- One 150-seat lecture theatre, it is not possible to accommodate this space within the existing building, so it should be designed as an extension.
- “The Space That Did Not Exist” is an atrium that connects all three levels of the building, providing students with an opportunity to explore the spatial potential of the existing building and facilitate a seamless flow of movement between levels.
- New informal learning in-between spaces, encouraging the shift from conventional corridors to interconnected spaces.

THE BUILDING STRUCTURE FIRST

Students, and at times even architects, have a tendency to conceive designs before considering how the coordinating different professionals throughout the design process, conducting an appraisal of building will be supported. Often the issue of structural system is rarely mentioned during critiques, preliminary and final.¹⁷ One of the primary advantages of working with an existing building is the ability to anticipate structural problems prior to embarking on design exploration. Since architects are responsible for potential structural issues at an early stage allows students to ensure the alignment and

coherence of design and structural solutions and to enhance their wider structural engineering knowledge.¹⁸

During the first session of the project, following an extensive survey of the building and its surroundings, students were instructed to produce drawings and a 1:100 model of the bare structure. A prerequisite of this task was to select a material for the structure that was easy to cut in the event of design or structural alterations.

The structural rhythm of the building presents a tightly spaced grid of 1500x8100 mm, with the exception of the central structural spine. This creates a distinct visual identity where the mullions on the elevations are, in fact, columns. In the model, the absence of other ancillary elements highlights the structural framework as a design feature in itself. The structural model allows students to appreciate the aesthetics of construction while also learning about the capacity of design to withstand gravitational force.¹⁹

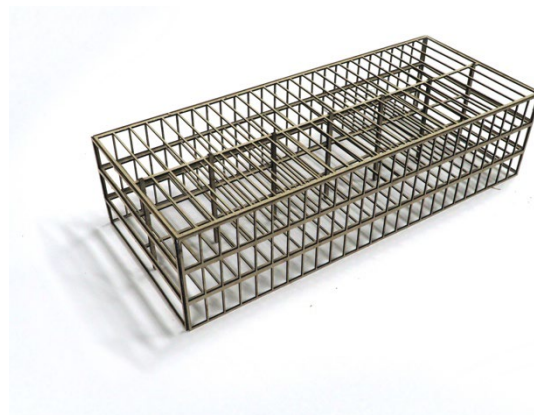


Figure 2. Ana Belen Andino Sarango: structural model

The building is now seen as a conceptual sculpture, where the space between the elements serves as a ground for imagination. Students are now empowered to approach the design creatively and contemplate effective strategies for generating new spatial configurations within the existing structural framework. To this end, cardboard was employed as the primary material, with the students using it to construct slabs and ramps to gain insight into the possibilities presented inside the existing structure.

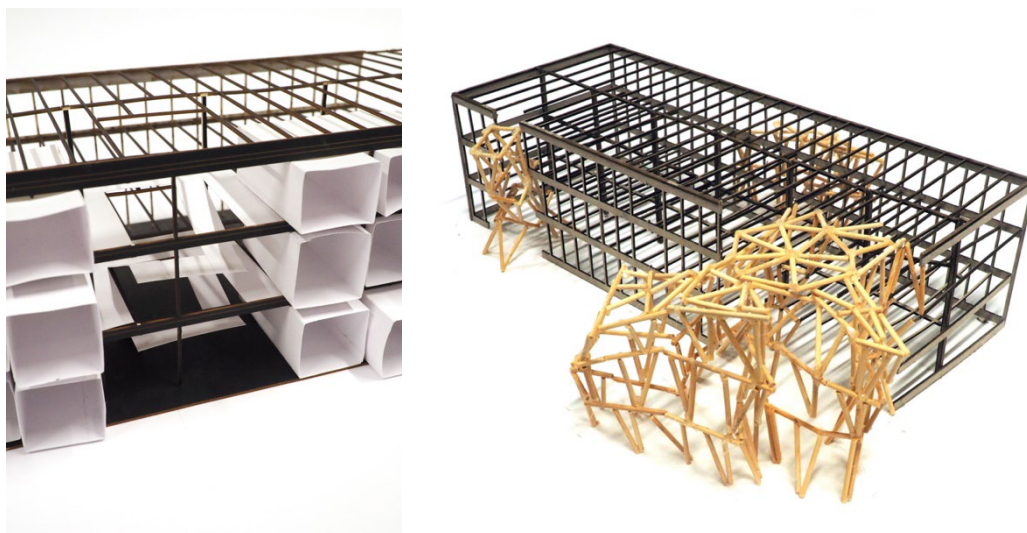


Figure 3. Thomas Peacock and Serena Yu: studies around the structure.

The primary propositions arising from the students' explorations at this stage were centred around broad atriums and vertical connection spaces, cantilever extensions, and objects designed atop the current building. The work allowed opportunity to enhance their learning process by engaging in a problem-based learning studio environment²⁰ and explore how design ideas may be realized through structurally sound solutions or how, conversely, the exploration of structural solutions may foster innovative design ideas. By comprehending these issues at an early stage, while the frame (in their models) was still exposed, students gained a better grasp of the technical challenges involved in maintaining structural integrity following the removal of existing elements. Furthermore, given the weak structure, the class was able to comprehend how to support heavy new extensions atop the building with a structure passing through the existing one while also gaining an understanding of the functioning of cantilever elements.



Figure 4. Thomas Peacock: structural cantilever models.

Figure 5. Lukasz Deptuch: study for cutting and reconfiguring the existing structure through "the space that did not exist".

A DIFFERENT CREATIVE APPROACH

Giving students the task to work with an existing building, and asking them to transform it might at first seem restrictive in terms of stimulating design creativity. However as showcased by Ruth Lang,²¹ through the case studies presented, when designers are presented with reduced resources, they are compelled to engage in unconventional thinking and develop novel solutions. Such limitations may serve to disrupt engrained patterns of utilising repetitive methodologies or materials and inspire individuals to explore new possibilities. Furthermore, working with the available resources can lead to the development of sustainable and resourceful solutions.



Figure 6. Sebastian Evans: the structural grid as the generator of the new spatial configuration

In view of architecture's relationship with art, a beautiful analogy can be drawn with Michelangelo: "The sculpture is already complete within the marble block before I start my work. It is already there, I just have to chisel away the superfluous material". This resembles an uncanny similarity to the approach of architectural retrofitting, where the dynamic between the artist and the medium is characterized by an interplay wherein the former engages in a process of discovery and uncovering, rather than merely imposing on the medium. Some students adopted this sculptural approach to showcase the inner workings of the building. They selectively removed sections to create atriums and connections, revealing the structural elements that now play a significant role in the creative design process, demonstrating a unique and innovative approach to their designs.

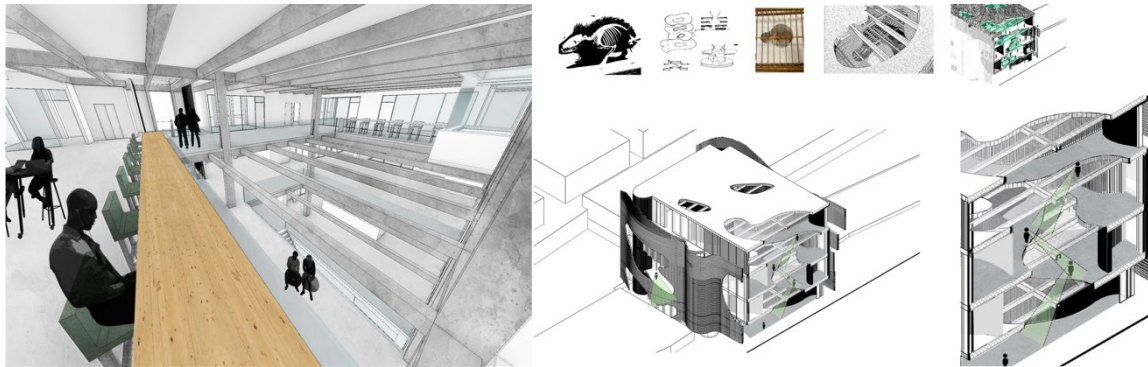


Figure 7. Sebastian Evans and Dominic Monasterial undertook projects that involved removing horizontal elements while retaining the existing structure to establish diagonal cross views.

Regarding this contemporary creative architectural practice, the Pritzker Prize winners, Lacaton & Vassal, have long advocated re-using existing architectural structures and unleashing the opportunities and possibilities within them.

We are at a point in the history of architecture where the question of inhabiting becomes an essential subject. We do this by constructing the conditions for freedom through space, in a positive and open relationship with the climate, and by starting from the existing, without ever demolishing anything. This is the essence of our work... It is urgent to stop demolishing, eliminating, deleting, cutting, and to start from the city as it is, exactly as it is. To do and to invent with all what we have. Any building can be transformed, reused. Any tree can be carefully conserved. Any constraint can be turned positively.²²

Using the existing structure of buildings as a basis for developing innovative and sustainable design solutions that address a particular building's distinctive characteristics, students are able to produce fresh, aesthetically appealing and operationally functional structures that are responsive to the specific context in which they are situated.

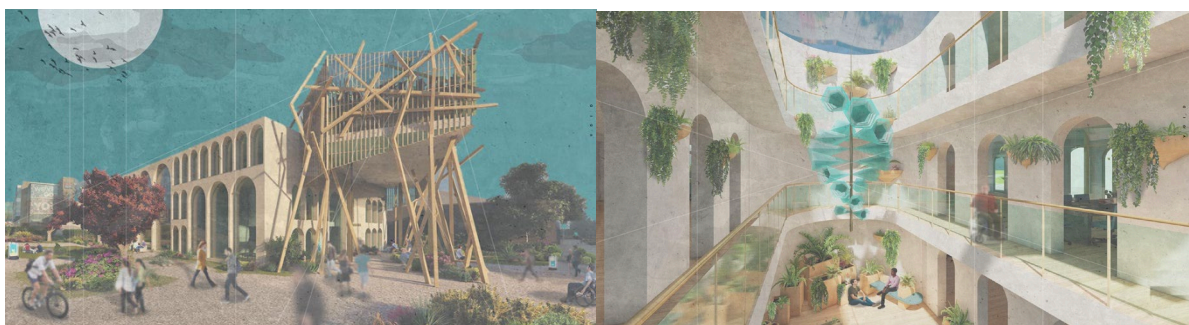


Figure 8. Timothy Turner's project: reimagining the original façade by employing a classicism rhythm, while a deconstructivist parasite serves as a contrasting feature.

Therefore, this approach does not restrict students' creativity, to the contrary, it introduces a new methodology in terms of thinking about the existing built environment and unleashes a magnitude of new challenges that generate different and unexpected creative solutions.

DESIGN CHOICES DRIVEN BY TECHNOLOGY AND SUSTAINABILITY

To ensure a cohesive and interconnected delivery of FP and ADS modules, their integration was accomplished by adopting student-centred strategies in accordance with Biggs' theory. This approach aimed to foster an environment that encourages critical thinking and the practical application of knowledge through diverse teaching methods and content formats.²³

The brief for ADS requires students to collaborate as a cohesive team, applying their expertise in architectural technology and sustainability to various design exercises, and achieve an aesthetically impactful final proposal encompassing the following elements:

- Engaging with the building's occupants and incorporating their feedback into the retrofit design proposal.
- Assessing the existing building envelope and evaluating its performance.
- Prioritizing the preservation of historical and architectural significance.
- Exploring passive design strategies and incorporating sustainable design principles.
- Implementing modifications to enhance accessibility for all individuals.

Design exercises that foster collaborative learning play a crucial role in architecture education.²⁴ These exercises not only facilitate collaborative learning but also promote constructive dialogue among students, leading to valuable insights and improvement opportunities. To further enhance the collaborative learning experience, the assessment method incorporated a comparison board, allowing each group to critically assess and provide constructive feedback on each other's work.²⁵



Figure 9. Comparison board: "The Skin and Comfort + Indoor Environment", students Beitz Salas, Lemos, Medina Castrejon, Turner

Additionally, the panel for critique sessions was thoughtfully curated in collaboration with the local RIBA branch, ensuring a bridge between the industry and education, and providing students with valuable insights from professionals.

Working with a real building provided students with a valuable opportunity to delve deeply into the building's current performance and leverage energy analysis findings to identify appropriate retrofit measures. Additionally, this approach enabled students to consider the building as a materially stratified 'document'²⁶ and prioritize the needs of both current and future occupants, offering a substantial advantage for their learning and the overall retrofit process.²⁷ The opportunity of multiple site visits and interactions with the client and occupants played a pivotal role in assessing the existing layout's effectiveness.

The outcomes of adopting this retrofitting approach demonstrated that students acquired knowledge in the implementation of technology in architecture and the integration of sustainable design principles within creative retrofitting strategies. This resulted in enhanced building performance and indoor environmental quality, with a focus on the various parameters that influence a building's efficiency.

CONCLUSION

As architectural educators, it is our responsibility to continuously explore the world we inhabit and stay abreast of professional trends. As we shape the future generation of professionals, we must strive to anticipate the evolving needs of the field. One prominent aspect within the broader architectural profession is the increasing focus on retrofit and adaptive reuse. This trend is evident through the statements made by renowned architects and theorists.

Furthermore, driven by the urgent challenge of the climate crisis, there is a significant body of work and impact originating from grassroots groups such as LETI, ACAN and STUCAN. These groups engage in data-driven approaches and knowledge exchange through non-traditional collaborative channels, which have contributed to advancements in architectural practice and education pertaining to retrofitting.

The experience of teaching retrofit in design studios has dispelled any doubts that this particular focus might hinder students' ability to create designs of exceptional quality and creativity. In fact, we have discovered that embracing limitations can serve as a powerful tool for fostering a uniquely creative approach and driving innovation. It allows students to investigate structural challenges and uncover hidden potentials in the existing built environment.

NOTES

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- ⁴ Durrell, 84-85.
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CHANGING THE WAYS OF TEACHING ARCHITECTURE TO PREVENT PLACELESSNESS ARCHITECTURE TYPE, IN OUR COPY-PASTE GENERATION

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INSIGHTS

Nowadays, everything is just at the distance of a click, or of a simple touch on the screen, and the realm of Architecture is no exception. Indeed, what is done today, worldwide, is available online in a blink of an eye. There are no doubts: the influence is inevitable and a *copy-paste* generation emerged out of nothing. We can't prevent it anymore, it's irreversible. One way or another, everything is about the same everywhere. We're producing buildings that can be placed anywhere. In other words, this global sameness shapes Globalization. Undoubtedly, the issue of identity and character of today's Architecture arises, but the awareness of it has also awoken the need to reveal our differences. So, finding ways to avoid sliding into such placelessness architecture type must become a concern of today's architectural practice, somehow.

However, in this paper, the main question is centered on architecture higher education. What matters here is wondering: How to prepare a student to be conscious and face this challenge? In a *copy-paste* generation, like ours, how can we stimulate the original creative process in a student? What has to change methodologically, from the educational point of view? What has to be the role of a teacher, now?

Hence, through two layers of approach: reading our architectural practice results and (re)thinking our pedagogic methodologies, this paper aims to expose my personal experience at EAAD (University of Minho - Portugal), in order to address some solutions to this problem.

READING OUR ARCHITECTURAL PRACTICE RESULTS

If Globalization allows a remarkable transmission of ideas, meanings and values, around the world, increasing some cross-cultural significant interchanges, it also leads to a decrease of the uniqueness of once-isolated communities and cultures. Accordingly, it's easy to admit that local culture diversity is at stake, today. Concerning architecture, we may say that a certain universal language is actually spread all over the world. Somehow, it's nurtured by the exchange of technologies, materials, systems, models, images and even values, wherever it's built. The contributions of the main local architectural traditions are now mostly irrelevant, as well as it tends to ignore the place, the site, its *genius loci*, or even the geographic idiosyncrasies and climate contingencies. It looks like that the most important thing is to achieve a kind of *nowadays' international-style*.¹

However, back in 1961, the concerns of Paul Ricouer (in *History and Truth*)² were already evident when he wrote a manifesto about the phenomenon of globalization, identifying a paradox: as an advancement of mankind, vital to become modern; but also, as threatening, being crucial to return to traditional sources, at the same time.

About two decades later, Kenneth Frampton writes “*Towards a Critical Regionalism: Six Points for an Architecture of Resistance*”, sharing these same worries and quoting Paul Ricouer in its opening. Frampton emphasizes the awareness that architecture should resist homogeneity, but he rejects the consideration of a paradox. Instead, he appealed to an architecture that should incorporate both positions, by exploring issues like difference and identity and calling for a poetic consciousness of the place. This way, Frampton seeks to evoke a reinvigorated regional architecture sustained in a geographic and cultural structure, saying: “*The fundamental strategy of Critical Regionalism is to mediate the impact of universal civilization with elements derived indirectly from the peculiarities of a particular place. It is clear from the above that Critical Regionalism depends upon maintaining a high level of critical self-consciousness. It may find its governing inspiration in such things as the range and quality of the local light, or in a ‘tectonic’ derived from a peculiar structural mode, or in the topography of a given site.*”³ For Frampton, in a way, architecture was losing qualities through a blind implementation of industrialized techniques which works against any reflection of local culture and tectonic considerations: “*Modern building is now so universally conditioned by optimized technology that the possibility of creating significant urban form has become extremely limited. (...) The practice of architecture seems to be increasingly polarized between, on the one hand, a so-called ‘high-tech’ approach predicated exclusively upon production and, on the other, the provision of a ‘compensatory facade’ to cover up the harsh realities of the universal system.*”⁴ However, he didn’t encourage the return to some kind of sentimental regionalism. Instead, he calls for an architecture type that should embrace new ways of doing it, which includes the considerations of topography, environment and tectonic-forms. Frampton did believe that the problem could be overcome through the use of local materials and traditional building techniques that also embraces local geographic context, clarifying: “*it necessarily involves a more directly dialectical relation with nature than the more abstract, formal traditions of modern avant-garde architecture allow. (...) The bulldozing of an irregular topography into a flat site is clearly a technocratic gesture which aspires to a condition of absolute ‘placelessness’, whereas the terracing of the same site to receive the stepped form of a building is an engagement in the act of ‘cultivating’ the site.*”⁵ In fact, Frampton not only clearly identified the problem, but also gave us a flawless solution, proving it with some excellent architectural examples of that time. So, why doesn't it work anymore? What can we do to encourage architectural diversity, the one that can express the place-specific culture, in form, techniques and materials?

Well, let’s go back in time, exactly one hundred years (1923), and take a look at Le Corbusier, when he wrote: “*In my pocket was the plan of a house. A plan without a site? A plan of a house in search of a plot of ground? Yes! (...) With the plan in our pocket, we spent a long time looking for a site. After considering several, one day we discovered the right one from the top of the hill. It was on the lakeside and might be said to have been waiting specially for the little house. (...)*”⁶ Although admitting that he “already” had the plan, he chose the right place very carefully. Moreover, first of all, he had one purpose: “*this little house will shelter my father and mother in their old age, after a life of hard work*”⁷; then he had the idea: to do a “dwelling machine”, that would “fit like a glove” to his parents. Later, expressing the concept, he points out: “*the architectural features implied in the simple solutions of 1923, a period when the search for a suitable form of house was not a question which exercised people’s mind very much.*”⁸ And then, ironically, he underlines: “*The CRIME: when this little house had been completed in 1924 and my father and mother were able to move in, the*

*Municipal Council of a neighboring commune met to decide that a building of this kind constituted “a crime against nature”. Fearing lest it might nevertheless give rise to competition (who knows?) they forbade it ever to be imitated.”*⁹ As a matter of fact, this “simple solution” within this “suitable form of house” must have been imitated thousands of times, without being a “crime”. Somehow, it became our “ordinary” plan of today, because it was a good idea. So, we wonder: does this lack of architectural diversity reveal a problem of lack of creativity? Are we drifting in an ocean of references, in such a way that we’re no longer able to yearn the newness, or to be committed to originality? If so, then we should go deeper and find out the roots of our educational systems to realize what can be done to ease this problem.

(RE)THINKING OUR PEDAGOGIC METHODOLOGIES

Again: In a copy-paste generation, like ours, how can we stimulate the original creative process in a student?

In a world of images and influences, affinity is an inevitability as Molder recalls: *“Affinity can only be patented in feelings (neither in intuition nor in reason).”*¹⁰ This allows us to understand why we easily assimilate references and influences. Concerning architecture, all of a sudden, we’re all designing and building in an identical way. Our contemporaneity is fatally contagious and accessible to all: in desires, tastes, manners, etc.. Very easily, we convince our clients to “that kind of architecture”. With the same ease, our students convince us with “that kind of architecture”, because most likely, we have also been “infected” by it, eventually just by mistake, during a fleeting zapping of any page of the Internet, Facebook, Pinterest, Instagram, or simply drifting around at Google or YouTube. Now, it’s hard to identify to whom those “architectures” really belong. So, how can we work on difference, character, identity, if everything resembles something we have seen, somehow, in the meantime?

In fact, the anguish of influence is a frequent theme in the intricacies of Philosophy, Arts and Architecture. As early as 1973, Harold Bloom wrote *The Anxiety of Influence: A Theory of Poetry*, recalling in this regard: *“Influence is simply a transfer of personality, a way of dismantling that which is most precious to ourselves, and its exercise is even a reality of loss. All the disciples take anything from their masters.”*¹¹ But if this is legitime, we wonder: Is there the right amount of influence allowable?

Probably, from the architecture higher educational point of view, the only way out is to admit that all these tons of information that we consume daily, and all the leading technologies already available (like AI – ChatGPT,¹² for example), aren’t optional anymore. No matter how powerful, or risky, these tools can turn to be in the hands of a student, we have to deal with it, somehow. By some means, we should turn it into a useful “guide on the side”. All that is needed is to realize how, and what, has to change methodologically, in our educational systems?

FINDING SOLUTIONS

To the question: What will be the real role of a teacher? We remind Kant’s *Announcement of the Program of the Winter Semester of 1765-66*: *“The teacher is expected to develop in his student, first the man of understanding, then the man of reason, and finally the man of instruction. (...) Understanding should not learn thoughts but to think. He must be conducted, if we wish to express ourselves in this way, but not carried on shoulders, so that in the future he will be able to walk by himself, without stumbling.”*¹³ This means that we shouldn’t teach them “thoughts”, but ways to think properly. Therefore, we should give them the right tools. In other words, we shouldn’t give them the fish, but the fishing-rod and teach them how to fish.

Thus, our challenge now is to formalize a disruptive way of thinking, as a methodologic pedagogy, in

order to become a tool to spur creativity and overcome the problem of influence in the search of originality.

For that, after giving them the universal bases, and fundamentals, of the architecture *modus-operandi* (in the first years of their graduation), then we need to push them to (re)start again from the beginning, by focusing mainly on the thinking process. They need to question the usual patterns, models and systems; They need to blur the bias and refresh the knowledge; They need to learn how to (re)think differently, by themselves, in order to reach the newness.

Our personal experience

As an example, our personal experience relies on teaching an architectural design class (residential architecture): *Modes and Models of Inhabiting*, of the 4th year of a Master Degree in Architecture (MiArq-EAAD, Portugal), where we dwell on the theme “Unravel the house”, aiming to design a singular house, as a practice exercise.

The exercise is divided in 3 parts:

ACT 1: We start by giving them the proper time for unraveling, undoing and decoding “the house”, through the filters of our five senses: vision; hearing; smell; taste; tact. Taking into account the sensory receptors, they question: how does it interfere with the architecture of the house? This way, they can deepen the understanding of its elements, and relationships, from the identification of the form (the space at home), to its functions (the actions), decomposing, revealing and clarifying each action in each space, within the scope of a daily basis.

ACT 2: Then they select a place (to settle) and learn everything about its *genius loci*.

ACT 3: At last, they choose a concept to feed the idea and to nurture the purpose of the house, as well as to spur creativity, reminding that we’re constantly recombining old ideas to make something new.

In fact, during the first two acts (sketching out action-by-action, and modeling space-by-space), the students are free to use all available means to do their research. However, they are sentient, by now, that one of the most difficult things is to unlearn. So, if they genuinely embrace the main goal of being original, they struggle to avoid “too much contaminations”, focusing on their own creative process.

Nevertheless, to make the difference, they must feel really involved in the process, being followed-up by a convincing, and continuous, one-to-one relationship (student/teacher), just to give them the strength to make it happen. Then, when good ideas emerge, they realize that it’s really worth fighting for their own identity. And this becomes the main lesson to retain.

OUTCOMES

In fact, concerning architecture, the question of identity is invariably related to the question of language, yet merging and belonging (either to a place, or to the *modus faciendi* of a particular architect) are more serious, and profound, things. It pushes us to a much more genuine reading, rather than a simple formal interpretation, or an influence based on the whim of taste, or any casual impression. It goes far beyond the simple copy-paste action. It implies to pay attention to the deepest intrinsic relationships that goes beyond the epidermis and focuses on the invisible dimension, which Edward T. Hall¹⁴ talked about.

Above all, it’s a matter of character. For instance, it’s not just a mere question of regarding the *site*, but to fit properly in that place, through the significances of its purpose. That means that, at the very least, if we want to pursue originality, we need to reflect upon: How can it be built differently, though cherishing its *genius loci*, at the same time? How can it truly reveal “identity”, without being influenced? And these are the kind of issues that we should alert our students to pay attention to.

So, if influence is inevitable, nowadays, there is no alternative rather than to embrace it in a pro-active way, come what may. Instead of mitigating its disadvantages, which induce to a lack of creativity, or

even character, we should perceive the real intentions of that “architecture”, instead of just copying that “image”; we should be interested on understanding its purposes, instead of just to reproduce that language. Indeed, if we really want to prevent placelessness architecture type, perhaps this is the only way out.

Even more, regarding our higher educational system, we ought to change the ways of teaching architecture, no matter how. We need to rethink our methodologic pedagogies, taking into account all the available technologies, to give them the right tools to face and tackle this problem. If we won't be able to overcome IA, in accuracy and efficiency, then all is left to do is to bring the best of it and use it very carefully. Above all, we should make them realize how amazing is to create something that arises as the result of a truly genuine thinking process; We should make them fall in love with architecture, to encourage them to yearn the newness and to be committed to originality, striving to build a better world. Probably this must be, precisely, the key role of a teacher, from now on.

NOTES

- ¹ Although it's quite different from the one praised by Philip Johnson and Hitchcock back in the 1930's, which were related to "the Modern Movement".
- ² Paul Ricœur, *History and Truth* (Illinois: Northwestern University Press, 1998).
- ³ Kenneth Frampton, *Towards a Critical Regionalism: Six Points for an Architecture of Resistance* (London: Pluto Press, 1983), 17.
- ⁴ Kenneth Frampton, *Towards a Critical Regionalism: Six Points for an Architecture of Resistance* (London: Pluto Press, 1983), 21.
- ⁵ Kenneth Frampton, *Towards a Critical Regionalism: Six Points for an Architecture of Resistance* (London: Pluto Press, 1983), 26.
- ⁶ Le Corbusier, *Une Petite Maison. 1923* (Zurich: Éditions D'Architecture, 1993), 06.
- ⁷ Le Corbusier, *Une Petite Maison. 1923* (Zurich: Éditions D'Architecture, 1993), 05.
- ⁸ Le Corbusier, *Une Petite Maison. 1923* (Zurich: Éditions D'Architecture, 1993), 07.
- ⁹ Le Corbusier, *Une Petite Maison. 1923* (Zurich: Éditions D'Architecture, 1993), 80.
- ¹⁰ M. Filomena Molder, *Símbolo, Analogia e Afinidade* (Lisboa: Edições Vendaval, 2010), 31-33.
- ¹¹ Harold Bloom, *A Angústia da Influência: uma teoria da Poesia* (Lisboa: Edições Cotovia, 1991), 17-18.
- ¹² ChatGPT is an artificial-intelligence (AI) chatbot developed by OpenAI and launched in November 2022. It's a member of the generative pre-trained transformer (GPT) family of language models.
- ¹³ Immanuel Kant, "Announcement of the Program of the Winter Semester of 1765-66" in *Theoretical Philosophy, 1755-1770* (Cambridge: University Press, 1992), 306-7.
- ¹⁴ Edward T. Hall, *The Hidden Dimension* (New York: Anchor Books Edition, 1990).

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COMPLEX THINKING CHOREOGRAPHIES AND TRANSFORMATIVE PROCESSES

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INTRODUCTION

This paper is framed by a theoretical framework for the pragmatic operationalisation of a notion of complex thinking, informed by complexity theories and by an enactive approach to cognition. We developed a qualitative method- Complexigraphy- to visually map the complexity of the thinking of practitioners conducting assessments and interventions with multichallenged families with at-risk children in community and child protection contexts. This method presents a performative dimension and can be used, in contexts of training and supervision of practitioners or intervenors intervening with real-world complex systems, as a tool to scaffold their thinking movements (and guide actions). In this presentation, we highlight its potential as a training and supervision tool scaffolding transformative changes in the organisation of the thinking. Given how this method supports reflexivity and invites the observer to approach their own thinking as an object of investigation and (embodied) manipulation it has the potential to activate transformational processes and deep personal changes. We reflect on the promise of this method for training and supervision in contexts of real-world practice, from an enactive cognition and a constructive-developmental perspective.

COMPLEX THINKING AND THE CHALLENGES OF THE REAL WORLD

In many areas of professional practice, complex problems need to be addressed in conditions of high uncertainty and risk. The challenges of ‘real-world’ complexity reflect the relational and dynamic nature of reality and its interconnectedness as well as the emergent features of life, bringing with them novelty and surprise.¹ A complex systems-informed perspective invites us to consider key properties of complex systems such as relationality and recursiveness, self-organisation, emergence, context and path-dependence, multiple time scales, when carrying out ‘real-world’ interventions.² The capacity to attend to these processes is often associated with “complexity thinking”.³ But, as Edgar Morin said, “complexity is also a mode of knowledge when we integrate certain principles: the principle of retroactivity, of connectivity, in a dialogical principle. It is a way of thinking”.⁴ The epistemological implications of complexity are not always fully embraced, marking the distinction between a restricted and a general complexity approach.⁵ However, it is precisely the embracing of this complexity, through the enactment of key properties of complex systems, at the level of the organisation of the thinking- as a mode of coupling with the systems which we aim to affect and their environments- that may determine the success of interventions.⁶ Taking as a reference point Ashby’s law of requisite variety,⁷ we could perhaps say that intervenors need to perform as much complexity

as the systems they are trying to affect.⁸ While this may not be attainable in relation to most living or human social systems, it may still be possible to augment that complexity through a complex form of coupling that guides action. The distinction between complexity thinking and complex thinking was previously proposed to highlight the difference between complexity as a content of the thinking and complexity as a process of thinking.⁹ A theoretical framework for the practice of complex thinking¹⁰ states that some key properties of complex systems can be performed in coupling with the target of our interventions and their environments that may lead to emergent outcomes, guiding actions. This framework describes 9 dimensions and 24 properties of the thinking that, understood as thinking movements, could contribute to more successful outcomes. More important than each individual movement is the non-linear interaction between them and how they may generate novel information, through abductive, creative and intuitive insights underlying skilful action. Schön (1987)¹¹ invited us to consider how skilful practitioners build knowledge through and in action. We assume that complex thinking could be enacted as a supreme form of “professional artistry” (Schön, 1987)¹² and as skilful dance engaging both the ‘know-whats’ (declarative) and the (embodied) ‘know-hows’¹³ (tacit) of professional practice. The notion of complex thinking here proposed is grounded in a conceptualisation of cognition as enactive, embodied, embedded and extended.¹⁴

Educating for complex thinking in professional practice

The context of this paper is the education/training and supervision of interdisciplinary teams of practitioners who, in community contexts, support families exposed to multiple stressors and challenges, namely cases with children at-risk or in danger, referred by child protection services.¹⁵ Multichallenged families experience a multiplicity of risk and inequality factors that interact unpredictably, generating cascades of other risks and constraints.¹⁶ These complex interactions call for congruently complex modes of thinking attuned to the dynamic, relational network of factors and processes affecting these families. The coherence between the modes of thinking guiding interventions and the nature of these processes may be critical to the success of the interventions.

Practitioners can be supported through programs, tools and resources that guide their practice in addressing the multiple challenges of these lives and the demands of ensuring the children’s safety and well-being in the face of multiple social risk factors.¹⁷ Ultimately, however, the complexity of their thinking may impact even how they use the resources and tools made available to them for conducting assessments and interventions.¹⁸ Transforming these modes of thinking adds to the complexity of the educational training and supervision programs and may be dependent on the level of the practitioner’s own cognitive-emotional organisation as well as on the complexity of the training programs.¹⁹ The extent to which these programs enhance and support reflexivity in relation to professional practice,²⁰ attending to the specific nature of the cognitive-emotional organisation of each individual²¹ will affect their potential to scaffold transformative changes.

We required a method to assess the complexity of case conceptualisations of practitioners supporting multichallenged families and to support the training and supervision towards changes in the organisation of their thinking. We assumed this would demand a reflexive process and that it could be facilitated by some embodied or sensorimotor processes through which they could interact with their thinking, appealing to the embodied, enactive, embedded and extended nature of cognition.²²

MAPPING COMPLEX THINKING FOR RESEARCH AND PRACTICE: THE COMPLEXIGRAPHY METHOD

Under the scope of a framework for complex thinking we developed a qualitative method-Complexigraphy²³- to visually map a set of key dimensions and properties of the complexity of the thinking underlying the case conceptualisations of practitioners supporting multichallenged families

with at-risk children in community and child protection contexts. This method presents the unfolding of thinking movements and the configurations of properties that compose the thinking as a whole. As described elsewhere, it was designed to be methodologically coherent with the underlying conceptualisation of the thinking as a distributed, spatially unbounded stream²⁴ of differences²⁵ and processes.²⁶ We assumed an enactive foundation of cognition and the role of movements in space and physical gestures.²⁷ There are two complementary Complexigraphies maps: (i) one highlights contents, the relational movements of the thinking and its recursive dynamics, through the mapping of iterations, (ii) the other highlights the processes, different types of mental movements associated with selected dimensions and properties of the thinking: dynamic or process complexity (timescales, dynamic processes, relativity and uncertainty), causal and explanatory complexity (modes and finalities, historicity, complex circularity and emergence) and the complexity of the observer (multipositioning, reflexivity, intentionalities).

The process-focused version of the map attempts to grasp the manoeuvres of the thinking (the different expressions of the properties identified in the complex thinking framework), through ideograms, also conceived as metaphoric gestures.²⁸ The ideograms suggest particular physical gestures that could be performed to support mental movement. They are organised in a map both horizontally (diachronic unfolding from left to right) and vertically (synchronic time). Figure 1 shows a process-focused map of reduced complexity and Figure 2 a map of higher complexity in terms of the differentiation and configurational arrangement of the properties represented by ideograms. The ideograms are arranged to portray the unfolding expressions of each property (movement) and the configurations of properties composing the thinking as a whole.

The grey zone in the centre maps the nature of the content of the thinking (e.g. squares correspond to events; rectangles to situations; R points to relations; waves to processes and arrows to temporal sequences or causal relations; the numbered circles correspond to iterations of the thinking which, on its complementary content-focused map, identifies the nature of the contents). This zone contains some information about the structural complexity of the thinking, namely the type of information considered (e.g. boxes with 'XXX' represent behavioural information; '!!!' points to emotional information and '???' marks refer to cognitive information). The line above displays expressions of the complexity of the observer (multipositioning/multiple; perspectives and intentionalities) and the lower one pertains to properties of causal and explanatory complexity as well as some structural dimensions such as recursivity and multidimensionality of the information considered.

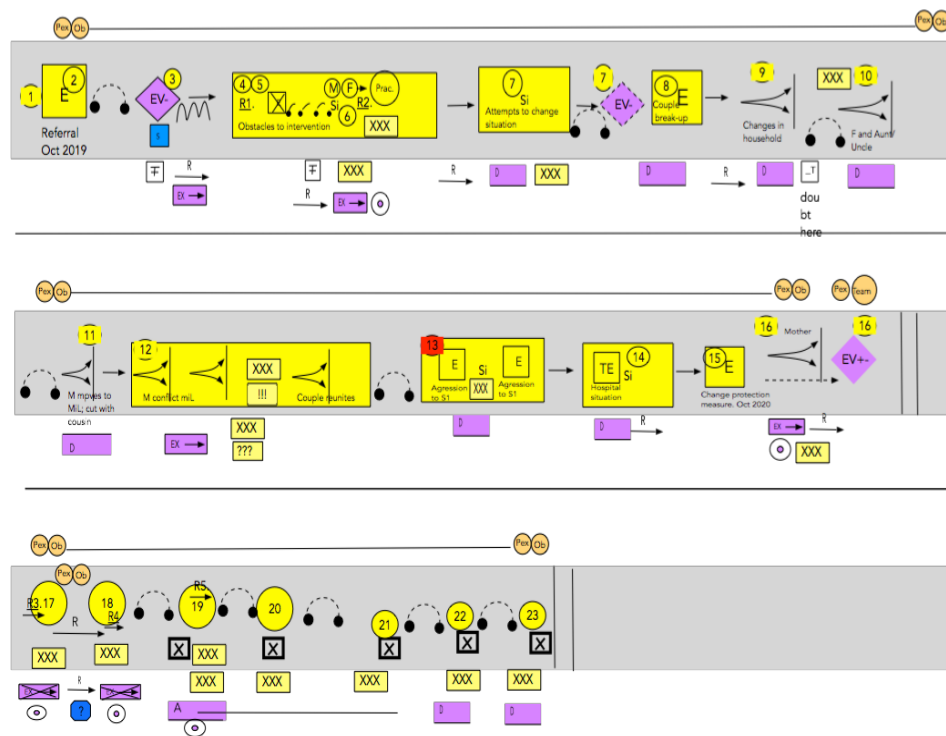


Figure 1. Example of a Complexigraphy of reduced complexity

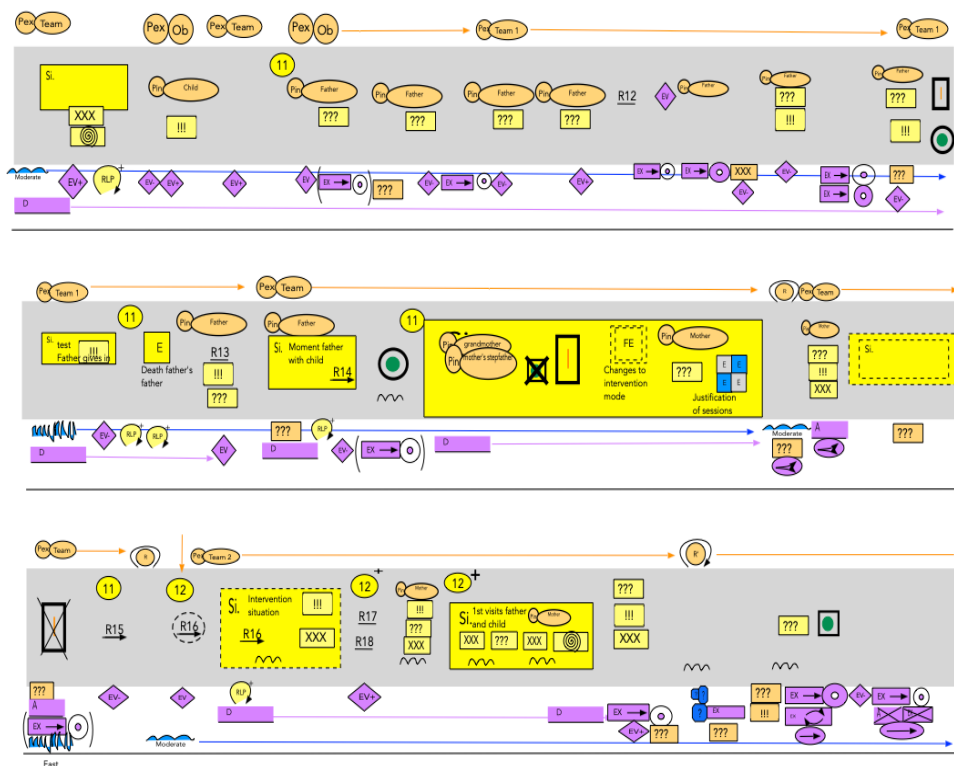


Figure 2. Example of a section of Complexigraphy of moderate-high complexity

Figure 3 shows a content-focused map of the contents of the thinking and the relational and recursive movements during a particular trajectory. For our practice, these maps are customised to include a base dimensions associated with a conceptualisation of families as complex systems.

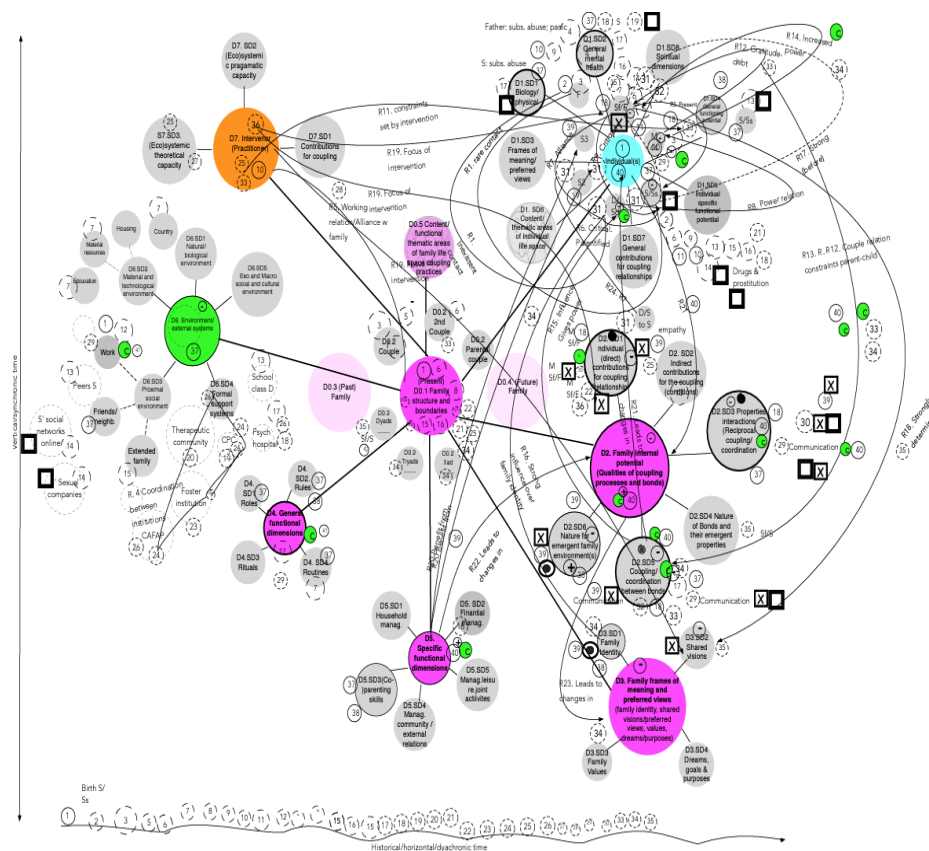


Figure 3. Example of a content-focused Complexigraphy of moderate-high complexity in terms of the diversity of contents and relationality. The base schema pertains to different dimensions and levels of the complexity of family functioning. Green: environmental dimensions; Orange: dimensions of the intervenor/intervention; Blue: individual dimensions; Pink: dimensions of family functioning,

THE COMPLEXIGRAPHY METHOD: SCAFFOLDING TRANSFORMATIVE LEARNING

The Complexigraphy method has a performative potential that is particularly promising to support the training and supervision of practitioners or intervenors intervening with real-world complex systems. The maps support the visualisation and simulation of movements in space. Additionally, the ideograms and the relational marks suggest gestures which can be associated with mental movements to scaffold the thinking and guide action.²⁹ The grounding of the method in embodied gesture offers a variety of possibilities for interventions aimed at choreographing the thinking.³⁰ The maps support the externalisation of thinking patterns allowing for them to be explored reflexively and for transformations to be rehearsed and supported through the physical manipulation of the symbols. The absence of particular ideograms is informative to the extent that it suggests movements to be explored. Although the Complexigraphies were designed as two-dimensional maps they can also be assembled three-dimensionally using objects for each ideogram or physically performed (e.g. as a continuous dance which unfolds in a variety of movements). In our practice, we have used the method to provide feedback in live case supervision sessions (we hand draw maps in real time during case presentations) and after the sessions (with improved digital versions of the maps). The maps guide our

conversations and questions about the case, supporting the identification of problematic, absent or alternative movements and how they could compose more complex configurations. In the follow-up sessions we use the improved versions of the maps to further explore how different thinking movements can support different types of actions and guide the coupling with the cases. The maps are used to trace a learning plan and change objectives. After several sessions, practitioners can visualise the changes in the maps and their relational organisation. They can relate them to their lived experience of the cases and their evolution. We aspire to develop technology to facilitate the live composition of the digital maps so that practitioners can and receive moment-to-moment feedback to support the management of their thinking.

Reflexivity and transformative change

Jack Mezirow defined transformative learning “as the process by which we transform problematic frames of reference (mindsets, habits of mind, meaning perspectives)” These frames, encompassing “cognitive, conative and affective components, may operate within or outside awareness and is composed of two dimensions: a habit of mind and resulting points of view. Habits of mind are broad, abstract, orienting, habitual ways of thinking, feeling and acting, influenced by assumptions that constitute a set of codes.”³¹

One of the most important ways through which the Complexigraphies may promote transformational change is through increasing reflexivity. They help individuals directly see their habits of mind not just in terms of content but also in terms of the forms and the organisation of the thinking, pointing to the implications of the perspectives that result from them, for example, in terms of the relation between the nature of the explanations or emergent hypotheses and the anticipation of actions. To some extent, the Complexigraphies may transform the individuals’ epistemologies and the ways they know the world by introducing perturbations in their subject-object relations, as proposed by Robert Kegan.³² They support a reflexive movement through which the individuals take their own thinking patterns as an object that they can explore, manipulate and act upon, in an embodied way.

Reflexivity is a fundamental property of complex living systems that is the core of the basic biological foundations of cognition. It has also been identified as a critical ingredient of action learning.³³ As Varela said, “in considering our own cognizing, we put together the essentials of the two (...) instances (...). On the one hand, our cognition is in our biological substrate as the body; on the other hand, our descriptions are fully capable of self-descriptions at indefinitely many levels”.³⁴ Reflexivity is a key process underlying our cognitive organisation and, therefore, a key to learning and to transformative change in this system. The Complexigraphies create new information that becomes available to the individual and re-enters the cognitive system through recursive self-organising circles affording a multiplicity of possibilities of (self)description and (self)action.³⁵

The Complexigraphies mediate the coupling of the individual with its own actions and may, to some extent support sophisticated forms of reflection both on action and in-action.³⁶ They can be used as instruments to provide some type of post hoc feedback but also as tools to generate immediate, moment by moment, information as practitioners act, through mental simulations and in direct contact with the systems they target. The maps instigate recursive loops in the cognitive processes through which the individuals’ own organisation becomes an object of attention and of action. They make visible and accessible that which is invisible and unconscious. Therefore, Complexigraphies can be regarded as meta-cognitive learning strategies supporting a transformation in the modes of engagement with the world, through which, recursively, practitioners bring forth new possibilities for change. Through the feedback provided by the Complexigraphies, individuals can establish new relationships with their own cognitive processes as separate entities that the individuals can recognise,

explore and manipulate creating a novel set of experiences (a sort of second-order experiences-of-experiences).

Affective perturbations

The effects of the Complexigraphies are not strictly “rational” or disembodied. On the contrary, they are accompanied and constituted by whole-body affective reactions. Practitioners enter into a relation with their maps as new objects or entities in their environment to which they will respond. When used in the context of training and supervision the Complexigraphies provide feedback on the practitioners’ modes of organisation, their cognitive choices and actions. A variety of affective and aesthetic experiences are activated by the visual character of the maps and the reflexive process, as perturbations in the individuals’ landscapes for being/acting in the world. Individuals can appreciate the beauty of the patterns as one “sees” one’s thinking unfolding. The Complexigraphies are not “sterile” devices. They shape the individuals’ relation to themselves and their organisation in many ways, eliciting different types of emotions (e.g. surprise, curiosity, shame, awe) which will further guide the individuals’ engagement, eventually “broadening-and-building”³⁷ their landscape of action and modes of coupling with their environments. Hence, this transformation is also affective.

Maiese reconceptualised transformative learning from an enactive cognitive perspective: “Although conceptual reframing no doubt plays a role in this shift in perspective, there also is change that occurs at a more basic, affective and bodily level. Along these lines, I will argue that a subject’s new “openness” and attunement to certain features of their surroundings involves a shift that is simultaneously both cognitive and affective; and this change in cognitive-affective orientation brings with it a transformation of a subject’s habits of mind, which I will maintain can be understood as a dramatic shift in what I call “affective framing patterns”.³⁸

Action on and through the thinking

The Complexigraphies invite an observer to approach their own thinking as an object of investigation and manipulation: the thinking not only guides action but also be acted upon.³⁹ This implies that a whole landscape of possibilities for knowing may be transformed as the individuals change their modes of engagement and contributions to the coupling with their environments and the systems they target with their interventions. The ideograms, as metaphoric gestures, scaffold meta-cognitive movements and offer an interface for acting on the thinking while performing that thinking, particularly when the process of mapping is done live, with almost immediate feedback.

CONCLUSION

We developed the Complexigraphies in the context of our research and practice targeting the assessments and interventions conducted by practitioners, in community contexts, with multichallenged families with at-risk children, in the intersection with the child protection system. This method was initially designed as an assessment tool to visually map the complexity of the thinking. However, they presented new possibilities for the training and supervision of practitioners, operating in challenging “real-world” contexts where the complexity of their thinking is critical to the success of the interventions they conduct. The Complexigraphies revealed great potential to be used in the context of training and ‘in-action’ supervision, as a tool to support transformative changes. They target key processes underlying cognitive complexity, aligning with process-focused, embodied and enactive approaches to professional education.⁴⁰ Their most distinctive feature is that they target key processes underlying our cognitive relational organisation, having the potential to promote truly transformative transformations.⁴¹ The Complexigraphies afford a multiplicity of possibilities for

physical and embodied interactions with our patterns of thinking grounding the transformative learning processes in the foundations of the thinking itself.

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USING TEXT-TO-IMAGE ARTIFICIAL INTELLIGENCE PLATFORMS AND REPERTORY GRID TECHNIQUES TO GENERATE VISUAL BRANDING SCENARIOS.

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INTRODUCTION

The entanglement of artificial intelligence (AI) with architectural form design began to surface in the early 2010s. Pioneering research speculated the capacity of AI in spawning original designs based on its art creation capabilities.¹ Subsequent models demonstrated the ability to conceptualize elevation designs and suggest spatial components such as the structural core of high-rise buildings, although the results of the elevation design remained in developmental stages.² Further strides in the field saw the creation of AI software capable of classifying and grouping the works of architects through deep learning strategies.³ The results echoed the traditional understanding of architectural design by theorists and historians.⁴ AI models have also facilitated the design of highly efficient architectural spaces, surpassing conventional methods.⁵

However, as noted by,⁶ there are several challenges inherent to programming with AI, such as ethical dilemmas, potential bias, and over-reliance. These issues might well apply to the architectural field, with over-reliance and educational sustainability emerging as the most crucial challenges. Despite this, scholars continue to explore ways to enhance traditional design methodologies such as.⁷ AI's potential to inspire has allowed it to be harmoniously integrated with most conventional approaches, thereby overcoming most of the aforementioned challenges.

This paper delves into the capability of AI to generate residential villa designs tailored to the user's perception and preference. This preference is extracted via a psychological tool (Repertory Grid Technique) facilitated by an architect. We aim to nudge AI towards respecting the city's brand image to maintain the context of the place. Therefore, the research questions are:

Can AI platforms effectively address the aesthetic preferences of users identified through the (RGT)?

Are AI platforms capable of recognizing a city's brand image and incorporating its value into the design process?

METHODOLOGY

In this preliminary study, we employed the Repertory Grid Technique (RGT) in structured interviews with five architectural engineering students residing in Al Ain city to understand their perception of architectural styles. RGT, a psychological tool, assists in deciphering both conscious and subconscious human perceptions of a particular issue.⁸ We used the triadic RGT with binary scoring method to solicit architectural meaning constructs from these students.⁹ The interviews averaged 20

minutes, with elements ranging from traditional local styles to the most contemporary designs of villas from Abu Dhabi and Al Ain city being used to elicit the students' constructs.

We aimed for seven unique bipolar constructs from each student, although the actual number depended on the students' capability and willingness to contribute. Students were asked to score the bipolar constructs based on their preference using a binary method (0/1), with zero indicating unpreferred and one for preferred.

The preferred constructs of each student were then combined to create a unique statement representing their ideal residential villa characteristics. To ensure relevance, we included terms like 'villa', 'realistic', and 'should have', among others. This statement was input into two AI platforms in different trials, trials with its raw form, trials with the additions of 'having Al Ain city Brand Image', trials with the addition of 'having Abu Dhabi city Brand Image' and trials with reference image for the brand image if possible. The purpose of those trials is to investigate the capability of AI to distinguish the brand image of each city either by text or by reference image.

The generated images were evaluated for design concept creativity, construct adherence, and relevance to the city brand image by a panel of nine architects working in Abu Dhabi and Al Ain city. The evaluation was recorded using an online questionnaire on the Repbit website. The authors assessed the AI's compliance with students' objective constructs through a systematic three-step process: distinguishing objective constructs, tracking AI's achievement of these constructs for each student and translating the results into a percentage, and finally, reporting the average commitment across all students.

DATA COLLECTION

The process of data collection consisted of three stages: gathering constructs from architectural students, converting these constructs into complete sentences, and collating results from AI platforms. During the initial stage, we conducted interviews with five students from the Department of Architectural Engineering at the United Arab Emirates University. The constructs elicited from these discussions can be found in Appendix (1), which delineates each student's preferred constructs. While three students each yielded six constructs, another student offered nine, and one student contributed an impressive 29 constructs. These constructs varied, with some being objective (e.g., 'wide glass') and others being subjective (e.g., 'comfortable'). Nevertheless, we incorporated all constructs in the subsequent generation of AI statements.

In the second stage, the authors amalgamated the elicited constructs into cohesive statements, reflecting the students' preferences as demonstrated in Appendix (2). We strived to maintain the constructs' original order as far as practicable during this process. Along with these statements, additional sentences were incorporated that pertained to the brand images of cities (e.g., 'It should incorporate the Abu Dhabi city Brand Image' or 'It should reflect the Al Ain city Brand Image'). For the third student, we prefixed the term 'realistic' to the statement. This modification was necessitated due to the AI platforms' initial output of black and white sketches; introducing 'realistic' resulted in the generation of more lifelike designs.

The final stage entailed exploring the quality of designs produced by both AI platforms. We presented both platforms with the combined statements (as shown in Table 1) and a sentence related to the Abu Dhabi brand image.

Student	Prodia: TheAlly's Mix II	Midjourney
1		
2		
3		
4		
5		

Table 1. Midjourney and Prodia results

An exhaustive trial of all engines available on the Prodia platform revealed that TheAlly's Mix II was the most acceptable, as some engines could not even produce a villa despite numerous attempts. Conversely, the Midjourney platform did not offer engine selection and consistently delivered results without necessitating regeneration. The test results in Table 1 indicate a clear superiority of Midjourney over Prodia. As such, we elected to proceed with our research exclusively on the Midjourney platform.

RESULTS AND DISCUSSION

To address the research queries, we administered four trials on the Midjourney platform, each utilizing the unique construct statements derived from individual students. The inaugural trial (A) involved supplying Midjourney with both the construct statements and an image symbolizing Al Ain city's Brand Image - Al Ain Palace (refer to Figure 1). The subsequent trial (B) supplied Midjourney with the construct statements alongside the phrase 'it should reflect Al Ain city Brand Image'. The third trial (C) operated similarly, but with the phrase 'it should incorporate Abu Dhabi city Brand Image'. Lastly, the fourth trial (D) presented Midjourney solely with the students' construct statements. The outcomes from these four trials are delineated in Table 2.



Figure 1. Image of Al Ain Palace used as visual reference on Midjourney¹⁰

The reference image was provided as a web link. Midjourney facilitates the incorporation of image links in addition to text, resulting in intriguing outcomes by generating entirely novel designs inspired by the referenced image.










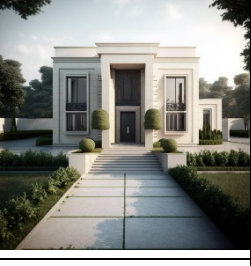


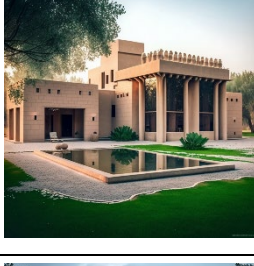
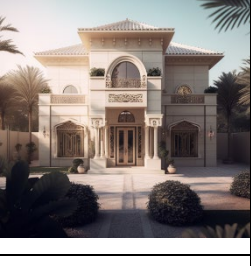
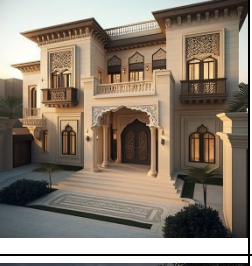





Students	Trial A	Trial B	Trial C	Trial D
1				
2				
3				
4				
5				

Table 2. Varied trials conducted on Midjourney

Subsequently, architects evaluated the resulting images from Midjourney in terms of both design creativity and relevance to the city's brand image using the Repbit online website. Table 3 illustrates the evaluation results. Notably, the AI demonstrated impressive capabilities, generating designs with an 83% relevance to the Al Ain city brand image when supplied with a reference image. Interestingly, the AI also produced designs with 80% relevance to the Abu Dhabi city brand image without needing any reference image. Moreover, designs generated with the phrase concerning Al Ain's brand image

were evaluated as 58% relevant to Abu Dhabi's city brand image, and 70% relevance was recorded with the Abu Dhabi brand image phrase. This may correlate with the observations from three participating architects who highlighted Abu Dhabi's dual brand images - one representing the city's traditional architecture, and another reflecting the burgeoning popularity of contemporary eclectic styles. These findings suggest a possible trend towards associating designs with Abu Dhabi's emerging brand image. However, this hypothesis requires further exploration in future studies.

On the creativity front, the architects' overall appraisal was relatively negative, with exceptions observed for certain designs, such as trial D from students 4 and 5, trial B for student 3, and trial C for student 4. These were evaluated as being 78%, 74%, 77% and 78% creative, respectively. Nonetheless, the average evaluation for creativity was below par.

Qualities	Trial A	Trial B	Trial C	Trial D
Relevance to Abu Dhabi Brand Image	11%	58%	70%	80%
Relevance to Al Ain Brand Image	83%	36%	24%	14%
Creative Design Concept	34%	34%	34%	59%
Non-creative Design Concept	56%	60%	62%	36%

Table 3. Architects' evaluation of the results

To finalize the evaluation process for Midjourney's output, we assessed the AI's adherence to students' objective constructs. We began by distinguishing objective constructs from subjective ones. Following this, we determined the degree of AI's commitment to each student's constructs within each trial, denoting this as a percentage. Lastly, we computed the average AI commitment for each type of trial, as indicated in Table 4, which outlines the three-step evaluation process. The findings from this assessment highlight the AI's strong adherence to the given constructs. However, we observed a declining commitment level as the number of constructs increased, especially apparent in the case of student 3. Additionally, our results indicate that the use of negation in constructs, as seen with student 3 ('no cornice at all' and 'entrance with no stairs'), often yields outcomes divergent from the intended result.

Student	Step 1: Objective constructs	Step 2: ranking of AI commitment			
		Trial A	Trial B	Trial C	Trial D
1	Contemporary - asymmetric - wide glass - more materials - light colors - comfortable - interesting - attractive - Eastern . (Five constructs)	80%	100%	100%	100%
2	Symmetrical - Balanced - large openings - earthy tones - approachable - warm exterior (Four constructs)	100%	75%	75%	100%
3	Organized composition - symmetry - balanced distribution and arrangement - hierarchical emphasis of elements - balanced visual weight - designed to proportion and scale - defined entrance - focal point - motifs used - regular repetition - rhythmic facade outline - organized and united composition - genuine basic shape - be built with a balance between adding and subtracting elements - elements shall be aligned and perpendicular - cultivate a sense of place - original and unique - multiple materials and textures - have metal material - glass with big openings compared to the size of the building - refer to a specific function - in context - long term pleasant - exciting - neo-traditional design - have elements that show dimensional transformation - designed based on a modular grid - no cornice at all - entrance with no stairs (Twenty constructs)	70%	65%	70%	65%
4	Traditional - Simple form - Shading elements - light material - large openings - dynamic form (Six constructs)	83%	66%	66%	66%
5	Symmetrical - Prefabricated Material - Large openings - calm feeling - smooth texture - combination of materials (Five constructs)	80%	80%	80%	80%
Average		82.6%	77.2%	78.2%	82.2%

Table 4. Assessment of AI's adherence to students' constructs

CONCLUSION

This study highlights the potential of Text-to-Image AI platforms, namely Midjourney and Prodia, in architectural design, where these systems could reliably interpret and incorporate personalized text derived from psychological tools, specifically RGT, into creative, diverse design solutions. The research particularly underscored the system's efficacy when a reference image mirroring the city's brand image was used in conjunction with the personalized text. As indicated by the evaluation of nine practicing architects from Al Ain and Abu Dhabi, these AI-generated designs successfully encapsulated the unique brand identity of the city while offering a rich array of tailored alternatives.

This research not only substantiates the potential for AI's participation in generating architectural design solutions but also sets the stage for in-depth exploration into its role within the educational ecosystem, particularly within architectural design studio education. It calls for further investigation to uncover the challenges and opportunities AI presents to optimize its utility in pedagogy and practice. Though preliminary, the results illuminate a promising trajectory in harnessing AI capabilities for personalized, contextual and innovative design in architecture.

NOTES

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- ³ Yuji Yoshimura et al., "Deep learning architect: Classification for architectural design through the eye of artificial intelligence," in *Computational urban planning and management for smart cities*, ed. Stan Geertman et al., Lecture notes in geoinformation and cartography (Switzerland: Springer Cham, 2019), 15.
- ⁴ Yoshimura et al., "Deep learning architect: Classification for architectural design through the eye of artificial intelligence," 16.
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- ⁸ Rawan Rahman et al., "Advancing the use of the repertory grid technique in the built environment: A systematic review," 8 (2022): 2, <https://doi.org/10.3389/fbuil.2022.1082149>.
- ⁹ Viv Burr, Nigel King, and Mark Heckmann, "The qualitative analysis of repertory grid data: Interpretive clustering," *Qualitative Research in Psychology* 19, no. 3 (2022): 683, <https://doi.org/10.1080/14780887.2020.1794088>.
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DESIGN FOR CHANGE: AN INTERDISCIPLINARY CRITICAL REFLECTION OF EQUITY IN DESIGN IN THE DIGITAL AGE

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INTRODUCTION

Design education is undergoing a transformation, prioritising teaching and learning methods fostering an awareness of cultural, social, and ethical issues, which enables the effective and inclusive development of design solutions.¹ Critical Design is one such approach, premised on provoking critical thinking and stimulating dialogue by questioning social norms through the creation of satirical, thought-provoking design concepts to instigate a change in perception related to associated values or behaviours.² The UN Sustainable Development Goal (SDG) number 5 aims to achieve gender equality and empowerment of all women and girls by 2030.³ This research is grounded in the belief that gender equality is a fundamental human right and a necessary foundation for a sustainable world and a critical talking point for consideration in design higher education and industry.

This paper reports on a student project designed to support transformative learning⁴ at an undergraduate level through the facilitation of a Critical Design project in design higher education exploring representation in Design. Through qualitative analysis of student reflections and project outcomes, this paper explores the effectiveness and significance of this pedagogical approach in undergraduate teaching and learning.

CONTEXTUALISING GENDER IN DESIGN

Gender bias arises when individuals assess a person or group based on gender-related stereotypes.⁵ Traditionally, men and women have ‘dominated’ different design disciplines as a result of stereotypical gender roles and gender socialisation,⁶ whereby women are associated with ‘soft’ or ‘feminine’ design fields such as Interior and Fashion Design, and men are linked to ‘hard’ or ‘masculine’ design disciplines like Industrial Design and Architecture.⁷ The design industry, as a whole, characterized by some as “irrefutably patriarchal”,⁸ has traditionally been male-dominated, with inherent gender biases. Although women have always played a significant part in the design profession, they have also been historically marginalized by it, with their achievements often unrecognized.⁹

While student enrollments now show a relatively even gender distribution worldwide, this is not mirrored in the industry, pointing to a “leak” in the pipeline carrying students from university to industry.¹⁰ The 2018 Design Economy Report published by the Design Council revealed that while 63% of UK Design and Art graduates are female, the makeup of the design workforce is only 22% Female. Similarly, in South Africa, although limited research and data exist on this subject, a comparable situation exists with only 21% of registered architects and 26% of industrial designers being women.¹¹

Biases filter into the products and services we design.¹² The lack of representation and diversity in design teams creates a gender “data gap” rendering many experiences excluded resulting in the development of products and services that further disadvantage women and other minority groups.¹³ For products, systems, and services to meet the needs of as many people as possible, design teams need to be diverse. Literature states while designers need to become aware of their own biases, design education falls short in encouraging design students to reflect upon the topic and their likelihood to gender stereotype.

PROJECT DESCRIPTION

This project encouraged students to develop their understanding of gender equality in their design disciplines through ethnographic research and respond to the data using a critical design approach. Framed within the digital age, the project was guided by the Fourth Industrial Revolution (4IR), as it is essential to acknowledge the rapid changes and technological advancements that impact our industry and have the potential to increase opportunities or further sideline diversity.

This research builds on a larger research project, “Unequal Stories”, a collaborative research project documented, in detail, in a conference paper titled: “Critical Design Futures: Challenging the Gender Data Gap Through Pedagogy”.¹⁴ This paper provides a brief overview of the project’s pedagogic premise, with a primary focus and discussion on student reflections and project outcomes.

This project was facilitated with 2nd-year students from stereotypically “opposed” disciplines of Industrial and Fashion Design. To allow for qualitative assessment of whether transformative learning had been achieved through the completion of the project, students were required to complete pre- and post-project reflections. To deepen the student's engagement with and understanding of the topic from diverse perspectives, interdisciplinary group discussions between the two departments were facilitated at each critical stage of the project. Although the project was facilitated within two design disciplines and modules, both groups were required to present their outcomes using presentation posters, a video, and a 200-word write-up. This allowed for effective cross-discipline comparison of outcomes and did not limit the students to work within the confines of their discipline.

OUTCOMES AND DISCUSSION

Pre-Project Reflections

Before receiving the project brief, or any context of the project or topic, students were requested to reflect and answer the five questions depicted in Figure 1.

Pre-Project Reflections

Questions

1. How does Gender affect your experience as a design student?
2. Is there an equal representation of gender in your discipline/department?
3. How did cultural gender roles and/or gender stereotypes influence your choice of design discipline?
4. How does your gender affect your confidence as a design student?
5. Have you experienced gender bias in the classroom?

Figure 9. Pre-project reflection Questions

The Fashion Design students’ pre-project reflections outlined a level of freedom of expression that students experience in the department. However, students still experienced the impact of stereotypes and connotations related to gender and sexuality. Another assumption that the students reflected on was the assumptions made by society about their choice to study fashion and the common assumption that it may not equate to a successful career.

Pre-Project Reflections

Fashion Design

"As a male fashion student I spend most of my school practical classes different genders and everyone is responsible for labelling his or her gender, with that I conclude that gender never affect me negatively in my discipline because gender is a wide concept in this century and with respecting everyone gender no effect shall affect you."

"I would not say it necessarily affects me directly but there are those stereotypes of how as a guy I am not expected to do fashion design as it is female dominated so it usually comes as a surprise when I tell somebody what I am studying."

"There are certain stereotypes linked to gender which may disadvantage me."

Figure 2. Fashion Design Student Pre-Project Reflections

Within Industrial Design, the majority of male students did not feel that gender had any impact on their experience as design students. More reflective answers were seen from female students who cited a lack of confidence or needing to prove themselves in comparison to their male peers. Overall, there was limited awareness of the status of gender representation in their industry.

Project Outcomes

Below we discuss a selection of project outcomes, two from each department, to showcase the overall efficacy of the project and the range of student design responses.

Student A (Figure 4) depicted a dystopian future scenario in response to the question; "What if we do not address the pre-existing biases relating to gender, race, and sexual orientation within the design industry?" Their response resulted in a brochure describing an induction program for girls, grooming them from birth in the likeness of a white man to ensure future career success. This response echoes the prevalence of whiteness and heteronormativity identified in the student's research activities. The supporting brochure outlines the training program the Universal Standard offers through a satirical and provocative use of language.

Pre-Project Reflections

Industrial Design

"I personally feel that gender does not affect my experience as a designer."

"I cant really say that gender has had any positives or negatives on my experience as a designer."

"I haven't experienced any difficulties as a male."

"It makes working together difficult because it is always a constant battle with oneself to feel the need to prove to each other that either one of us is good at what they do."

"It doesn't affect me in the design process, but I feel I have a disadvantage when it comes to the prototyping and manufacturing of my product, because I am not as strong as a man."

Figure 3. Industrial Design Student Pre-project Reflections

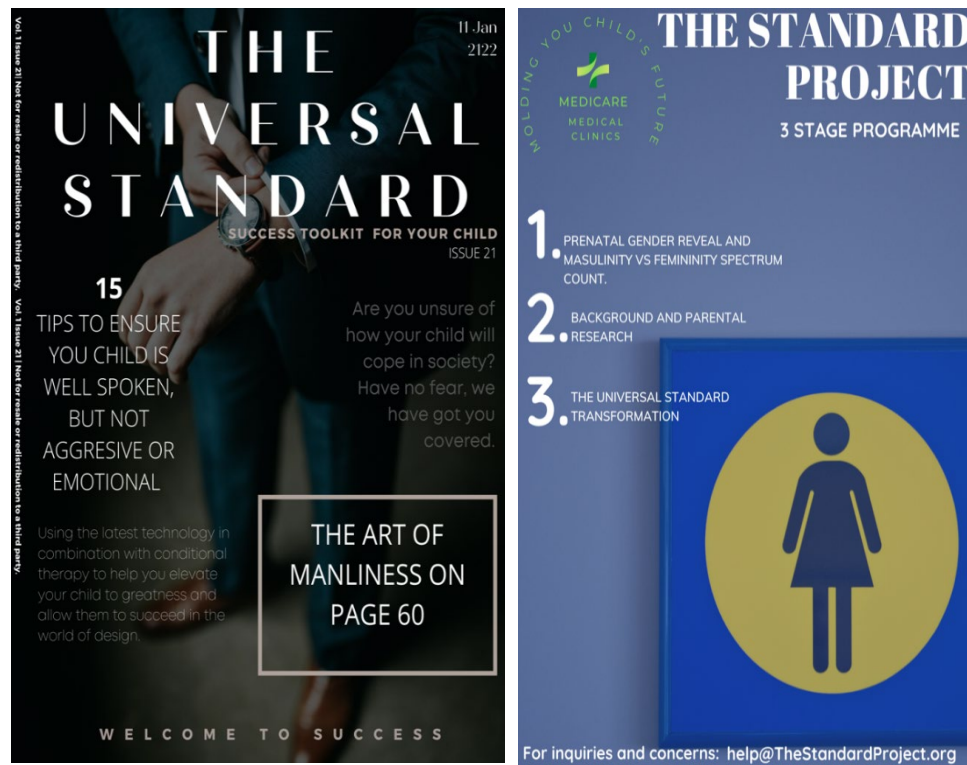


Figure 4. The Universal Standard by Student A

Student B identified a lack of inclusion of diverse family settings that do not prescribe to the traditional nuclear family. In response, Student B (Figure 5) depicted a speculative scenario guided by the question; What if male bathrooms accommodated single fathers by including baby changing rooms? The design response was a conceptualisation of the Daddy and Nana Room, ‘Nana’ being a South African vernacular term meaning baby. The changing rooms were designed for single fathers incorporating artificial intelligence (AI) functionality offering voice automated assistance allowing fathers to search for relevant resources while in the changing room.

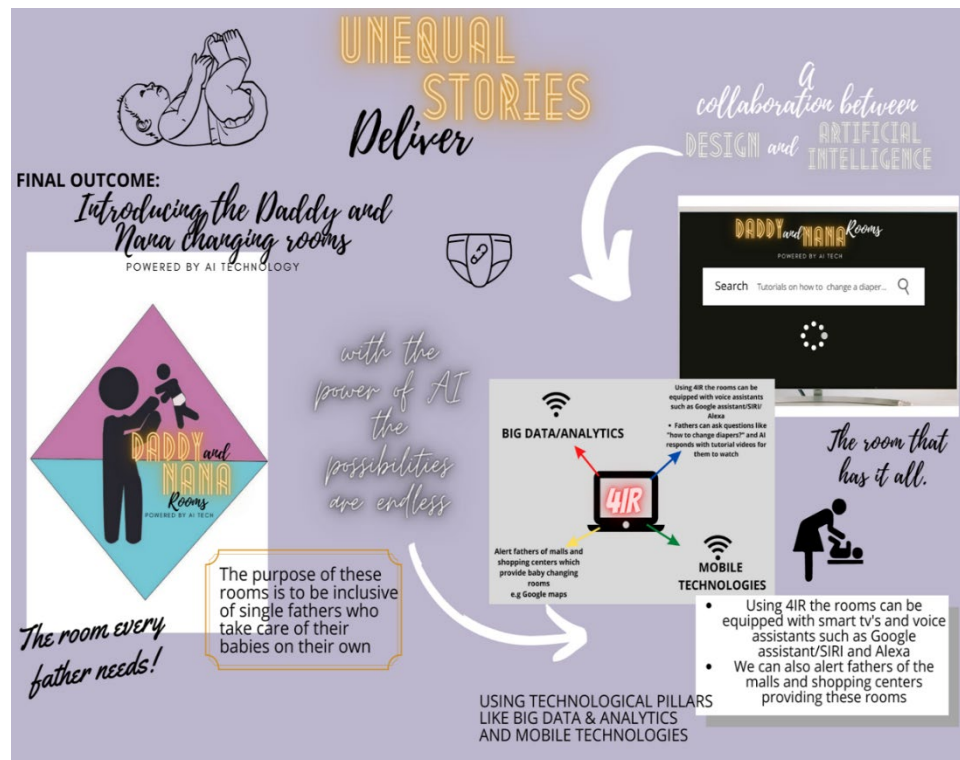


Figure 5. Daddy and Nana Room by Student B

Student C identified how gender stereotypes filter into products and now AI technology, through the 'male data' with which it is trained. In response to the question: "How might gender stereotypes found within products be amplified by AI in the future if AI replaces designers and generated products based on current data?", "Pocket Pretty" and "Man Pan" form a satirical range of products traditionally associated with a specific gender but incorporate stereotypes of the opposite gender to "make them more appealing" to the opposite gender. The result is a collection of peculiar or impractical products that critically highlight the consequences of gender stereotypes.

Student D observed that women of colour encountered difficulties in securing adequate funding for academic initiatives, experienced a lack of confidence in their work and abilities, and often felt marginalized and unheard compared to their white peers. In response to the question: "How might we create empathy and understanding for those systemically disadvantaged, through design?" 'INTRSXNS' is an AI-powered interactive board game concept that provides students and academic staff an opportunity to immerse themselves in the academic experiences of both white males and black females. The game highlights the structural injustices in design higher education environments by deliberately making it more challenging for black women players to "win" compared to their white male counterparts.



Figure 6. Pocket Pretty and Man Pan by Student C



Figure 7. INTRXSNS boardgame by Student D

Post-Project Reflections

Fashion Design

"As a feminine queer male it has been a bit hard for me because I feel like everyone has set these stereotypical standards of "queer men in fashion being the best designers" for me. I am not expected to flop because this is where people like me are supposed to shine."

"Coming from a black family, design is not something that is considered as a career but more of a hobby because of the social norms that have been instilled in our minds that in order to be successful we have to get an office job or something that requires a scientific mind."

"I feel there is equal representation of gender amongst students. But there's more female lecturers compared to male. It does not affect me because I believe lecturers are not hired because of their gender at the university, instead they are hired for their knowledge and qualification."

Figure 8. Fashion Student Post-project Reflections

Post-Project Student Reflections

Fashion Design students' post-project reflections highlighted more consideration of the external social factors and how that can influence their approach to designing from a more informed and empathetic position, avoiding unconscious biases that they may not have considered before the project. There was more reflection on the topic of gender with the acknowledgment of its intersectionality's. The exploration of the intersections of gender with race and class, specifically, allowed students to have provocative and challenging discussions openly amongst peers. This allowed for relevant insights and authentic and respectful dialogue between the racially and gender-diverse student cohort of the project.

After engaging with the topic deeply, all Industrial Design students showed a deeper understanding and reflection of gender in their discipline citing disappointment in the current realities, optimism for the future of the industry as well as personal unconscious bias.

Post-Project Reflections

Industrial Design

"No there isn't equal representation, and it is saddening as the women in this discipline are very skilled and have brilliant ideas. It is disappointing to know that the industry doesn't represent women."

"Within current industry there is not much equal representation however by looking at the split of gender within my class and lecturers I feel that Industry will start to have more equal representation in the coming years."

"My gender does effect my confidence within the workshop and with building as it is stereotypically a male skill, however, I think that has come from internal bias which has been instilled in me and not necessarily due to how I've been treated within the university."

Figure 9. Industrial Design Student Post-project Reflections

Project Feedback and Lecturer Reflections

Overall, the student's feedback on this project was positive. Students appreciated the interdisciplinary interaction during the project, whereby the facilitation of the project between stereotypically opposed design disciplines offered students an opportunity to engage with their peers and gain some insight into some similar experiences linked to the intersectionality of gender with race, culture, and class. Students reflected on their own implicit biases related to gender equality and representation and were exposed to different student experiences and subsequent challenges related to gender and race. The approach of speculative design offered students a new set of design thinking skills that required them to critically engage with the assignment and develop a relevant design response that did not follow the traditional design discipline-specific principles of creating solution-based design outcomes.¹⁵

The project was facilitated in two modules, a theory-based module for Fashion and a practical-based one for Industrial Design students. The ethnographic research element aligned well with the theory module's purpose to conduct research on key concepts through the application of design theories, methods, or approaches. The practical module's purpose is to develop practical design skills alongside creative thinking and critical analysis. While projects in this module are typically framed within the confines of standard manufacturing processes, this project allowed students to think more critically and imaginatively without the confines of manufacturing while still showcasing practical skills such as CAD work, resulting in an effective project aligned with the module's purpose.

CONCLUSION

Qualitative analysis of the project outcomes and student reflections revealed that students' perception of diversity specifically related to gender and culture significantly impacts how they design. The pre- and post-project reflections indicate that following critical design approaches, albeit quite challenging, offered new opportunities to design for social issues and highlighted the importance of understanding and acknowledging diversity in design. Exploring the social issues of gender in design within a South African context revealed that gender as a social issue could not be explored without acknowledging the intersections of gender with race, culture, and class.

Overall, this project proved to be a valuable and relevant teaching and learning intervention that fostered transformative learning across theoretical and practical modules in two 'opposed' design disciplines. The researchers aim to further this research by implementing further student projects applying Critical Design approaches fostering transformational and developmental pedagogy ethos amongst South African Fashion and Industrial Design students in higher education.

NOTES

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EXPLORING THE COMPLEX, EMERGENT CHOREOGRAPHY OF CLASSROOM TEACHING AND LEARNING.

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INTRODUCTION

Support for the view that learning and teaching are complex phenomena goes back decades, including long before social scientists began to draw on complexity theory to explain the networked intricacies, feedback loops and emergent, self-organised behaviours of the social world. Forty years ago, Schulman pointed out that the idea that ‘improving schools’ was possible via simple policy tweaks was a ‘collectively held myth’¹. A few years later, Eisner described teaching as ‘an inordinately complicated affair’.² Just two years later, Schön wrote that *‘Teachers’ work operates in the ‘swampy lowlands’ of everyday life*.³ In the following decade, Schulman delivered what could have been the final blow to the notion that teaching and learning are straightforward phenomena when he wrote that *‘Teaching (...) is perhaps the most complex, most challenging, and most demanding, subtle, nuanced and frightening activity that our species ever invented’*.⁴

The case for learning being complex, tacit, unpredictable and indeterminate; and for teaching relying as much on judgement, intuition and improvisation as on pre-planning were seemingly made. However, despite these descriptions, prevailing discourse on teaching and learning in public policy, the media and wider society remains stubbornly complexity-avoidant. Whilst it is rarely articulated explicitly, a mechanistic, input-output conception hovers uncomfortably beneath the surface of much teaching and learning discourse. This simplified version of school and classroom processes has produced constructs well known to those in the profession, such as ‘teaching effectiveness’, ‘school improvement’ and the idea of ‘fixing schools’. Somehow, we have always failed to listen to, and acknowledge, teachers’ experiences, the result of which is that policy and public discourse about learning, and by extension teaching, often bear scant similarity to the ways teachers experience them day to day.⁵

Such experiences have found their expression however, in some of the concepts associated with complexity theory, for example non-linearity, networked causality, emergence and self-organisation. Hardman⁶ has not been alone in pointing out that teachers are drawn to complexity theory because it seems to offer explanations of classroom teaching and learning which chime with their experience. Nevertheless, prevailing thinking about relationships between teacher practice and pupil learning remains stubbornly linear and process-product driven.⁷

There are understandable reasons why the discourse on teaching and learning has become so reductive and instrumentalized however. We humans are addicted to simplicity. Simplicity makes life

manageable. Simplicity helps us make choices about how to act in the world; it helps us get things done. The inclination to present learning as simple and fixable creates an influential and seductive, if limited, portraits of classroom realities; representations which are readily consumed by a society hungry to know ‘what works’. The problem for policy makers, and inevitably for teachers too, is that as Gert Biesta argues, ‘what works’ doesn’t always work.⁸ Hardman⁹ too, has pointed out that there has been a failure of simple, causal explanations to adequately account for the complexities of school and classroom learning. And as Mencken famously noted, *‘For every complex problem, there is a solution that is simple, obvious, and wrong.’*¹⁰

I am not arguing here that teaching does not in some ways ‘cause’ learning to occur in the broadest sense, or that changes to education policy cannot have positive effects on pupil learning. I am not even arguing that there are no more or less ‘effective’ ways of teaching or that classrooms and schools cannot be ‘improved’. Clearly effects in the social world have antecedents, just as actions and events have consequences. However, a complexity-sensitive reading of social causality is non-linear, meaning that effects of events within a system are pluriform and felt at all levels of the system. A given effect can be the consequence of multiple interacting causes, and itself a cause of multiple effects, therefore the idea of the single cause or single solution, so popular in education discourse, breaks down.¹¹

Obviously, there are such things as effective, not so effective and ineffective teaching. Undoubtedly, some approaches have higher probability than others of invoking conditions conducive to learning, but a complexity-framed view of teaching and learning policy enactment sees causation as stochastic and rejects the idea that effective/ineffective can be too confidently generalised. To be clear, I am not rejecting the idea that certain teaching approaches may ‘work’ whilst others may not, but qualifying the notion with questions such as, work where? For whom? Under what conditions? When applied how? For how long?

THE STUDY

The classroom-based study upon which this paper draws was undertaken against the backdrop of such simplified policy and media discourse. As a former teacher and now experienced teacher educator I was keen to develop representations of classroom learning which acknowledge its complexity. Accepting the impossibility of comprehensively modelling classroom system complexity, the study nevertheless sought to explore the contingent, unpredictable and emergent qualities of learning by interrogating a range of data from videoed episodes of small group interactions, collected during one week in a year 4 (8 & 9 year olds) primary classroom in the UK. Findings about the nature of learning have been used to support some assertions about the complex task of teaching, which I will come to later.

Research questions

- 1.To what extent can learning be said to have ‘emerged’ within small group classroom activity?
- 2.What are the characteristics of ‘emergent’ learning?
- 3.What conditions encourage ‘emergent’ learning?

The study sought to develop insights about the ways learning emerges bottom-up during small group activity, when pupils are collaborating on shared tasks without the presence of a teacher. This is a common context for primary classroom learning in the United Kingdom and comparable education systems.

Methodology

This complexity-sensitive, mixed-methods case study drew on the following data captured over five days of a collaborative model rocket building project:

- 1.6 Video-captured interactive small group episodes
- 2.4 Video-captured whole class episodes
- 3.203 Pupil self-reported 'Moments of Learning' expressed on modified post-it notes
- 4.14 Individual pupil interviews (about 'Moments of Learning')
5. Researcher field notes

Data were integrated to create 'Learning Narratives' (LN); stories which could be told about the learning journeys of small groups who collaborated on the classroom project over. The LNs captured and categorised instances of learning and traced their antecedents and consequences for the small groups and the wider class. Each narrative included a sociographic representation showing types and frequencies of interactions (Figure 1). Social network analysis (SNA) and Degree Centrality measures were used to determine which pupils exerted influence over the small group interactions. Critical learning incidents (CLI) from each episode were represented on graphic timelines (Figure 2), showing when different categories of learning emerged. Self-reported 'Moments of Learning' (MoL) data in which pupils annotated post-it notes (live) indicating moments in which they felt they had learned something, along with reflections about that learning from pupils' interviews were integrated to reveal ways that learning emerged bottom-up from the peer-to-peer interactions. Qualitative analysis of whole class video episodes added context to the small group structure and showed how pupils moved between centralised (teacher led), decentralised (small group) and distributed (whole class) organisational principles (figure 3) over the course of the week.

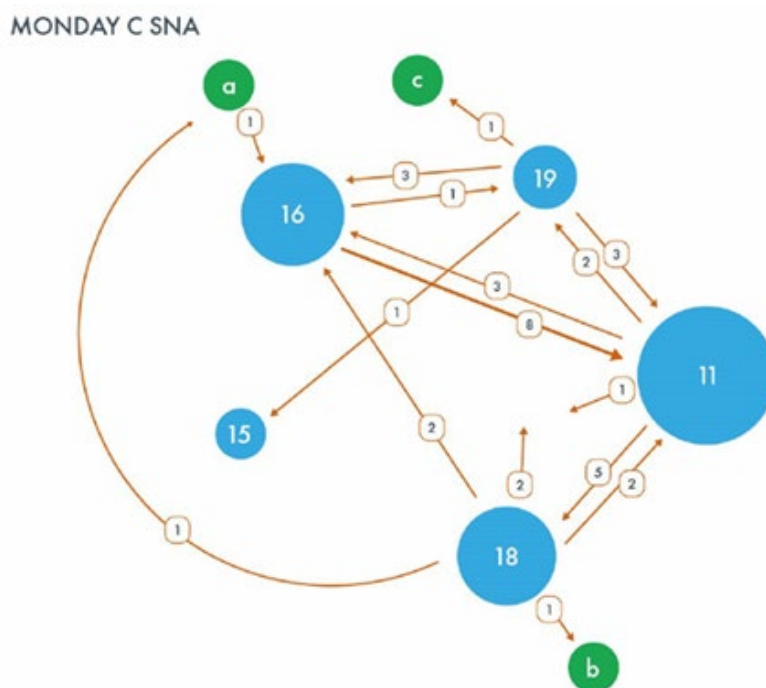


Figure 1. Example of sociographic representation of interactive small group episode. Nodes represent pupils, edges represent direction and frequency of interactions. Nodal size illustrates group influence calculated as 'degree centrality'. Nodes with higher incoming than outgoing utterances are considered more influential

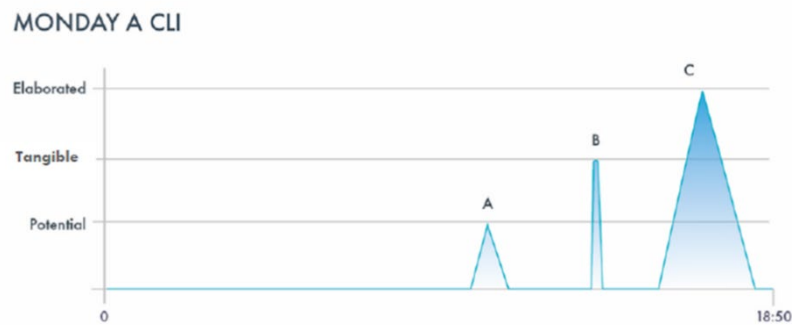


Figure 2. Critical Learning Incident (CLI) graph showing when learning, categorised as Potential, Tangible or Elaborated, was evident during a group work episode

Each CLI was described and analysed using qualitative thick description, incorporating transcribed dialogue and descriptions of social dynamics, body language and other qualitative observations to form vignettes within each LN. Categorising observed learning as Potential, Tangible and Elaborated (Figure 2) encouraged a focus on not only overt instances of learning, but also signs that learning may be about to emerge.

FINDINGS

As shown in Table 1, there was evidence that learning emerged ‘bottom-up’ from the small group interactive episodes. However, the only instances of elaborated learning occurred when the teacher was briefly present, posing scaffolding questions. Nevertheless, there were many instances of potential and several instances of tangible learning evident when the teacher was not present. These were primarily in the form of hunches and informal hypotheses. There was evidence that the conditions which encouraged emergent behaviours also allowed for degrees of self-organisation. This was most apparent through pupils imitating one another, adopting each other’s ideas and the ways knowledge (correct and incorrect) spread out from individuals to small groups and between small groups across the classroom. Non-linearity was a feature of all the small group episodes. Video data, MoL and interview data revealed how pupil knowledge and learning originated from multiple sources from within and outside of school. There was evidence of ideas appearing, disappearing and reappearing frequently and information always moved back and forth around the collectives before settling, being agreed or accepted. There were also often long delays between activities occurring and learning emerging. Finally, there was some, though limited, evidence that learning which emerged was novel and represented more than the sum of any one individual’s knowledge. A small minority of CLIs constituted knowledge or ideas which emerged organically from within the small groups, but which no individual entered the episode possessing.

Complex phenomenon	Conditions
Emergence: Learning emerged bottom-up, but not in clear or elaborated forms Hunches, hypotheses, correct & incorrect assertions	Pupil autonomy/decisional capital Internal diversity Collision of ideas Interplay of personalities and social status dynamics Pupil conflict and 'off-task' time
Self-organisation: Patterns of behaviours, information and knowledge did move within and between the small groups	Subcultures Word of mouth Imitative behaviours Bifurcations & eruptions of novel ideas/behaviours
Non-linearity: Learning arose from multiple sources Learning surfaced, adapted and resurfaced multiple times Information & ideas moved back and forth between pupils	Movement between different organisational Structures Feedback loops Continuity of tasks/topic
Transcendence: Resolutions, plans and breakthroughs sometimes arose from conflict and 'off-task' time.	Pupil autonomy, open-ended tasks

Table 1. Summary of findings related to learning as 'emergence'

DISCUSSION POINTS

1. The influence of internal diversity as a driver of emergent learning
2. Influence exerted on small group dynamics and system learning by 'salient' individuals.
3. That social conflict and other less desirable or apparently off-task interactions can prompt learning to emerge, though not consistently.
4. That emergent learning appears to be limited to 'potential' and 'tangible' forms.

The study found that autonomous small group learning does have emergent qualities. For example, novel ideas, contributions and suggestions emerged which were not articulated in the task briefs. Pupil interactions created dynamics which took group activities in new or unanticipated directions. These diversions and tangents were initiated by shared humour, subversion, silliness and group conflict, as well as by the presence (or absence of) pupils' subject knowledge. Learning, or the conditions for future learning, emerged from some surprising sources including pupil arguments, low level misbehaviour and off-taskness. Internal diversity appeared to drive this.

However, the only instances of 'elaborated' learning came when the teacher was briefly present and scaffolding through questioning, which indicated that whilst 'potential' learning could be prompted through interactive system emergence, timely and expert interventions from teachers are necessary for it to become fully articulated. Emergent learning may therefore be limited to lower-order forms

suggesting that fully autonomous interactive group activity is unlikely to produce the consolidated learning and mastery typically required by school curriculum. However, this indicates that valuable ground-work for learning and the green shoots of future learning emerge when pupils have opportunities to freely interact on open ended tasks and that such opportunities should be facilitated by teachers. It also indicates that teachers must be capable of judging how and when to transition between different organising principles.

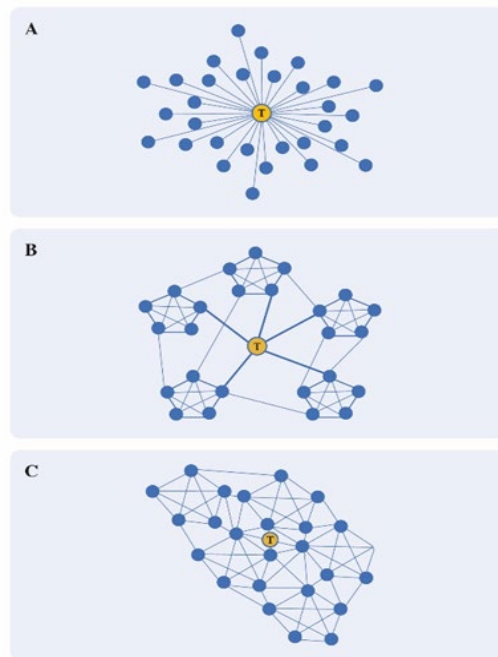


Figure 3. Whole class video data showed these to be the three most common organising principles in primary classrooms. Adapted from Davis and Sumara¹²

Findings from the study suggest that shifts between centralised [A] and decentralised [B] organising structures (Figure 3) are fruitful for pupil learning because decentralized structures [B] allow space and autonomy for ‘potential’ learning to emerge whilst centralized structures [A] help consolidate that learning. Decentralised group work structure [B] offers pupils scope to interact freely and for lower-order learning to emerge. Pupils need opportunities to operate autonomously without teacher input and top-down intervention. However, they also require teacher intervention to elicit learning in more elaborated forms. Centralised structure [A] enables teachers to scaffold, elicit and consolidate potential learning into more tangible and elaborated forms. This finding may appear to be obvious, however, a complex systems level examination of classroom learning reveals insights about relationships between these structures and pupils learning, as well as helping to identify pedagogical implications for teachers. Clearly teacher intervention and input is essential, however in the present study the teacher’s interventions were successful because they capitalised on ‘soon-to-be’ learning which was given space to emerge in potential forms during autonomous small group episodes.

PEDAGOGICAL IMPLICATIONS: THE CENTRAL ROLE OF TEACHER PROFESSIONAL JUDGEMENT

Findings from this study support the widely held view that learning is not merely transmitted from teachers to pupils in a linear causal fashion. If there were simple approaches and strategies guaranteed to produce desired learning at desired rates, you can feel assured that we would all know about them

and have been enacting them for some time by now. Derrida summed this point up nicely when he wrote

*'One shouldn't complicate things for the pleasure of complicating, but one should also never simplify or pretend to be sure of such simplicity where there is none. If things were simple, word would have gotten around [...]'*¹³

The fact that, as Doll¹⁴ puts it, teaching has an ancillary, not directly causative relationship, to learning may not be widely emphasised in policy and media depictions, nevertheless it has some important implications for teachers and teaching.

Teachers wishing to capitalise on the learning potential of autonomous interactive groupwork are signing up to some challenges which will demand expert classroom judgement. Emergent learning thrives in classrooms where the collision of ideas is encouraged, however, for ideas to collide pupils must collide too, in the sense of interacting at times with autonomously and minimal constraint. This means conditions for disagreement, counterpoint and self-organised resolution are necessary. Managing such conditions and occasioning opportunities for emergence (whilst preventing all-out havoc) demands a repertoire of skills and expertise associated with judgement, intuition and instinct. This includes (but is not limited to) locating 'sweet spots'¹⁵ in transitions between centralised and decentralised organisational structures, sensitivity to teachable moments, skillful assessment of disagreement and its potential to occasion novelty and innovation, confidence and competence in noticing and inferring signs of 'potential' or 'soon-to-be'¹⁶ learning and knowing how to nurture it, as well as comfort with uncertainty.

Teaching demands these competences, however they rarely surface in teacher competency rubrics. Teaching demands these standards of expertise, though they are conspicuous by their absence from teacher education curricular and early career frameworks. Such policies typically articulate expected practice in terms of outcomes, with little reference to processes or dispositions, however professional judgement lies within the processes of teaching, not its outcomes. This produces teacher development policy which makes little or no reference to judgement, dilemmas, instinct or reasoning despite these things being at the heart of teacher expertise. It is generally assumed that pre and in-service teachers will automatically develop these practices, and the expertise upon which they depend, merely from classroom teaching experiences. However, as Strom and Mitchell Viesca have pointed out, despite recent advocacy for approaches to professional development which take account of the complexities of teaching and learning, 'dominant thinking regarding teacher learning and practice remains relatively linear and 'process-product' driven'.¹⁷

In order to exercise judgement in the interests of pupil learning teachers must feel permitted to do so. This means they must have sufficient decisional capital to adapt their pedagogical actions and responses to dynamic classroom events. They must also be capable of doing so and I have argued that the lack of both permission and capability are failures of policy to appreciate the nature of learning and to articulate authentic depictions of teaching.¹⁸

Figure 4 shows a model for the development of two interdependent types of professional judgement, judgement removed from the moment of teaching (judgement 1) and in-situ judgement (judgement 2). An aspect of judgement 1 which is pertinent to this paper is systems thinking (judgement 1). I argue that to capitalise on the potential learning benefits inherent in managing shifts between centralised, decentralised and distributed classroom organisation, teachers must be encouraged adopt a system-level view of the classroom, to notice and capitalise on system-level trends.

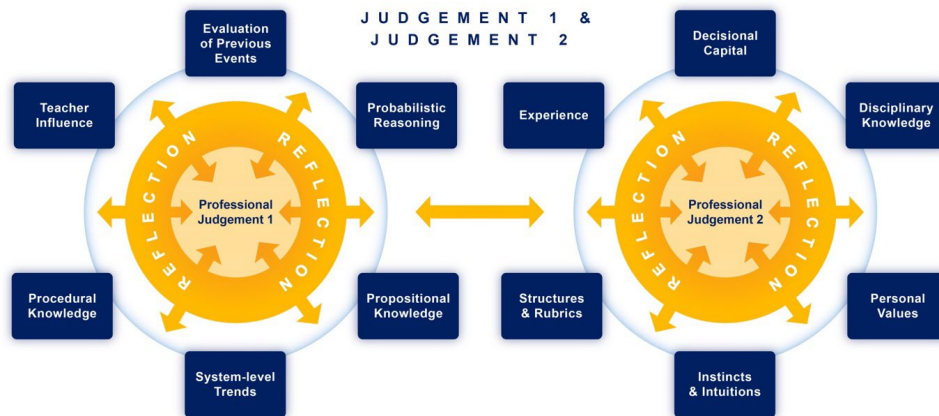


Figure 4. A model for teacher judgement on (judgement 1) and in (judgement 2) the moment of teaching (taken from forthcoming book¹⁹)

Viewing the classroom as a system within which different organisational structures elicit different types and stages of learning encourages teachers to consider ways they can instigate and manage shifts between organising structures to create conditions conducive to both ‘potential’ and ‘elaborated’ learning. It also encourages teachers to conceive their role as facilitator and orchestrator not only of individual learning, but of a learning system. As depicted in Figure 4, reflection is an essential mediating factor for such judgements.

CONCLUSION

In this paper I have presented arguments, drawn from an empirical study into the complexity of classroom learning, demonstrating that teaching requires judgement. Teachers cannot derive their actions algorithmically, through routine (though routine plays a role), or by simply doing what they did yesterday because classroom events and learning incidents are uniquely configured by context. As such, teachers are required to draw on a range of knowledge sources to make judgements *in* the moment and *on* the moment.

Learning does not, despite our best efforts, arrive on cue, neatly packed around curriculum ‘learning objectives’ because teaching and learning share a complex relationship. Teaching and teaching environments are choreographed through both rehearsal and improvisation in the interests of learning. One of the key mechanisms for this choreography is the orchestration of shifts between top-down and bottom-up organising principles.

NOTES

- ¹ Lee Schulman, *The Wisdom of Practice: Essays on Teaching, Learning and Learning to Teach* (San Francisco, CA: Jossey-Bass, 2004), 140.
- ² Elliott Eisner, *The Art of Educational Evaluation* (London: Falmer Press, 1985), 104.
- ³ Donald Schön, *Jossey-Bass Higher Education Series. Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions* (San Francisco: Jossey-Bass, 1987), 4.
- ⁴ Schulman, *Wisdom of Practice*, 504.
- ⁵ Karousiou, Christiana, Hajisoteriou, Christina and Angelides, Panayiotis, "Teachers' professional identity in super-diverse school settings: teachers as agents of intercultural education," *Teachers and Teaching* 25, no. 2 (2019): 240-258, doi <https://doi.org/10.1080/13540602.2018.1544121>
- ⁶ Mark Hardman, "Is complexity theory useful in describing classroom learning?" (paper presented at the *European Conference on Educational Research*, ECER, Helsinki, Finland, August 23-27, 2010).
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- ⁸ Gert Biesta, "Why 'What Works' Still Won't Work: From Evidence-Based Education to Value-Based Education," *Studies in Philosophy and Education* 29 (2010): 491.
- ⁹ Mark Hardman, "Complexity and classroom learning" (PhD diss., Canterbury Christchurch University, 2015), 15.
- ¹⁰ Paul Ciotti, "Freaked Out by Technology: A student of the '60s takes a new look at what moved the New Left," *Reason: Free Minds and Free Markets* August Edition (1983): 37.
- ¹¹ Keith Morrison, *School leadership and complexity theory* (London: Routledge Farmer, 2012), 15.
- ¹² Brent Davis and Dennis Sumara, *Complexity and Education: Enquiries into Learning, Teaching and Research* (Abingdon: Routledge, 2006), 52
- ¹³ Jacques Derrida, *Limited Inc.* (Evanston, Illinois: Northwestern University Press, 1998), 119.
- ¹⁴ William Doll, *A Post-Modern Perspective on Curriculum* (New York: Teachers College Press, 1993), 101-102.
- ¹⁵ Ben Knight, "Complex adaptive system behaviours in small group interaction: A year 4 classroom case study of learning as 'emergence'" (EdD diss., University of the West of England, 2022), 226.
- ¹⁶ Ben Knight, "Complex adaptive system behaviours in small group interaction: A year 4 classroom case study of learning as 'emergence'" (EdD diss., University of the West of England, 2022), 200.
- ¹⁷ Kathryn Strom and Kara Mitchell Viesca, "Towards a complex framework of teacher learning-practice", *Professional Development in Education*, 47 no. 2-3 (2021): 1. doi: <https://doi.org/10.1080/19415257.2020.1827449>
- ¹⁸ Knight, *Evolving Codification*, 10-11.
- ¹⁹ Knight, *Nurturing Professional*, 3.

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COMPLEXIFYING THE SELF: THE BREAKING THROUGH OF THEATRE IN PSYCHOLOGICAL EDUCATION

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INTRODUCTION

The following text frames and describes main orienting principles and recent results of *Irromper* [Pt. breaking through], an empowerment lead, artistic and psychoeducational project within the field of theatre, that was devised with a group of patients diagnosed with different psychological disorders. The methodology used in this article is mainly based in auto-ethnographic description.¹ This theatre project was one of the latest outcomes of a line of post-doctoral research initiated in 2014,² intersecting Theatre, Psychology and Education, in collaboration with *Encontrar+se* [Pt. to find oneself]³ an institution for the promotion of mental health, in the city of Porto, Portugal. Since then, we have been conducting, in a weekly basis, theatre sessions that interweave artistic and scientific methodologies, with the objective of helping individuals diagnosed with different psychological disorders (e.g., depression, anxiety, bipolar disorder, schizophrenia, borderline personality disorder, among others) to cope with complex mental and bodily issues in a collective context. After several years of collective theatre practices and experiences by the *Encontrar+se* users (hereafter referred to as participants), in 2021, during the pandemic, the Portuguese General directorate for the Arts (DGArtes)⁴ opened a call for artistic projects relating theatre and mental health. The fact that the proposal *Irromper* was chosen in the highest funding threshold validated the artistic dimension of our proposal in addition to the therapeutical one, reinforcing the relevance of the arts as an important activity to address complex issues in the contemporary world.

Theatre and Psychological development?

Since 1994, when I first got involved with theatre and performance, I have been observing and experiencing what Erika Fisher-Lichte has called its “transformative power”, not only in myself but also in other colleague actors and actresses I have been working with throughout the years. I have been grateful to all those who, through the practice of theatre, have aided me gaining meaningful experiential knowledge about myself and the world, and I have always also been curious about the reasons behind the transformations it facilitates. This curiosity led me to initiate a doctorate in Psychology, which was, in itself, a profoundly transforming experience. The possibility of looking at Theatre from a psychological angle, gave me the opportunity to acknowledge several relevant studies made in the area throughout the years, as well as to reflect about several aspects of my own acquired experiences as an actor and theatre director, in an expanded interdisciplinary perspective. One of the most striking findings, that I will here highlight, occurred when I firstly encountered Norman

Sprinthall's systematization of conditions for psychological development. The concept of psychological development is based in classical contributions of authors such as John Dewey, Herbert Mead, and Jean Piaget, among others, and, in a broad sense, presents an alternative to psychotherapy. One of its main underlying ideas is based on the fact that epistemological development is an ongoing process throughout life, directly related with how different subjects experience and relate with the world. Depending on the contexts (e.g., oppressive, caring, violent, challenging, supportive, among others) and the ways in which different subjects construct their own experiences, they may be prone to face difficulties and inner conflicts in result of dealing with the myriad of different elements that compose the world – including other human beings. This state of *cognitive conflict* (to use a Piagetian referential) can be surpassed through an epistemological expansion that dissolves the former elements in conflict, by creating a broader new unity of meaning (or *reflective abstraction*) – a principle relatable to that of the dialectical process described by Georg W. F. Hegel in *The Phenomenology of Spirit*. This epistemological expansion thus represents a complexification of the mental structures with reflexes in a global development of the psychological structures of the subject (mental, emotional, and behavioural). After years of systematic empirical and theoretical research in psychology, and evidencing the relevance of the quality of the contexts where subjects construct their experience of the world, Norman Sprinthall concluded that psychological development automatically occurs when: a) individuals are involved in significant role-taking experiences (action); b) balanced with relevant opportunities for reflection; c) in a relational (and emotionally charged) context that is both supporting and challenging of their world visions. From my previous artistic experience, this seemed an accurate description of the kind of work that is developed in theatre, especially in cases when the devising of a performative aesthetic object is more focused in the creative process, rather than in the final artistic product; as well as in the artistic work of performers rather than solely in the director's ideas. In addition, and very importantly, Sprinthall's systematization was very relatable with the research work that Jerzy Grotowski had conducted a few decades earlier in search of the minimum elements of theatre (aka. *Poor theatre*). From continuous theoretical research and theatre practices, Grotowski showed that everything can be subtracted from theatre (e.g., lights, costumes, props, scenography, text, among others) except the actors/actresses and, most importantly, the *relation* that is established between actors and spectators during the performative act. Based in my own knowledge and encouraged by the convergence between Sprinthall's systematization and Jerzy Grotowski's definition of Poor theatre (figure 1), a line of research started to gain form, allowing new interdisciplinary connections and the testing of a developmental hypothesis for theatre.

Psychological Development
(Sprinthall, 1991):

- Action (body)
- Reflection (Mind)
- Relational (Context)

Poor Theatre – minimum elements
(Grotowski, 1968):

- Actor (acts)
- Interpretation (interprets)
- Relation (collective context)

Figure 1. Theatre and Psychological development?

Using mixed methods, the research conducted during the doctorate, confirmed our theoretical hypothesis both by qualitative and quantitative data. After interviewing relevant professional theatre actors, actresses and directors without formal education in psychology, we found that, based on their personal experiences, their implicit theories about psychological change were comparable to those from specialized literature.⁵ On the quantitative side we created and validated the Scale of Sociocognitive Complexity in the Domain of Theatre (SSCDT) that showed that the more the experiences in theatre are demanding and intense, the more the theatre practitioners will tend to demonstrate capability for complex thought.⁶

PROJECT IRROMPER

Overall, both quantitative and qualitative data showed good indicators that the very artistic practice of theatre is, per se, capable of enhancing psychological development. Nevertheless, after concluding my PhD, I wanted to test my findings and continue the research. Having found that *Encontrar+se* provided psychological and occupational support to subjects diagnosed with mental issues, I proposed to initiate theatre activities in that institution. After several years of participatory theatre practices and experiences, what came to be the project *Irromper*, started to gain form. In response to a call from the Portuguese General-directorate for the Arts (*DGArtes*), our proposal was based on the theatre work we have been conducting, that was participant-centred, and often included autobiographical and fictional aspects. The core of the proposal was a theatre performance to be devised with (and preferably by) the participants, interweaving three ontological dimensions: a) real life narratives (as some participants routinely do public presentations of their own experiences with mental illness, in the context of an action called *Vozes de esperança* [Pt. Voices of hope]);⁷ b) Fictional narratives (to be created by the participants in the context of theatre work, and that could or not be based in real events); c) Interpretation of narratives (to be undertaken mainly by two professional theatre actors, as they routinely do in their professional work). Besides the devising of the theatre performance, other complementary actions included: a) a video documentary of the devising process,⁸ b) two public round tables gathering experts and participants around the theme of arts, theatre and mental health; c) a publication gathering texts from experts as well as the expert artistic team, and the final script written by the participants,⁹ d) each of the three performances of the play were to be followed by a brief session of questions and answers (Q & A) with the audiences. In addition, an ethics committee was to be appointed to survey the emergence of any possible problems and the team of psychologists of the institution, would maintain their regular support with a special attention to the (positive or negative) impacts of the project in the participants – as the process of development is recognized to be non-linear. Finally, the creative process was to be accompanied by two researchers from the Faculty of Psychology and Education Sciences of the University of Porto,¹⁰ in the context of their master dissertations in psychology. Although the call was made by an artistic organization (surprisingly enough, the financing came from the public arts budget and not science, education or public health) and did not require further scientific or research references, the proposal assumed to have been inspired in orienting principles such as those of Participatory Action-Research (proposed by Orlando Fals-Borda and Mohamad Rahman), Theatre of the Oppressed (developed by Augusto Boal), documentary theatre, devising theatre and several other artistic or scientific methodologies, that could be useful to the objective of placing the participants in the centre of all actions. The project aimed ultimately at the empowerment and autonomy of the participants in facing a complex (and too often unsympathetic) world, and this required changing the conventional frame of artistic creation to envisage the participants as the main creative artists. For this great adventure of collectively creating and presenting a theatre performance, a “professional” theatre dispositive had thus to be devised to create a relational, and collaborative environment both supporting and challenging of their world (and

Self) visions - in line with Sprinthal's systematization. In case of financing, this would be the best opportunity to aim beyond the rhetoric that "participation is always good" - as highlighted by researchers Pedro Ferreira, Cristina Azevedo and Isabel Menezes -, for we would be aiming to find sufficient means for creating conditions to facilitate processes of spontaneous development through theatre.

Theatre for all

In our regular theatre sessions throughout the years, we have always been open to all participants regardless of their diagnose. In fact, in our collective gatherings, the participants are never asked about the mental illness they were diagnosed with. The theme is addressed just like any other theme that emerges from the participants during the process and for the project this was no exception. This non-discriminative and receptive attitude, besides installing an atmosphere of receptivity and openness in our sessions, allowed us to focus more on the desires of the participants and the ways in which they could be materialized through a performative artwork. Everybody is welcome to our theatre sessions, that are divided into practical creative work and collective discussions in the end of the sessions - or during the session if needed. Due to the nature of the support provided by *Encontrar+se*, the group of participants is always changing (e.g., ongoing arrival of new participants recommended by the team of psychologists; participants finding remunerated occupations, namely formation courses; change of medication or relapses related with the mental condition, among others). Although this instability in the presences of the group is very disruptive to the systematic practice of theatre, we had opened the season with the idea of publicly presenting a theatre work – which is something that we are not always capable of reuniting conditions for. The theatre activities started by an approach to the body, inviting the participants to develop, through improvisations, physical characters inspired in animals, individuals, personalities, or other beings (contemporary or past) in which each participant would find personal meaning and would like to project him/herself. From materializations of these physical characters, and staying in the context of improvisation, the participants started to develop relations between their own character and the characters played by other participants, interacting with each other and freely exploring, changing, reorganizing, and perfecting the constitutional basis of their characters. This phase was interrupted by a severe lockdown due to Covid-19, where we were obliged to initiate a phase of online-sessions. In these sessions the participants were invited to write narratives and discourses of the characters that each person had been working on. Each participant could decide to write freely about whatever issue in three main categories. The narratives could be about ideas, experiences or emotions related with: a) real personal events (including related with the pandemic); b) they could also be completely fictional; c) they could be fictionalized based in real experienced events. Since no questions were made about the reality or fiction of the narratives and discourses, the character always "protected" each participant in case of unwanted exposure. The texts were deposited in a shared folder and in our weekly sessions the participants collectively read the texts that they have been written during the week. Several weeks have passed, many texts were written and shared, having some of the participants discovered a real pleasure in writing. It was at this point that we received the positive announcement of financing to our project by the General directorate for the Arts, very importantly validating (namely for the participants), the artistic value of the proposal, in addition to the therapeutical one. As the presential activities were reopened and the project gained progressive consistency towards its materialization (e.g., the need to systematize rehearsals, meeting the team of professionals, schedule the calendar of the project activities, defining dates and spaces for the premiere and following performances, among others) the group of participants started to be progressively involved in all the steps of this process, and started to stabilize, having six of them decided to accept the challenge of fully embracing the

professional theatre production. The pictures bellow, taken from rehearsals e few weeks before the premier, may give a sense of the aesthetics that emerged from the proposals brought by the participants.

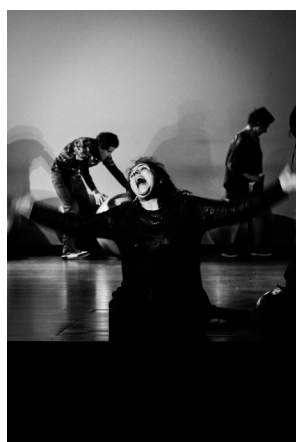


Figure 2. Irromper (rehearsals)



Figure 3. Irromper (rehearsals)



Figure 4. Irromper (rehearsals)

To be or not to be research-funded

The fact that the proposal was funded, allowed going a step beyond the usual objectives of participant centered “communitarian” theatre projects. In this case, in addition to giving a particular attention to the usual participatory aspects of the creative process (e.g., bottom-up approach, empowering for decision making, horizontality of the processes, among many others), we also managed to adopt the same participatory approach for devising the aesthetic object itself, with the aid of a carefully selected group of theatre professionals (involving lights, music, video, costumes, scenography, and interpretation). We also dedicated a significant part of the funding to paying the participants for their work, as a first step for assuming their participation as the most important part of the creative process. We were thus not only aiming to acknowledge the artistic value of their work, but also to “professionalize” their role in the theatre production, addressing the fact that most participants share the significant problem of having a difficult access to the labour market and to a stable income. As for the group of performative arts professionals, they were carefully selected and integrated in the ongoing work, under the understanding of the context and the premises of working towards the

support and empowerment of the group of participants in all aspects of the artistic work - including artistic decision making as much as possible. My role as theatre director, as well as the creative work of all the experienced professionals was to be understood mainly as a “problem solving” role, balancing challenge and support. The aim was creating the right conditions for the emergence of creative and artistic material from the participants and interfere creatively as least as possible – preferably only when the participants could not find a solution by themselves. This attitude towards the theatre work very subtly involved creating safe and challenging conditions for the participants and required a lot of attentiveness, patience, capacity for listening, acceptance and care for our fellow artists’ ideas and proposals – acceptance even if we may not agree or fully understand the proposals. On the one hand, in most professional artistic contexts these aspects are not required, but on the other, it is likely that most theatre artists would like to work in an environment where their ideas and proposals were accepted, experimented, and worked upon. If these rules were to be implemented in conventional professional contexts, could that change and improve the quality of the performative art works that are being produced? The professionals involved, have discussed this issue collectively after the *Irromper* experience, having concluded that the implementation of these premises in professional contexts would likely be highly appreciated. In addition, the fact that this artistic research project was funded allowed the good accomplishment of all the activities of the proposal above mentioned, which also involved the attention of the media (press, radio and television)¹¹ – highly contributing to the positive public perception of the project and to an enhanced self-perception of the participants.

FINAL REMARKS

From the beginning to the end, there were many interesting artistic and therapeutic aspects to this artistic process, namely the process of self-complexification. Departing from their own constructed narratives, the participants who decided to accept the challenge inherent to this performative creation, got to materialize their desires and ideas, discovering a whole new range of capabilities. From the point of view of the participants, this process allowed, four different levels of Self-interpretation and presentation from which everyone got to choose (or interweave): a) real self-narratives; b) fictionalized self-narratives; c) real narratives of peers; d) fictional narratives of peers. Rigid self-notions were challenged, new possibilities of being were explored and perceived. As recognized by Inês Van Velze,¹² one of the researchers in Psychology that accompanied the process: “(...) telling their [the participants] story, reconstructing their narrative and lending it to the voice and experience of the collective, allowed for a conscious exploration of themselves, and opened the way for the reappropriation and re-signification of the identities associated with the disease.”. In addition, and most importantly, through the language of theatre, the acknowledgement that each participant possessed the tools for its own present and future transformation, became possible: “(...) the theatrical techniques allowed to recover and exercise capacities, and to train adaptive mechanisms that were thought to be non-existent or dormant.”.¹³ Regarding the association between theatre and psychology there are still many aspects of research to be explored and from which contemporary societies could benefit from. In this same line of thought, we will conclude with the words of Inês Araújo,¹⁴ the other researcher in psychology that accompanied the process: “Even though the play *Irromper* was not developed in a therapeutic setting, it ended up contributing to a better psychological and social functioning of the users, proving, in this way, that theatre can be an important instrument of intervention in mental illness and for the recovery process.” We hope the present contribution may help to enhance future studies that focus the value and potential of the artistic work, namely theatre and other performative arts, for psychological and human development. Scientific research has been providing growing evidence of excellent potential in theatre and other arts forms, for addressing

challenges of our complex contemporary societies. Nevertheless, exploring the full potential of this interdisciplinary association, will only be possible with an increased investment in the arts and the systematization of programs interweaving artistic and scientific methodologies. In a world increasingly depleted in result of human action, artistic creativity in theatre and performative arts may well be one of our best hopes for finding sustainable solutions that may reunite all beings, will all their differences, in a coherent, complex, and multifaceted whole.

NOTES

¹ An approach to writing and research that aims to describe and to analyse (graphy) personal experience (auto) in order to understand cultural experience (ethno) – please vd. Ellis, Carolyn, Tony E. Adams, and Arthur P. Bochner. “Autoethnography: An Overview.” *Historical Social Research / Historische Sozialforschung* 36, no. 4 (138) (2011): 273–90. <http://www.jstor.org/stable/23032294>

² <https://orcid.org/0000-0001-9972-0814>

³ <https://www.encontrarse.pt/encontrarse/objectivos/>

⁴ <https://www.dgartes.gov.pt/>

⁵ José Eduardo Silva, *Entre o Teatro e a Psicologia: Ensaios para a reunificação de Corpos e Mentes [Between Theatre and psychology: Rehearsing to reunite bodies and minds]* (Porto: Apuro Edições, 2016), 227-62.

⁶ This study has been reviewed by peers and was published in the American scientific publication *Creativity Research Journal* in 2017. For an exhaustive literature review about relations between theatre and development in different knowledge areas please consult the article: “Theatre and Psychological development: Assessing Sociocognitive Complexity on the domain of Theatre”

https://www.researchgate.net/publication/318032937_Theater_and_Psychological_Development_Assessing_Socio-Cognitive_Complexity_in_the_Domain_of_Theater#fullTextFileContent

⁷ <https://www.encontrarse.pt/intervencao/vozes-de-esperanca/>

⁸ This video documentary (subtitles in English and Portuguese) can be acceded here:

<https://youtu.be/ZvQTX2kAoCE>

⁹ Rui Spranger, ed., *Romper: Teatro e Saúde mental*. (Porto: Apuro Edições, 2021), 11–18. ISBN:978-989-99751-7-0 This publication can be acceded here: [Miolo_Romper.pdf](#) (uminho.pt)

¹⁰ <https://www.up.pt/portal/en/fpceup/>

¹¹ <https://www.publico.pt/2021/10/08/p3/noticia/irromper-guiao-dramatico-doenca-mental-1980393>

¹² Inês Van Velze, “Práticas teatrais como ferramenta de desenvolvimento psicológico, cognitivo e social de pessoas com doença mental [Theatre practices as a tool for psychological, cognitive and social development of people with mental illness].” (MA, diss. University of Porto, 2022), 36-37.

¹³ Inês Van Velze, “Práticas teatrais como ferramenta de desenvolvimento psicológico, cognitivo e social de pessoas com doença mental [Theatre practices as a tool for psychological, cognitive and social development of people with mental illness].” (MA, diss. University of Porto, 2022), 36.

¹⁴ Araújo, Inês. “Teatro e doença mental: o (Ir)Romper de novas formas de terapia [Theater and mental illness: the Breaking through of new forms of therapy].” (MA, diss., University of Porto, 2022), 27.

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INTERNATIONAL VIRTUAL EXCHANGE AND THE PEDAGOGY OF GRIT

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INTRODUCTION

The future we are preparing our students for is, to some extent, unknowable given the rapid pace of change. The nature of work and the meaning of ‘the workplace’ is forever altered post COVID pandemic. The same can be said of higher education. However, we operate within a paradigm that seems increasingly cumbersome and not, in all cases, moving along with this pace of change. The Liberal Arts have lost their centrality to the purpose of higher education as their perceived economic value has declined. The shift parallels the greater shift to a knowledge-based economy post digital age. An economy that increasingly benefits the few at the expense of the many. Considering these factors and more, educators in all fields are innovating to evolve along with the new opportunities and challenges. This paper is an examination of our experience team teaching an international Virtual Exchange (VE) across disciplines and institutions, in the summer of 2021. It is an example of one approach to answering the question; how do we apply education in a complex world? It speaks directly to the questions posed by the AMPS Conference (Applying Education in a Complex World). Some of the prompts that got our attention and resonated with us are as follows:

It welcomes papers examining interdisciplinary teaching... It asks how education can both shape and respond to social, political, and technological change. In short, it asks how we are applying our teaching to the changing world we inhabit as teachers, and our students will inhabit as artists, designers, social scientists, and professionals of varying sorts... It is premised on exploring the relationship between education as a practice in and of itself. Equally, it is centered on the application of education across multiple pedagogical and professional fields in a real, if changing, world.¹

The authors of this paper are Dr Sue Langford, Academic Partnership Manager, Cornwall Business School, Falmouth University, UK and Blaise DePaolo MFA, Associate Professor of Sculpture, Morgan State University, Baltimore, Maryland, USA. They used international VE to bring students from Morgan, an HBCU (Historically Black College or University) and Falmouth University, a TWI (Traditionally White Institution) together in a learning community. The AMPS Conference and subsequent presentation gave them the opportunity to examine their collaboration more deeply than they may have otherwise. They believe virtual international team teaching at the university level is one avenue to “both shape and respond to social, political and technological change.”² It is accessible in a way it has never been before and for those students and faculty who cannot travel, can be a game changer.

Professor DePaolo and Dr Langford met working together in the late 90s at a non-profit, Baltimore Clayworks, at a time when the organization was actively recruiting artists of color and conducting programming in underserved communities in Baltimore City, Maryland, USA. In retrospect, the precursor to what we know of today as inclusivity. At Clayworks, working in different departments, they discovered that they had complementary skill sets, strengths, and shared values. That they should both eventually end up in academe and find themselves in a position where they were teaching essentially the same thing (democratic principles of social justice) but just from different disciplinary points of view, they could not help but find a way to put their two cohorts together around the content areas that intersect both courses. That they had not done anything like this before was not a deterrent, but it was a challenge as their universities were also new to the international VE model. Having said that, what motivated them to persevere was each other. Teamwork, especially if you are isolated in your field, can make all the difference in the world when it comes to creative, innovative course planning. Their collaboration proved to be well worth the steep learning curve. They approach research, teaching, and service not as a hierarchy but as spokes on the wheel of higher education. Teaching has been described as an art and a craft, a vocation, or a calling.³ It is an art form in and of itself and can be deeply satisfying when it works and painful when it doesn't. Higher education is shaped by the marketplace to no small extent in the 21st century and has become a competitive enterprise.⁴ Further, Alexander and Manolchev argue that the classic research university model may be more financially secure; they are however less agile in mitigating the challenges of a changing environment and market demands.⁵ It appears that as institutions increase workloads and reduce autonomy, especially when linked to bureaucratic university practices, that this is a 'predisposing factor to a negative perception of work-related well-being among university professors'⁶

Students crave authentic experiences and the professoriate at its best seeks authentic student engagement and connection.⁷ The VE pedagogy has cultural competency and collaboration at its core. Helm defines VE as 'a practice, supported by research, that consists of sustained, technology-enabled, people-to-people education programmes or activities in which constructive communication and interaction takes place between individuals or groups who are geographically separated and/or from different cultural backgrounds, with the support of educators or facilitators. VE combines the deep impact of intercultural dialogue and exchange with the broad reach of digital technology.'⁸

Interdisciplinarity offers the opportunity to create a curriculum more closely aligned to an international and collaborative work environment. Students want positive and supportive learning environments.⁹ For the professors, team teaching offers many benefits and can be highly motivating.¹⁰ Experiential and interdisciplinary teaching are often held up as high impact practices but there are barriers to those practices. Workloads, especially in the Liberal Arts, can be so heavy that any additional networking and planning may be too much to take on. If an institution values research over teaching, they may not support you in ways that would make interdisciplinary and experiential education more accessible. Also, it can be daunting when it comes to the mechanics of an interdisciplinary collaboration between different institutions. The authors found creative solutions to the challenges faced bringing American community art students and British business students together. They were more resourceful and resilient as a collaborative team than they would have been individually. Additionally, the students demonstrated a level of authentic motivation and engagement beyond what they had experienced in other virtual courses, fewer names on the screen and more faces. Although they pursued this collaboration in response to the pandemic, they believe international VE should be more widely adopted into the landscape of higher education under any circumstances. It has incredible potential to attract and engage students in a way that will prepare them for what promises to be a highly diverse and digital future.

Practicalities

The authors' advice to those interested in team teaching an interdisciplinary international VE would be to get the training, do the planning, and line up interactive digital shared experiences and activities. Technology training and planning are critical to the success of international virtual collaboration. In October of 2020 Morgan hosted a three-week training from DePaul University, a leader in the field of international VE. Traditionally,

VE was often associated in the context of foreign language education¹¹; however, more recently VEs have become popular with practitioners interested in inter-group theory and conflict transformation.¹²

DePaul describes VE as the practice of learning experiences that:

- are embedded in existing, credit bearing courses or modules in higher education programs
- are intentionally designed and implemented by two (or more) instructors who are teaching the courses involved in the experience
- are technology mediated
- involve learners who are geographically separated and/or coming from different cultural settings
- implement multiple opportunities for sustained communication and/or collaboration among learners
- are focused on collaborative projects conducted by learners in mixed groups
- have clearly identified learning outcomes that include explicit outcomes in the area of both intercultural awareness and/or competency and the content of the courses involved.¹³

DePaolo and Langford followed the model from the training and adopted many of the best practices in their four-week synchronous and asynchronous course/module, June of 2021. Morgan State students were in a summer minimester, a four-week three credit intensive, that fulfilled one of their humanities electives. Here is an excerpt from the syllabus:

‘Community Art VE is a service-learning course focused on experiential education and addressing social justice issues in society. Summer Session I, 2021, GENL396 students will be tasked with working as a member of a team to develop an advertising campaign and PSA (public service announcement) aimed at addressing a social justice need such as promoting environmentally sustainable practices as part of the Morgan State University culture. Using this example, you will work as a group to co-develop an advertising and branding campaign, educating the Morgan community on how to recycle and minimize single use plastic. Using both creative and leadership skills, demonstrated in the social enterprise business model, students will create a body of work that can inform Morgan’s future in meaningful ways. Students will either use the sustainable campus concept described above or propose another similar and mutually agreed upon concept for a socially engaged advertising campaign. Dr Langford’s course (Falmouth BUS388) and Professor DePaolo’s course (Morgan GENL 396) have intersecting content. Our virtual team-teaching approach across cultures will encourage new ways of understanding national social justice issues as global social justice issues. Additionally, students will gain valuable cultural competencies by interacting with their peers in the United Kingdom.’

The Falmouth students were on a condensed two-year BA(Hons) in Entrepreneurship, and this was intended as their final module. A module that was designed to build on their previous two years of study and enable them to ‘do something for real’ before they graduated. Following is taken from the assignment brief:

In this module you will be tasked with developing a social enterprise concept in response to a ‘wicked problem’ posed at the start of the module. You will work in groups to co-develop and validate the concept proposed. In doing so, you will consider challenges of the Fourth Industrial Revolution and a range of societal challenges. You’ll be expected to produce and share research on relevant audiences and markets, toward developing feasible (as well as innovative) solutions. You’ll be expected to use

collaborative tools, synchronous and asynchronous, to work with your team on a regular basis. You will be expected to ‘do something for real’, either working for an established CIC, charity or non-profit or work towards establishing your own.

Initially the professor’s plan was to have mixed groups of students working on either a campaign or social enterprise concept, but their numbers were vastly different, there were only seven Morgan students versus twenty-four Falmouth students. In light of this they decided it made more sense to bring the groups together via a speaker series and the synchronous activities. As it worked out, one of the Falmouth students requested to join the Morgan group and was warmly welcomed. That student’s success was one of the highlights of the collaboration. He flourished working within the Morgan group whereas he had been struggling in his original cohort. The Morgan group chose to work on PSAs having to do with mental health. This young man was attracted to the subject matter and the supportive nature of the Morgan group. He produced a digitally illustrated PSA on neurodiversity and mental health that was truly powerful.

Technology

The technological advance of the last decade and certainly since the pandemic are nothing short of miraculous in many ways. So much of the success of the VE model has to do with technological advances. DePaolo and Langford learned and utilized a variety of new technologies such as Padlet, Mural, Teams, Zoom, Flipgrid and WhatsApp. Some of these platforms were completely new to them. Shared virtual spaces for student interaction and engagement to take place both synchronously and asynchronously works well for students, who are digital natives and social media savvy. The students had no problem accessing and using these free platforms on a variety of devices. These digital platforms can greatly facilitate relationship building in a way that has implications for future networking and collaboration.

Another important aspect of DePaolo and Langford’s collaboration was the speaker series. They gave students mutual assignments before each speaker and asked their guests to prepare an engagement component for breakout room work. The breakout rooms, where students worked together, was one of the most popular parts of the course based on student feedback. Their guests represented different non-profits and businesses from the U.S. and U.K. whose missions were aligned with the objectives of the courses. Their guests were enthusiastic about presenting to the students. DePaolo and Langford were amazed at how gracious people were, and how willing they were to accept the invitation. Group work across institutions, disciplines and cultures is attractive to students, especially those who are digital natives. Leaders in the non-profit world including social enterprises such as The Washing Machine Project, founded by Nav Sawhney¹⁴, want to engage with others and share their knowledge. Role models provide much needed exposure for students to see what is possible with the right skill set, knowledge, and perseverance. Students almost unanimously agreed that the international VE experience was one of the most memorable courses and completely different from most of what they were accustomed to.

Difference

Although DePaolo and Langford were very excited to bring the two different groups together, they didn’t make differences, academic, cultural, or racial the focal point of the course work. Their intention was to create shared learning experiences based on content that was mutual to both groups. Having said that, they were bringing two homogenous groups together to form a diverse learning community. For most of the Falmouth students this was their first experience working with a person of color. The groups were overwhelmingly receptive to learning about each other and working together. What DePaolo and Langford have come to understand is that they created the circumstances

for ‘contact theory’ to take place. Contact theory is what author John Blake calls, “the overlooked ingredient that reduces racial prejudice”.¹⁵ He goes on to explain, “This is a term popularized by one of the 20th century’s greatest psychologists, Gordon W. Allport. Allport challenged the notion that racist attitudes can’t be conquered in his classic 1954 book, “The Nature of Prejudice.” Contact theory, as described by Allport, is to bring about the “optimal conditions” under which contact might lead to improvements in intergroup relations. He argues that prejudice is most likely to be reduced when contact between groups entails equal status between the groups in the situation; common goals; intergroup cooperation; and the support of authorities, law, or custom.”¹⁶

Bringing about the conditions for students to work together on an equal footing and across differences further extends the benefits of VE. The students can gain cultural and racial capital as a result of working together. Students are interested in other cultures and disciplines. Capturing the elements of what makes education engaging for today’s average college students requires operating on multiple digital platforms and across a wide range of interconnected fields, ideas, and peoples. In both the UK and the US there has been a cultural shift toward inclusivity. Although there is a conservative backlash, systemic racism and exclusion are being questioned and confronted globally. Very likely, the students who are well prepared for a more inclusive and diverse society will be better prepared for a more inclusive workplace. What we do to prepare them is no longer relegated to the limits of a discipline, but in how they function as a member of a team across cultures and other differences.

CONCLUSION

VE has nearly unlimited potential for preparing students to be global citizens. In the authors’ experience, it is a highly effective and inclusive way to address an ever changing and complex world. Technology has made so much more possible than ever before. If faculty wait for administrators and politicians to bring about change or lift educators up from the low rung of the economic ladder they now occupy, they may be waiting indefinitely. It takes work to cultivate a network of collaborators, to build your technology skill set and to circumnavigate the bureaucracy. However, the reward is authentic student engagement and that, for most educators, is the holy grail of university teaching in the 21st century.

NOTES

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- ⁴ Philip G. Altbach, Liz Reisberg, and Laura E. Rumbley. *Trends in global higher education: Tracking an academic revolution*. Brill, 2019.
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- ¹⁰ Rebecca S. Anderson and Bruce W. Speck. "'Oh what a difference a team makes': Why team teaching makes a difference." *Teaching and teacher education* 14, no. 7 (1998): 671-686.
- ¹¹ Robert O'Dowd and Breffni O'Rourke. "New developments in virtual exchange in foreign language education." (2019).
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HOW ARCHITECTURAL EDUCATION CAN RESPOND TO AND LEARN LESSONS FROM THE FUSION OF TWO DIVERSE CULTURES INTEGRATING INTO ONE SYSTEM OF INTERNATIONAL EDUCATION

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INTRODUCTION

This paper is informed by trends and demands within architectural education and the profession such as internationalisation, collaboration and cultural connectivity. The Liverpool School of Architecture has welcomed between 80-150 students per year since 2012 from Xi'an Jiaotong-Liverpool University (XJTLU) China. The majority of students who study at XJTLU are Chinese nationals, resulting in a large increase of Chinese students in the current BA. This significant growth has been handled well by the School in a reactive fashion, but this paper examines the issues of student expectation and intercultural integration and how internal communication can be strengthened, and provides suggestions which may be implemented to improve them.

It also looks at and updates -in relation to the Architecture Department -an Early Enhancement Project by Fitzgerald and Foye in the Liverpool University Management School which “examined the issues of misconceptions, expectation gaps and a lack of knowledge regarding British life and culture formed by Chinese students prior to arrival in Liverpool, and their negative effects on cross-cultural integration at the University of Liverpool. These were found to be a key cause of culture shock upon arrival in the UK and thus a large contributing factor to the clear integration issue at the University.”¹ These misconceptions were contributing to intercultural segregation at the University, due to the Chinese students’ view of British culture and life before arriving at their study-abroad destination (mainly taken from films and TV programmes.) It similarly looks at the ‘Project Challenge’ report by the University Planning School and utilises a recent Curriculum Review of the school’s Architecture courses, carried out by the author.

As well as the above studies mentioned, informal discussions were undertaken in each of the total five years of the BA and M.Arch programmes, and with 40% of the School staff, including support staff, workshop and computer specialists. Discussions also took place with the Head of International Relations within the University.

Overall, the number of Chinese students at UK universities has risen gradually in the last ten years and the government has been keen to attract more international students as they have become a key source of income for UK universities and the UK economy. (Although new Visa rules may have some impact on this.) The University of Liverpool has been one of the most successful UK universities in recruiting from China (especially since Brexit and the reduction of the European intake).

The new university in Suzhou, being a partnership between Xi'an Jiaotong University and University of Liverpool, is the largest international collaborative university in China (Xi'an Jiaotong translates as "transportation and communication").² Students at XJTLU have the opportunity to study abroad at the University of Liverpool on a 2+2 program (2 years at XJTLU and 2 years at UoL) or a 4+1 program (4 years at XJTLU and entry to a master's program at the University of Liverpool (UoL)). The first year in China is a general foundation year studying maths and physics.

Initial culture shock upon Chinese students' arrival in the UK is identified as a key cause of cross-cultural segregation at their new University, as they seek comfort in co-cultural communication. Contributing to this culture shock is an array of misconceptions of British culture and this will be examined in the architecture dept itself. (Why are the British students always saying "sorry"?)³

Fitzgerald and Foye used a range of sources for their literature review, including academic journals, interviews as well as other news sources to provide a richer insight into the issue. However, XJTLU is "unique in the fact Sino-British institution that has such strong links to Liverpool and therefore will have many individual differences to the cases considered in the literature."⁴

Another expectation gap found in the literature shows that the Chinese students' perception of the UK education system prior to arrival does not correspond with reality. Jin & Cortazzi state that there is a clear dissonance between Confucian and Socratic learning cultures.⁵ Slethaug states that students often incorrectly assume their new learning experience will match their previous education in China.⁶ Although some Chinese students may be aware that the difference exists, their lack of prior knowledge and understanding of exactly what these differences are, and what the expectations of a UK HE (Higher Education) learning environment are, can lead to "learning shock".⁷

Fitzgerald and Foye also referred to Hui Yang and Fleming who suggest that "British films and TV programmes often influence Chinese students' understanding of British culture."⁸ With one of the most popular British TV shows in China being *Downton Abbey*,⁹ it is easy to see why Greg Philo's research found Chinese students imagine the UK as full of characters from Jane Austen and Charles Dickens and full of gentlemen and ladies. In a BBC interview,¹⁰ he said their expectations were "shattered" upon arrival in the UK when they saw the behaviour of other students, the drinking culture at University, crimes and racial discrimination".

STUDENT PARTICIPANTS: SOME POSSIBLE DISADVANTAGES

During discussions, the difficulty for the issue of engagement with some of the Chinese students is that parents have chosen their university as well as their course (education is seen as a route to becoming more wealthy/increasing social mobility.) The Architecture course perhaps may not be their own first choice? Chinese students are also at a major disadvantage when they start their course, as they join in BA second year. Liverpool University allows a student to arrive up to three weeks late to begin a new course- and some Chinese students have to spend time in London organizing their police registration and BRP identity card- delaying their start. Also, first year home and EU students have already formed friendships and alliances through studying together for a year, and generally living and socialising together in student halls. Similarly, Chinese students will have formed their alliances in Suzhou- so the issue in one of integrating the cohorts.

Chinese students also cite language issues as causing difficulty (they come to Liverpool University as they also wish to improve their language skills.) The English they had learned in China did not account for accents or speed of delivery. Apart from the wide range of British accents, many staff are from Europe and English is their second language – also spoken in an accent; teaching and learning thus both occurring in a second language. Basic Mandarin is not spoken in classes or taught in the School of Architecture, increasing the feeling of alienation from XJTLU students.

Also a barrier is the cultural difference of socialising preferences and the fact that Chinese students tend to be located together in their residential accommodation - affecting student experience, as is their inclination to speak Mandarin when off campus. Some of their accommodation also tends not to have kitchens; thus students order takeaway or eat out.

Drinking alcohol tends not to be an option, and can often be frowned upon, therefore out of class socialising with home students tends to be minimal due to the cultural differences. Also, Bailey states that the Confucius traditions in China are reflected in their education system, where the tutor is often in a 'parental' role – discussing a student's personal problems if required.¹¹ Contrasted with the UK system of a variety of University support officers, the students feel a dissociation in what they see and their level of support.

POSITIVES

One positive issue to arise was the personal freedom Chinese students feel here in the UK. A same sex couple can walk hand in hand on the campus in public, which is not the case in China, and this freedom was greatly appreciated. A Shanghai student also mentioned that they really liked the sky in Liverpool- when asked why this was the case- as there is sky in Shanghai, they replied "yes but you cannot see it" (a reference to their city's pollution problem).¹² Students also liked the size of Liverpool- they think of it as small and easily navigable- at 500,000 population it is much smaller than most Chinese cities with their millions of residents.

45% of students stated that they applied for 2+2 before starting at XJTLU. This shows that it is a recognised RIBA accredited program and it could be the unique selling point for attending XJTLU as students in China look for this opportunity for study abroad.

The idea of experiencing student life in Liverpool was chosen by a high number of the Chinese students in the School of Architecture. The University would benefit from placing importance on promoting the idea of the student life in Liverpool and take measures to meet students' expectations. This goes hand-in hand with promoting the Schools overseas Semester Exchange programmes (including the Bauhaus in Dessau, Sidney Australia and Aarhus in Denmark) which was also a popular reason for joining the School

Experiencing student life in Liverpool and making new international friends are elements which can complement each other. This is critical during the first few weeks of term, because after that period many students settle into a social group and it becomes more difficult to venture out of that- or it becomes more intimidating, for some, to integrate with other groups. This is a point for a potential positive intervention, and the "buddy" system utilised by the school is a positive step forward.

In discussion with students already in Year two or three at the University of Liverpool, their influence on other potential applicants back in China is strong. Their feedback is essentially a source of promotion for potential applicants at XJTLU, so a strategy to ensure the satisfaction of Year 2 and 3 students would aid in attracting new applicants to the programme.

Many students stated that an influence to come to Liverpool is to open opportunities to continue with postgraduate study and apply to take an RIBA Part 2 Master's degree in the UK, either at Liverpool or elsewhere. This is another huge selling point for the 2+2 program. Students should be assured that this is an investment in their futures and more than just an opportunity to experience a new culture.

INTEGRATION OF XJTLU STUDENTS: SUGGESTIONS FOR IMPROVEMENT

More integration is required, but in a manner that avoids trauma, 'connectivity' across the two groups' maybe a more realistic option than full integration.

Suggestions to improve connectivity

- Chinese students to be fully informed of the mechanism and importance of the National Student Survey (NSS), as completed by Final year students, which provides league table positions through emails sent in Mandarin. However an induction talk to groups in each studio is currently improving the NSS response rate, and also may strengthen recruitment from XJTLU.
- XJTLU students entering BA2, miss out on the Historic Culture lectures and others in relation to Liverpool as a City that is given in BA1 – perhaps Skype this as part of their XJTLU History course, or move the Liverpool focus context lectures to BA2 (* already actioned)
- BA2/3 Home and EU students have said they feel slightly overwhelmed by the XJTLU numbers – they feel that they themselves are in the minority. Staff must re-iterate to students on the launch of each studio project that English only is to be the language used in the studio at all times (unless it is in a proposed Mandarin language module.) Also use of the student social area should be encouraged- most helpful could be the showing of a variety of films that are of interest multi-culturally.

BA1

- A reintroduction of the XJTLU – Liverpool ‘pen pal’ scheme previously set up by the studio leaders would be a good introduction prior to XJTLU student arrival into BA2. The existing “Buddy” scheme in BA1 could be carried onwards through the School to the higher years.
- An informal talk in each semester – ‘Mandarin for the construction site’ would introduce Liverpool students to the Chinese language without it being explicitly for the XJTLU student cohort arrival. Mandarin is the most commonly used language in the world, so this is a global vision.

BA2

- An extra-curricular activity at the end of the first week in BA2 Semester 1 could be introduced to help the existing Liverpool/New XJTLU students get to know each other socially. A local facility can provide a one day outdoor activity course for 100 students/ day @£25 + VAT each and can be reached by local bus. Funding could be provided for this student experience activity by utilising the £100 per head budget that each student receives.
- Prior to their arrival in the UK, XJTLU students have an induction at home in China on the Liverpool University campus and the city of Liverpool – not in particular the Architecture Department- this needs to be rectified. (this de-mystifies the “lords and ladies “ perception.)
- Before the COVID pandemic, we had two BA2 staff regularly visiting China in early June, who could give an induction talk on the Liverpool school, its methods, its modules etc. to the XJTLU BA1 and BA2 students. This is to be re-introduced.

BA2 & BA3: Group Site Analysis for all Studio Projects

- The ‘All School’ project at the beginning of Semester two is a cohesive practice that helps to unite the whole of the BA, and could be repositioned in Semester one- as this is especially important to XJTLU student integration. The current one -week January Winter School introduced this year is also a positive progression.
- Group working on challenging briefs in a powerful social, cultural and physical context introduces students to the opportunities of site. A variety of media is to be encouraged including digital modelling, film and animation. Mixing the international cohort encourages peer respect and appreciation, and this could be investigated as a proposal at the beginning of EACH studio project.
- The Liverpool University “Academy” carries out induction talks for staff- and all BA2 & BA3 studio full and part-time staff should attend. These explain the culture of the Chinese students in relation to their studies and how they approach teaching and learning as a discipline.

Exchange: Increase the number of Home/EU Liverpool students that exchange with XJTLU in BA2 Semester 1

- Until Covid, there were often several BA2 Liverpool students going to XJTLU on exchange in Semester one. Liverpool students require a 60% marks average in BA1 to be considered for exchange, and receive a £500 award for travel costs.
- As Liverpool/XJTLU are one organization, investigate the possibility of reducing the Home/EU students marks requirement to a 50% average – to enable more Home/EU students to join the XJTLU exchange programme. (Head of the Faculty is investigating this.) This will slightly increase the ratio of Chinese/Home students in the School- but is a very positive cultural experience for the Liverpool students.

Improving Departmental Communication: Suggestions

- Involve the Creative Workshop with meetings involving formulation of studio programmes. Head of the Creative Workshop & Technical Support Team Leader to be invited to the staff student liaison meetings (SSLC). (*already actioned)
- Invite the History lecturers – those who are not involved in studio – to the studio reviews.
- Invite current and previous Chinese M.Arch students to the studio critiques as guest critics (*already actioned).

Assessment

- Continue to make Formative Assessment and Summative Assessment format be the same across all three years (anonymous marking is difficult with studio pin-ups, as tutors are familiar with the building design project- however this is now being tested in BA1.)

CONCLUSION

After the introduction by the Chinese Government in 2016-2020 of their Five Year Plan, a huge emphasis was placed on Chinese society to pursue education. XJTLU is well positioned to take advantage of this.

XJTLU have had both their own B.Eng (Architecture) and M.Arch Architecture courses validated by the RIBA (similar to Liverpool) since 2015 and 2017 respectively, and renewed in 2019, the author acting as an advisor on the three separate visits. This has been a positive development for both schools, as many student respondents stressed the importance of RIBA course validation when choosing their school.

Good feedback by XJTLU students studying at Liverpool to their student contacts back in China is a source of promotion for the Liverpool course. As it has fallen to individual departments to ensure that their Chinese students' transition is smooth, more emphasis and possibly funding needs to be placed on preparing students for the transition to the UK- with special focus on “soft” skill sessions.

There needs to be a change to the perception of drinking culture at Liverpool, increasing guild participation and addressing the culture shock, therefore increasing integration.

One unifying element mentioned that may help was sports activities, Chinese students stated student life at Liverpool was more relaxed than they expected, with lots of students participating in sports and other activities during the day, such as playing football on Abercrombie square, and open-air basketball on the new courts by the sports centre.

A cultural issue that puzzled some Chinese students was the home students' attitude towards their studies – it seemed “cool” to appear to not be working too hard (then getting good results!). When design studio team cross-culture collaborations were undertaken in the M.Arch, it was apparent to the

Chinese students that the Home students did work hard, and their casual attitude was a pretence. More collaborations to be encouraged in the BA.

The introduction of XJTLU students at Liverpool actually widened the perceptions of Home students, making them more likely to exchange to Suzhou and other study abroad destinations.

The one-week Winter School in January this year (and the All School project) are open to all students and helped integration, as does the recently introduced first floor coffee area/social games space. New student-led reviews are working well.

Some recent Chinese M.Arch graduates working in local practices are now active as guest critics to the school for the 4th year design studio, which shows the journey has now come full circle-connectivity between the UK and Chinese cultures being strengthened.

NOTES

- ¹ Holly Fitzgerald and Beth Foye. "Student Enhancement Project 2016/17 - Revisiting the issue of integration of home and Chinese students in the University of Liverpool Management School"
- ² Kelvin Everest. "The Story of XTJLU" Liverpool University Press, 2016.
- ³ Discussions with BA3 students held on 23rd March 2023.
- ⁴ Holly Fitzgerald and Beth Foye. "Student Enhancement Project 2016/17 - Revisiting the issue of integration of home and Chinese students in the University of Liverpool Management School"
- ⁵ Lixian Jin and Martin Cortazzi. "Dimensions of Dialogue: Large Classes in China." *International Journal of Educational Research* 29 (8): 739–61. 1998.
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- ⁹ Ten most popular British TV dramas in China. *China Daily*, accessed 19 Oct, 2023, http://www.chinadaily.com.cn/world/2015xivisituk/2015-10/16/content_22203346_2.htm
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- ¹¹ Chris Bailey. "The UK lecturers don't teach me anything": Chinese students' expectations of their teachers and implications for UK HE providers. In *Southampton Solent University (2005) Conference Proceedings: The Chinese and South East Asian Learner: The Transition to UK Higher Education: September 2005*. Southampton: Southampton Solent University, 2005 1-12.
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WHAT IS ONLINE LEARNING IN THE CONTEXT OF THE 4TH INDUSTRIAL REVOLUTION? THE CASE OF A CONNECTIVIST MODULE INTO A TEACHER EDUCATION ONLINE COURSE

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INTRODUCTION

After more than 30 years of educational change driven by a focus on cost-effectiveness as well as the progressive industrialization of education systems and after two intensive years change and adaptation precipitated by a global pandemic, online learning has suffered from bad press and a rather mixed image. Our hypothesis is that educational developments follow technological developments and are linked to different industrial revolutions. These different revolutions have transformed our relationship to production and consumption, with mass production and the attendant mass consumption disconnecting us from the processes used to create the things that we consume—not unlike magically receiving presents during the holidays from the Western incarnation of Santa Claus. This same disconnect is reflected in our education systems. Online courses, like face-to-face courses, are today dominated by a single model: standardized, mass-produced learning experiences with learners who have been disconnected from control over their learning. To succeed in the 21st century, however, requires the development of different and additional skills such as autonomy, inclusion, collaboration, and creativity. To support the development of these kinds of skills, a portion of an online post-secondary course was modified to use a connectivist approach that emphasized learner autonomy and self-direction. We then explored the impact of this connectivist learning experience on students enrolled in the course. The results show that if the non-directiveness of such a course creates some uncertainty or discomfort for students, it makes it possible to develop authentic, deep learning and to develop skills related to the 4th Industrial Revolution.

FROM AN INDUSTRIAL APPROACH TO THE 21ST CENTURY SKILLS

To understand the transformations of our education systems, we must begin by describing the history of the transformations of the production systems of our industrial societies, in connection with technological changes, as shown in figure 1.

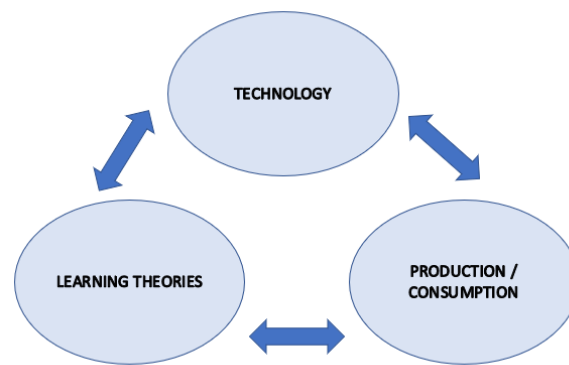


Figure 1. Technology, learning theories and production interrelated.

Industrial Revolutions, Technology, and Learning Theories

The first industrial revolution began in 1790 with the invention of the steam engine, which enabled the mechanization of production and the development of new methods of transportation.¹ This advance in production and the possibility of being able to more widely transport and distribute products introduced for the first time a break in production and consumption: the product has become almost magical for consumers dispossessed of design and production. This massification was accompanied by the transfer of rural agricultural jobs to urban manufacturing jobs and was made possible thanks to the establishment of an efficient mass education system, particularly in the United States.²

The second industrial revolution began in 1860 with the generalization of electricity and chemical processes³ which made it possible to accelerate the growth of mass production and consumption, giving the consumer ever more products from which they were, by the very nature of mass production, separated from any involvement in their design and by distinguishing the roles of workers who do and those of engineers who know.⁴ The Taylorist theses of division of labour inspired American public schools to train workers and introduced functionalism into the school system resulting in, among other things, curricula, objectives, and measures of learning, as well as the fragmentation of disciplines and materials.⁵ It was also during this second industrial revolution that behaviourism was born, with a view to scientificizing the learning process and with it the notion of humans as learning machines.⁶ If the great contribution of this approach is to focus on the student, the main criticism of behaviourism is that learning is defined as a decontextualized memorization process.⁷ Today, this paradigm, with characteristics close to the mass production of the first industrial revolution, is still important in our educational systems and is reflected in, for example, summative assessments and memorization for exams.

The third industrial revolution is that of information, with the generalization of the computer at the beginning of the 1980s which allowed the automation and computerization of production processes. The computer, and its power to model cognitive processes, gave rise to cognitivism in psychology and its counterpart constructivism in education.⁸ Constructivism has made it possible to highlight the concept of representation in cognitive processes: the child no longer memorizes knowledge but builds it from information and its own past representations in a dynamic way.⁹ As with behaviourism, the main limitation of this approach concerns the consideration of the learning context,¹⁰ a context that several theories and approaches, such as situated cognition¹¹ or socioconstructivism,¹² attempt to overcome.

Finally, the fourth industrial revolution is very recent and the technologies that underpin it are more difficult to identify. These technologies seem linked to the development of networks and the intersection of real and virtual universes: the Internet of things, 3D printing, virtual reality, artificial intelligence, cloud computing, big data analysis, nanotechnology and others.¹³ These technologies are associated in part with the relocation of several aspects of production and with the reintegration of the design and production processes by the consumer. Educationally, the impacts are not yet fully understood, but several key competencies have been identified.

21st Century Skills

The literature on the 4th Industrial Revolution is generally accompanied by a mapping of new skills. This latest revolution is changing our production systems considerably, and these changes are accompanied by the need to develop new skills that must be articulated with more traditional disciplinary knowledge, hence their names of transversal skills or 21st century skills.¹⁴ It is difficult to be exhaustive and to establish a curriculum of these 21st century skills, but we can find common elements of which we present a synthesis here.

Problem Solving and Algorithmic Thinking

With the development of artificial intelligence, it is important to train in algorithmic thinking and to solve new and ever more complex problems related to constantly accelerating mutations. Enlightened citizenship requires a better understanding of the codes and programs that affect our lives.

Creativity and Multidisciplinarity

In this changing world, it is important that future citizens know how to build innovative and creative solutions on their own, which no longer mobilize specialized knowledge, but knowledge from different epistemologies and different fields of knowledge.

Critical Thinking and Capacity for Continuous Learning

The profusion of digital information and the multiplication of accessible content require the future citizen to develop critical thinking for the selection of sources, but also learning capacities to adapt to new tools; he must learn to learn.

Social Skills

With the development of networks and access to all of humanity online, the future citizen must develop social skills to collaborate online with ever more people and in an ever more digitized and complex way.

Engineering of Online Courses and Connectivism

With the first industrial revolutions, we witnessed the development of engineering methods that made it possible to consolidate the production system. While there are several definitions of engineering in different areas of industrial production,¹⁵ all of them put a fundamental principle at the heart of the process: the separation of design and production. This is the difference between the artisanal process, during which the artisan designs the product at the same time as he develops it. This mainly allows two things: (1) economies of scale, since the design is not repeated each time and production can be done in a chain, in a less expensive way, and (2) quality assurance, since the production follows the design orders to ensure the same output product. Even today in our societies, this same principle of production dominates. From the 1980^s, education became permeable to these principles of production engineering.²¹

The same goes for online training, which shares many of the same principles found in software engineering, though with strong cognitive inspiration.²¹ The course design process is always prior to its delivery, separating content development and learning, respecting the key principle of engineering and production specific to the first industrial revolutions. For 21st century skills, though, this poses a problem: learning is decontextualized, cognitively and socially. This learning is also standardized, with the same curriculum(s) and assessment(s) for everyone, when these skills require an individual approach (for critical thinking, for example, or for creativity). How can the learner appropriate the instructional design? How can he or she develop skills related to the 4th Industrial Revolution but in an online setting? Connectivism theory can provide us with answers.

Connectivism and 21st Century Skills

Connectivism emphasizes the connections of the online learning process: the pipe is as important as the content it carries. It is organized around a principle of specialized nodes (information, data, feelings, images, etc.) in a networked learning space and navigation in all the information sources of this network, encompassing neural connections, connections between humans, computers, and the interconnection between different types of content and knowledge. Connections increase the skills of learners and of the network.¹⁶ The value of diversity is therefore a function of learning, here we emphasize the importance of social presence through the creation and maintenance of networks of learners who learn from each other as much as from other members of the space.¹⁷ One of the dominant elements in this approach is the high level of user control over the content and how to apprehend it.

Information is less at the centre of the learning process than the social aspect and the interactions between actors, via content. Learning is co-constructed and the curiosity of the learner or group of learners is the first guide. Knowledge is no longer individually discovered, constructed and stored, but instead becomes something that is socially created at the interstice of individuals. Meta-learning (learning to learn) becomes more important than the learning itself. Connectivism seems more inclusive than previous industrial theories, even if over industrial revolutions, the learner is always more at the centre of the learning process. Connectivism seems to fit well with the development of 21st century skills, but it remains very difficult to implement a connectivist pedagogy in the context of credited courses, with curricula and assessments. How might one implement a connectivist curriculum and its evaluation in the context of today's education systems?

Research Question

In this article, our research question is: how can we create an online module which permits teachers to develop 21st century skills? Our hypothesis is that by developing a connectivist module in a credit course, and by handing the keys (so to speak) to the curriculum and to their assessment to the learners, learners will be able to reconnect with the process of design and production of learning, and be able to leave the position of consumers of learning by developing their 21st century skills.

METHODOLOGY

We designed and developed a connectivist-inspired module in an academic post-secondary setting based on an online course on the integration of technologies in teacher training in the faculty of education in 2021, during COVID. We were inspired by the design-based research method.¹⁸ The design-based research is used to develop an artifact and evaluate it. This method involves 4 steps: collecting information, designing the artifact, testing the artifact on a small group and, finally, large-scale evaluation. We did not do a separate full-scale evaluation instead using the quantitative and qualitative data from the end-of-course evaluation, conducted at the conclusion of every course, for

this purpose. Also, we were able to compare certain evaluations with the evaluations of the same course and the same course instructor that was run without a connectivist module in 2017.

Participants and Procedures

The course participants were 25 students at the University of Ottawa's online teacher training for the winter 2021 session. We were also able to compare certain quantitative data with the same course given in winter 2017, which had 13 students.

Using literature, in 2021 we transformed the core module of an existing course that had been given in 2017. The first module was, in both versions, organized around the production of a web page to developing the digital literacies of future teachers. The last module, in both courses, focused on an individual project to set up an educational activity by integrating a resource, developed or existing. It is in the heart of the 2021 course that the connectivist module replaced two more traditional modules of the 2017 course. In modules 2 and 3 of the initial course in 2017, students had to carry out theoretical readings and propose a first draft of instructional scenario. In the 2021 version, we replaced 2017's modules 2 and 3 with a connectivist module called "Maker project."

Connectivist Module

In a connectivist approach, the teacher is more a guide than a content provider for the students, by sharing methods and tools; aggregating best practices to disseminate them to the whole class; supporting the collaboration between members of each team; and reassuring students about the directions they choose. We therefore proposed an initial situation and a final situation to the network of students, then followed the learning of the groups independently, thus promoting creativity, critical thinking, curiosity, resourcefulness, collaboration, and the putting into practice of design thought. The principle of the connectivist module was to combine inquiry-based learning¹⁹ and the Maker approach²⁰ in an online research activity. The first step was to define a team research question. From this question, the students did their own research on the Internet to make a 10-minute video that presented their work to the whole class. To be sure that the students were motivated by their curiosities and not by the strict direction of the professor who evaluates, we proposed a collective evaluation: each student evaluated the work of his or her own team, as well as the work of the other teams. The final videos were shown in a synchronous session at the end of the module to facilitate peer review. We met and exchanged e-mails with each group at least once a week, and we distributed the comments of each group to the whole class by e-mail after the meetings. Students were given latitude for the organization of each of these stages, guided by curiosity and discovery. In this way, students were in control of their curriculum and their assessment.

Instruments and Data Analyses

The tool used to collect student feedback was the course evaluation. This formal assessment is made up of 13 questions and we were thus able to compare the answers to these questions between the 2017 version of the course, without a connectivist module, and the 2021 version, with a connectivist module. The questions had students rate various aspects of the course and the course instructor, including the preparation of the course instructor; the instructor's ability to communicate the subject matter effectively; the general quality of the course instructor; whether the instructor's teaching and course's content was stimulating; the organization of the course; the clarity of the instructor's expectations; and the relevance of the comments and feedback provided by the course instructor. Students could also provide anonymous written comments and other qualitative feedback about the course content and instructor.

To analyze the data, we only used descriptive statistics to compare the two courses, since it was unfortunately not possible to do mean comparison analyses without having the data per respondent. It is therefore a qualitative analysis of these data that we propose. Finally, we analyzed the written comments of the course evaluation by grouping them into three categories: the teaching, the work, and the negative aspects.

RESULTS

As mentioned, we were able to retrieve all the evaluations of the courses given in 2017 and 2021 to compare them, the main difference being the connectivist adaptation in 2021.

The teaching

All the variables are substantially the same between the two courses. However two variables have positively progressed with the addition of the connectivity module: the stimulating aspect of teaching (Figure 2) and the teacher's ability to communicate the subject (Figure 3). For these two variables, the “very positive” (*Très positif*) rating gained percentages, while the “positive” (*Positif*) rating decreased by the same amount. In addition, for the 2021 course, there are 3.85% of students, therefore 2 students, who evaluate each question negatively (*Négatif*) and neutrally (*Neutre*).

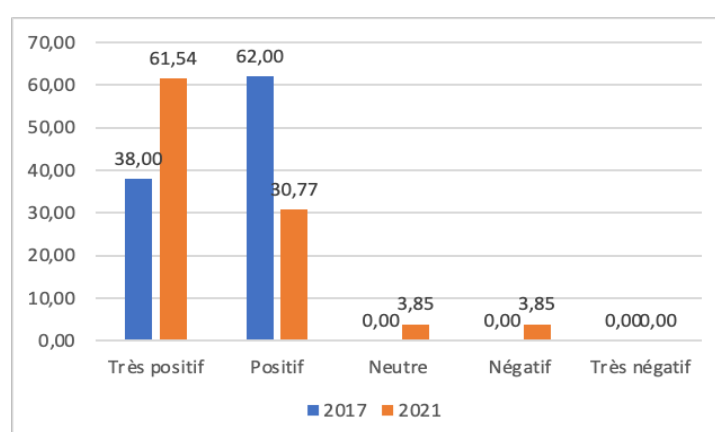


Figure 2. Stimulating aspect of teaching in 2017 (n=13) and 2021 (n=25).

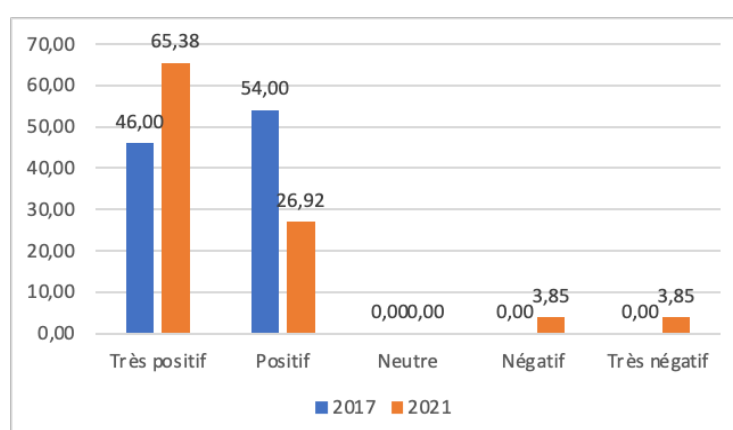


Figure 3. Quality of subject communication in 2017 (n=13) and 2021 (n=25).

In the comments for the 2021 connectivist module course, several mention how the course took them out of their comfort zones: “*This course was not at all what I expected, and I was not disappointed. I*

actually learned a lot more than [what] I expected, and I feel like I've been pushed out of my comfort zone and I'm more than ever willing to explore and try new technologies, ideas and teaching methods". Or another student: "The course is stimulating and takes me out of my comfort zone". And a last student: "Where did I embark? What is this course? But, by dint of advancing in the course and abandoning the old traditional method, I discovered during the course [...] another pedagogical side that I had in me and another way of seeing teaching".

Another student mentioned the contextualization of the course because it was done by students: "The course content was extremely relevant to the reality we live in the classroom." Finally, a student mentioned the meta-learning aspect of the course: "I liked the course which allows us to train ourselves and learn how to learn. I take with me some wonderful achievements!" To conclude, this student mentioned: "In my other classes, I was subjected for hours on end to my professors' monologues and the continual handing over of a series of detailed plans or answers to questions requiring nothing more than the rewriting of information have been presented. The delivery of this course and the activities in which we participated were stimulating and, for the first time, made me think and reflect."

The Workload

Several other variables that have changed with the connectivist module relate to the quality of feedback on assignments (Figure 4) and the amount of work compared to other courses (Figure 5). In terms of the quality of comments, as with teaching, the "Very positive" (*Très positif*) category increases and the "Positive" (*Positif*) category decreases. Again, there are 3.85% of students, so 2 students, who rate each question negatively (*Négatif*) and neutrally (*Neutre*). In terms of workload, most students found the workload higher (*Supérieur*) (50%) and very high (*Très supérieur*) (19.23%).

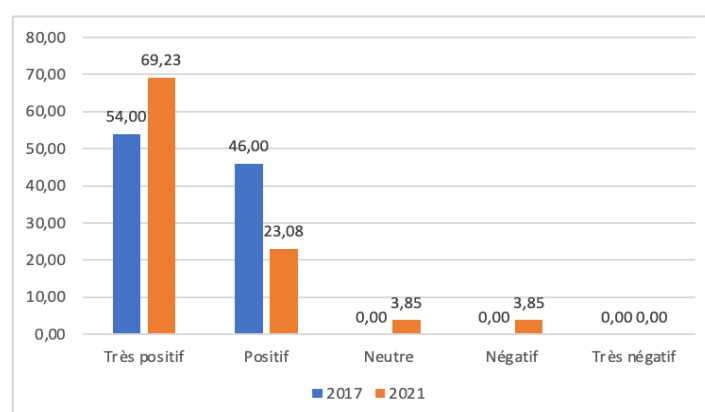


Figure 4. Quality of comments on the work in 2017 (n=13) and in 2021 (n=25).

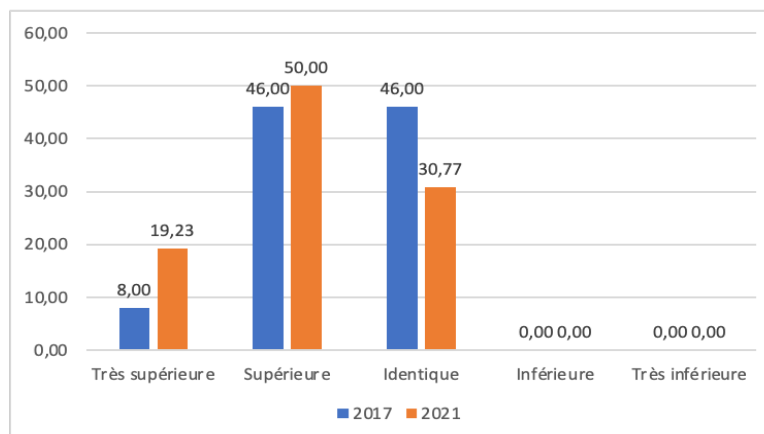


Figure 5. Workload related to other courses in 2017 (n=13) and in 2021 (n=25).

Several comments focused on the works and their degrees of freedom: “[I] liked the freedom given for work.” Or: “The way the content was presented is empowering. I really liked the ‘open-ended’ character of the productions to be accomplished. I learned a lot”. In conclusion, this student summarizes about critical thinking: “Avant-garde approach to the work: the website, the research project, the pooling of knowledge, it was extremely stimulating and led to a lot of deep reflection and questioning.”

Negative Aspects

We received a total of 22 comments. Of these 22 comments, 20 were clearly positive. But 2 comments from 2 different students were more negative. As the first student mentions, he or she has “Difficulties completing assignments for this course. Work instructions can be clearer. Comments could have more details.”

Finally, the second student is more decided and raises the main problem related to directivity: “This course was a waste of time, the teacher spoke as if we were computer experts. The instructions for the works were confusing and the teacher’s explanations were even more so, he asked us to do what we want for the works, there was no waiting, in general, I have nothing learned in this course, the documents we had to read were not relevant, therefore useless.”

DISCUSSION

We have attempted to develop a connectivist module in a university credit course by trying to circumvent two aspects linked to mass production: the standardized evaluation of the teacher and the development of homogeneous activities that follow the same curriculum. To circumvent the behaviourist aspect of the teacher’s evaluation, we used self-evaluation and peer evaluation. This connectivist influence course and in particular its module 2, seems to have contributed to developing 21st century skills in relation to the 4th Industrial Revolution.

The main improvements of the connectivist module, between 2017 and 2021, concern the stimulating aspect of teaching, the instructor’s ability to effectively communicate the subject matter, the comments on the work and the workload. Even if we cannot speak more directly to the effects of the connectivist module without further statistical analysis, a qualitative reading shows that the evaluations go from positive to very positive, except for two students. This may highlight how a non-directive lesson increases student engagement and relevance of instructor feedback but creates a more demanding workload for students.

The non-directiveness in solving problems has, according to the comments, made it possible to mobilize several domains of knowledge. The formulation of the problems made it possible to authentically seek the unknown and original, guided by curiosity. Above all, the control of the activity by the students made it possible to remain close to their contexts: the students thus had a course close to the “reality that we live in the classroom,” since they themselves defined the contours of the problems and the solutions. Connectivism would therefore make it possible to reduce the contextual limit of behaviourism and constructivism. Students developed their meta-skills, their “learning to learn,” by developing the location and judgment of information specific to connectivism. In terms of critical thinking, the course was also very important since it particularly encouraged the students to “think and reflect.”

Regarding the freedom of the curriculum in the module, we note that the students are pushed out of their comfort zones, and this corresponds to the progressive abandonment of the “old traditional method” and, sometimes, to the discovery of “another pedagogical side [that we have in us] and another way of seeing teaching.” This last quote is important because it suggests that this learning through curiosity is already in us, and that it may have been affected by the top-down logic of curricula and ministerial directives. Connectivism therefore offers a decentralized approach to learning that questions our educational systems, in the same way as the transformations of production systems in the 4th Industrial Revolution: the consumer becomes a producer, in the same way that the learner becomes their own teacher, guided by the curriculum of their curiosity.

Let us dwell on the two students who evaluate the course less favourably, and to whom we could lend the only two negative or neutral comments on the course. These two negative comments are interesting because they corroborate the course instructor’s experience. These comments mention the problems of “clarity” of the instructions, the “confused” instructions, and the problem of “doing what [the instructor] want[s] for the work.” Not everyone is ready to take charge of their own learning and prior empowerment work could be important in some cases.

CONCLUSION

In conclusion, we showed how one could try to integrate a connectivist activity—without rigid curricula and with decentralized assessment—in a university course. This type of activity makes it possible to develop 21st century skills in connection with the transformations of our production systems, helping to develop the autonomy of learners in the face of growing and ever more complex information systems. This connectivist module allowed learners to contextualize their learning, leaving them in charge of the direction to go, thus partly overcoming the limits of behaviourism and cognitivism that are largely dominant in our industrial education systems. It has thus made it possible to achieve more transformational learning based on the development of curiosity and no longer only through a predefined program. In our view, a post-industrial education requires a great decentralization of curricula. Take, as an example, the Finnish education system²¹ which, before 1994, left the design of the curriculum to the teacher, which contributed to Finland’s strong PISA ranking.

Our experience has two limitations. The first is that this kind of connectivist module should be adapted and experimented with in other professional and school contexts, because teacher training is very specialized, with students who are already familiar with learning theories. The second limit is also a perspective: associated with this connectivist decentralization of curricula, it is necessary to associate an opening of assessment and evaluation by multiplying the actors and focusing on the formative aspects more than summative. Much research is to be conducted on these new types of assessments made possible by the technologies of the 4th Industrial Revolution. To conclude, our results should lead our production and education systems to increasingly reduce control through technology and instead increase trust in all actors.

As Gergen ²² mentions, if technologies and their standardization capacities can reduce the development of our individualities, they can also extend our collective capacities via networks. This is a crucial step in moving away from the production-consumption disconnect towards no longer believing in the educational Santa Claus!

NOTES

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- ¹⁴ Blinder, "Education for the Third Industrial Revolution."; MEO (Ministère de l'Éducation de l'Ontario), *Compétences du 21^e siècle. Phase 1 : Définir les compétences du 21^e siècle pour l'Ontario — Document de réflexion*, (Toronto: Imprimeur de la reine pour l'Ontario, 2015); Klaus Schwab, *The Fourth Industrial Revolution* (Cologne/Geneva: Currency, 2016); Yusuf et al., "Restructuring Educational Institutions for Growth in the Fourth Industrial Revolution (4IR): A Systematic Review"
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TEACHING AND LEARNING IN THE FACE OF COVID-19: CHALLENGES AND REWARDS IN UNDERGRADUATE MATH CLASSES IN TUNISIA.

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INTRODUCTION

In 2020, the COVID-19 crisis caused rapid disruption and had significant effects on higher education, impacting students, instructors, and institutions. Most courses that started in spring 2020 as face-to-face rapidly moved to online courses, despite limited training to ensure continuity of learning, for the benefit of students needing to complete courses and earn credits. and as O'Keefe, et. al, pointed out, "Regardless of whether an institution had a robust online course catalogue or offered few to no online courses prior to COVID-19, the sudden demand for mass migration of courses to the online environment is challenging"¹. Today, as we are transitioning into a new phase of this challenging period, we need to be more thoughtful about how to design and deliver high-quality online learning in order to adapt to the changing school and work environments. Indeed, much of the Covid-19-induced remote work in white-collar positions persisted at least in part-time.²

It is clear that educational institutions must be prepared for the possibility of future disruptions. blended learning provides a solution that can improve the overall learning experience and adapt to changing circumstances. Therefore, it is crucial that educational institutions invest in blended learning to ensure that students continue to receive a high-quality education, regardless of the circumstances. According to Tunisia's official regulations for higher education, all universities in the country could only offer face-to-face sessions; the Virtual University of Tunis was the only institution authorized to offer online courses.

Only during the COVID epidemic phase was it necessary for other institutions in Tunisia to transition to online education. During this time, instructors experimented with platforms and online teaching technologies. Additionally, only during COVID did students get to use these e-learning resources and context.

Industries' need for remote work skills has motivated some universities to further pursue the use of online learning. However, there is a need for research examining the factors affecting the students' acceptance of online learning in developing countries and more specifically in Tunisia. To the best of our knowledge, this is the first work to examine the factors affecting students' acceptance of online learning by Tunisian university students. There hasn't been enough research done on how students behave while adopting online learning during and post-pandemic period. Thus, this paper aims to investigate the variables that influence university students in Tunisia's behavior and intention to adopt online or blended learning.

Background to the Study

The research was conducted in Tunis at South Mediterranean University (SMU). SMU is a private, co-educational university with a student body of approximately 2,000 undergraduate and graduate students representing more than 10 nationalities. It is the first English-Speaking Educational HUB in Tunisia since 2002.

MATH 341, which covers differential equations and modeling applications, is a mandatory course for SMU Engineering students. The lead author taught four sections with a total enrollment of 90 mixed-gender students. The course was designed in a face-to-face classroom format based on lectures and group work to enhance learning and increase academic achievement. Group work activities that “position students in the center of the process, with models that stimulate their curiosity, creativity, abilities, teamwork, and knowledge acquired outside the classroom”³ engage the students and offer them the opportunity to move from surface learning to deeper learning. In fact, students were not sitting passively in class. They were working on problems and interacting with each other. Here is the time breakdown of a typical class:

- ~45min Students gain an understanding of class content.
- ~35min Students were working in pairs or in small groups whichever they find more comfortable. They are trying to solve the questions while the instructor was walking around, answering questions, explaining concepts, and providing individual help as needed.
- ~10min the instructor explains on the board the problems that students were not able to answer correctly.

Transition to online learning

Due to the pandemic situation, six weeks into the semester, the delivery of the course content went from face-to-face to only classes being conducted through Microsoft Teams and Moodle. The Microsoft Teams page was organized per class. Introductory videos⁴ of the concepts were shared with students before class time. First, the instructor gave a presentation to students and shared them through Microsoft Teams. During the second part of the lecture, she divided the students into three groups and worked with each group separately for maximum interaction and engagement. Each group had the same number of students. The students took graded quizzes through Moodle. Each quiz had 5 to 7 multiple-choice questions. Students could take the quizzes in any order and repeat them as many times as they wanted. After a student finished a quiz, they submitted their answers online and received an immediate quiz score as well as feedback.

RESEARCH METHODOLOGY

In this two-part research study, the first part looks at the students’ reactions to and level of satisfaction with online learning. Part two builds on the findings in Part one to gain a better understanding of the student’s acceptance of online learning utilizing the Technology Acceptance Model (TAM).

In both stages of the research data was collected through student surveys designed by the authors. The surveys had a mix of Likert scale questions, and open-ended questions to get both quantitative and qualitative data. The surveys were given to the students at the end of the semester.

Part 1: Discussion of findings

To get a better understanding of the student’s perceptions of online learning, the students in all sections were asked to fill out a short survey at the end of the course. Most students were satisfied with online learning. Some students commented that the online classes were similar to face-to-face classes. A student said it is an unpleasant experience that sometimes he lacks motivation and found it difficult to engage with others. As one student stated: “I tried my best to keep myself motivated as

much as I can yet it was a very hard period”. When asked to elaborate on what helped them learn, some of the comments included:

- The posted lessons on Moodle.
- The shared videos before lectures.
- The possibility of one-on-one calls with the professor.
- The posted solution of exercises on Moodle.
- The comfort

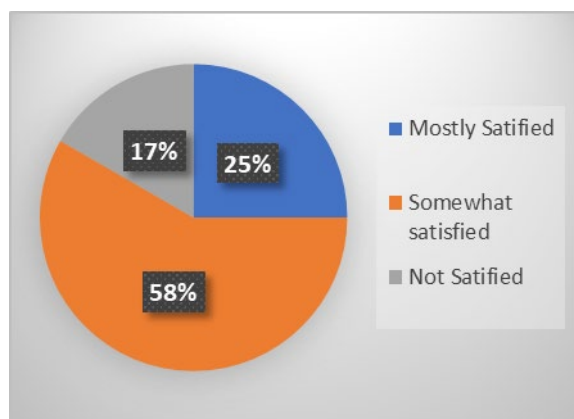


Figure 1. Students' satisfaction.

The students were presented with six potential obstacles that impacted their learning. As shown in figure 2, poor connection is the main obstacle for many of them followed by the poor video quality.

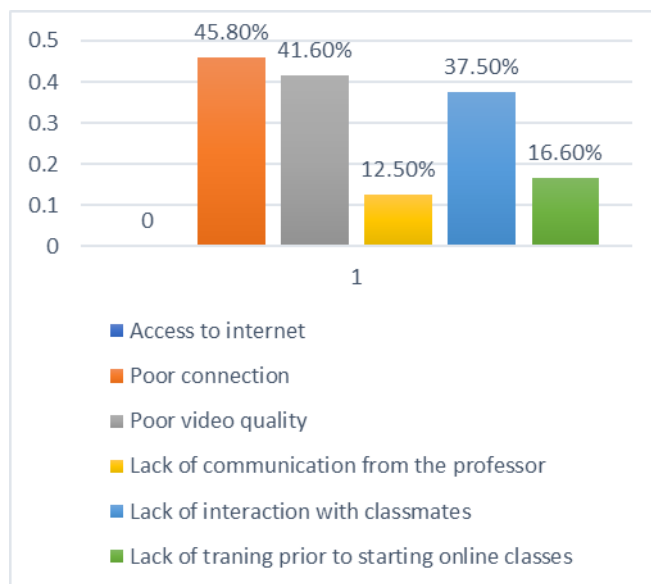


Figure 2. Obstacles that impacted online learning.

In addition, students were asked to pick their preferred type of class. They were given five choices: 100% face-to-face class; 75% face-to-face class and 25% online; 50% face-to-face class; 50% online class; 25% face-to-face class and 75% online class and 100 % online class. The responses to these five choices can be found in figure 3 below:

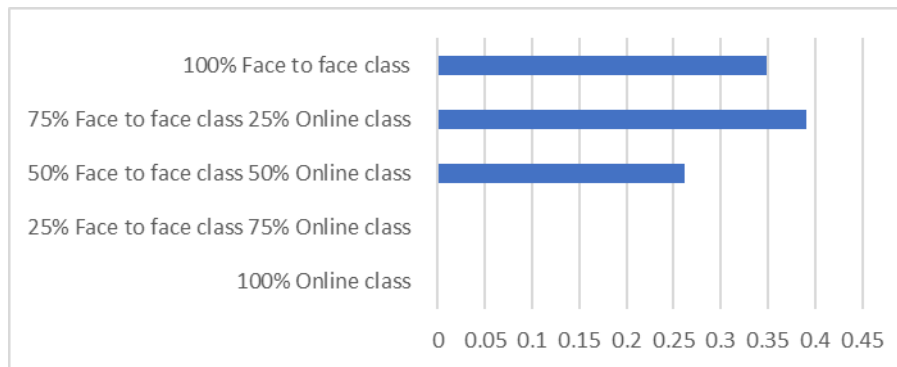


Figure 3. Distribution of students' preferred class type.

To summarize the main findings in part one of the study, the students adapted to the online environment, despite some of the obstacles they encountered. They noted that there are advantages to online learning but given that they also noted they value face-to-face classes, blended learning⁵ appears to be the most useful option for them.

Part 2: Research Model and hypotheses

In the second part of the study, we used the same survey questions/answers used in part 1 and adapted them to fit the Technology Acceptance Model (TAM)⁶ to examine the factors affecting students' acceptance of online learning. TAM is a theory developed by Davis in 1989⁷ to explain the determinants that influence the acceptance of technology.⁸ TAM is still one of the most robust theoretical models⁹ capable of exploring the use of innovative technologies in different contexts based on the Theory of Reasoned Action (TRA).¹⁰ It has been shown in several studies that the core factors in the Technology Acceptance Model are perceived ease of use (PEU) and perceived usefulness (PU). Perceived Ease of Use (PEU) refers to the degree to which a student believes that the online learning method is easy to use. Many researchers showed that the Perceived Ease of Use (PEU) has a positive effect on the behavioral intention to use online learning.¹¹ Behavioral intention (BI) "refers to the intent of the learners to employ online learning systems and involves persistent use from the present to the future"¹². Perceived Usefulness (PU) refers to the degree to which a student believes that the online learning method is very helpful for obtaining new knowledge. Many researchers showed that Perceived Usefulness (PU) has a positive effect on the behavioral intention to use online learning.¹³ In addition, it has been shown that Perceived Ease of Use (PEU) and Perceived Usefulness (PU) are related.¹⁴ Hence, the second part of the study is guided by the three following hypotheses to test the correlations among the constructs:

Hypothesis 1 (H1):

Perceived Ease of Use (PEU) positively affects the Behavioral Intention (BI) to use online learning.

Hypothesis 2 (H2):

Perceived Usefulness (PU) has a positive effect on the Behavioral Intention (BI) to use online learning.

Hypothesis 3 (H3):

Perceived Ease of Use (PEU) positively affects Perceived Usefulness (PU).

Based on their research objective and context, many scholars have expanded TAM by adding external variables such as, accessibility, perceived enjoyment,¹⁵ perceived playfulness,¹⁶ social/subjective norms, computer self-efficacy, content quality, computer anxiety, experience,¹⁷ technical support, system quality,¹⁸ perceived behavioral control,¹⁹ gender,²⁰ trust.²¹ It has been noticed that these factors may affect students' acceptance of online learning. However, in this study, our research model uses

the basic TAM as a first step to investigate the relationships between perceived ease of use (PEU), perceived usefulness (PU), and behavioral intention (BI) to use online learning. This model can be seen in Figure 4.

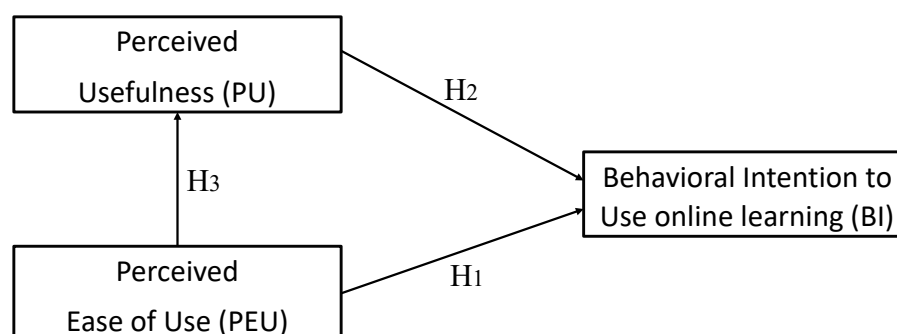


Figure 4. Research model and hypotheses.

DATA ANALYSIS

In this part of the study, the collected data was analyzed by using partial least squares structural equation modeling (PLS-SEM) which is a suitable data analysis to deal with a small sample size.²² This statistical method can measure causal correlations among indicators and constructs. Since we consider only single indicators of constructs, there is no measurement model assessment. The construct is the same as the indicator therefore assessment of construct and indicator reliability are equal to one: perfect reliability. Findings from prior studies²³ revealed that multiple indicators are generally preferable.²⁴

Analysis of the Structural Model (Path Analysis)

The partial least square method structural equation model (PLS-SEM) was applied to construct the structural model and analyze the three proposed hypotheses in order to examine the influencing factors affecting the acceptance of online learning using SmartPLS 4.0.²⁵

First, by examining the path significance levels of each hypothesis, the correlation between constructs can be evaluated based on their degree of significance levels (p-value). The smaller the p-value the stronger the evidence against the null hypothesis in favor of the alternative and hence the result should be statistically significant. Conventionally, a p-value less than the level of significance of 0.05 is statistically significant.²⁶ Table 1 represents the correlations observed among the constructs used in the study.

	PEU	PU	BI
PEU	1.000		
PU	0.200	1.000	
BI	0.296	0.647	1.000

Table 1. Correlation between the constructs.

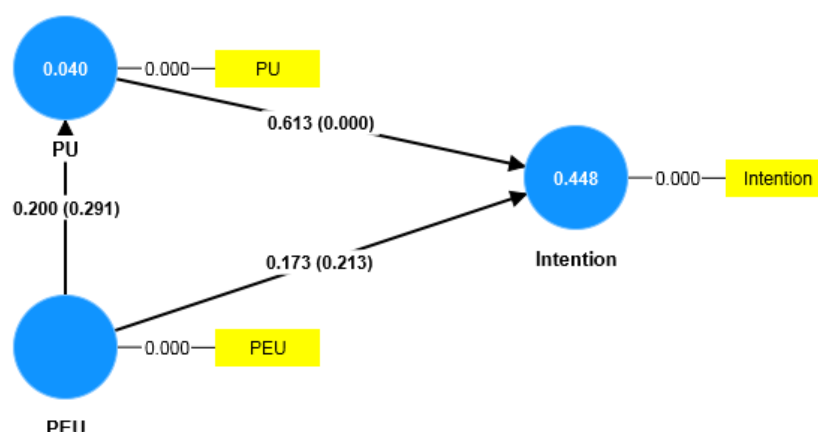


Figure 5. Model of PLS-SEM path analysis diagram. P-values are in parentheses.

Table 2 illustrates the path coefficients generated and the hypotheses testing results. It can be observed that only one hypothesis is supported by the model, the remaining two hypotheses are not supported by the model. PEU significantly affected BI ($\beta = 0.613$, $p = 0.000$). Therefore, hypothesis H2 is supported by the model. While the H1 and H3 were not supported by the model.

Hypothesis	Path Analysis	Path coefficient	T-value	P-value	Results	R ²
H1	PEU -> BI	0.173	1.246	0.213	Not Supported	0.448
H2	PU -> BI	0.613	5.48	0.000	Supported	
H3	PEU -> PU	0.200	1.055	0.291	Not Supported	0.04

Table 2. Hypotheses testing.

In addition, R² is used to indicate the structural model's predictive power of the model. The greater the number, the stronger the model. As seen in Table 2, R² for the dependent variable BI is 0.448 which indicates that PU explains 44.8% of the variance in students' BI ($R^2 = 0.448$, $p = 0.00$).

DISCUSSION

The results of the data analysis indicate that not all proposed hypotheses are supported by the model as shown in Table 2. We found that perceived usefulness can strongly predict students' acceptance of using online learning (H2). This supports the original hypotheses of TAM.²⁷ Hence, we speculate that when students believe that online learning has a quality functionality, their behavioral intention to use it will increase. "It is argued that the higher the perceived usefulness of the e-learning system, the higher the individual's positive attitude would perceive. According to the literature, it has been pointed out that there is strong empirical support for the correlation between perceived usefulness and behavioral intention".²⁸ Therefore, teachers should apply online teaching strategies that promote the growth of students' knowledge and skills.

The impact of perceived ease of use on perceived usefulness was not significant so H3 was rejected by the model. This result is consistent with the findings of,²⁹ but inconsistent with the findings of.³⁰ Furthermore, we found that perceived ease of use does not influence the students' acceptance of online learning. This finding disagrees with previous assertions³¹ that "there is a significant correlation between ease of use and system adoption, as students could lose confidence in the system if they find it difficult to use".³²

Therefore, as mentioned in the first part of the study, blended learning is the most useful option for the students involved in the study, where traditional teaching is combined with online teaching, to

guide students in online learning. This finding is similar to ³³ which found that “usefulness plays the leading role in enhancing the students' intention to participate in e-learning”.

CONCLUSION

In this study, the transformation from a face-to-face classroom to an online classroom is presented. Based on the results students offer differing opinions on digital learning. Some of them believe that online sessions cannot replace face-to-face sessions in undergraduate math courses. Others believe that blended learning is a suitable learning providing students with a learning model, which has not replaced face-to-face learning but has successfully implemented digital technologies and blended them with face-to-face learning. The blended learning model is thus proposed as an appropriate model that would help students in the future.

Further to the conventional statistical analysis, an attempt was made to examine the influencing factors affecting the acceptance of online learning by adapting the technology acceptance model (TAM). This research attempts to explore the relationship between perceived usefulness, perceived ease of use, and behavioral intention to use online learning in the context of undergraduate education in Tunisia. According to data analysis, we found that perceived usefulness is the most important factor affecting the students' acceptance of online learning. The key to making students willing to use online learning lies in the useful teaching strategies implemented by teachers. The powerful functionality of online learning can make students believe that it promotes the growth of their knowledge and skills. In other words, when students believe that online learning has quality functionality and is useful, their behavioral intention will increase.

Furthermore, the study found that perceived ease of use has neither a direct nor indirect influence on the students' acceptance of online learning. Further, the impact of perceived ease of use on perceived usefulness was not significant when tested, unlike findings from previous research studies in online learning³⁴. The differences could be due to cultural aspects, service quality, and other factors between developing and developed countries. The authors plan to examine the external factors that affect students' online learning acceptance in future work.

RESEARCH LIMITATIONS

This study is a first step and will require further studies on the factors affecting the use of online learning. In fact, it is recommended to add external factors in a future study to make further analysis of students' acceptance of online learning. Second, single indicators were used in the model. So it is suggested to use multiple indicators in a future study to conduct robust data analysis. Finally, the study is limited to a small sample size that comes from 28 sophomore students who are also from a specific university environment in Tunisia. It is suggested to expand the sample size in a future study.

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FROM SENSE TO MEANING: APPROACHING A COMPLEX WORLD THROUGH STORYTELLING AND IMAGINATION

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INTRODUCTION

Here's a thought: the world is not more complex than it used to be. We just can sense that more clearly nowadays, which draws our attention not to the complexity itself, but the reasons why we can see it. Someone optimistic might say we have finally listened to Chimamanda Ngozi Adiche,¹ when she alerted us about “the danger of a single story” more than a decade ago, but maybe the conditions that led her to talk about that were even previous. The digital paradigm has given rise to a more intense communication among people who didn't have the means to connect each other before. Far from considering that paradigm as a sign of a “democracy set by media”, the fact is that historically broken, oppressed, and peripheral voices are now widely heard.

So the world had its own infinite cultural diversity revealed to the whole... world. Added to the great amount of social, environmental and political problems humanity in general has been carrying on, that cultural diversity helped to spot that complexity. That means we have to set, say, similarly complex tools to deal with multiple kinds of people, values, symbols, and layers of reality that intermediate our presence and experience in this planet.

Now, when it comes to how we perceive those layers of reality, or how we see values expressed by symbols, or simply how we read people, we find in storytelling a key to sense and make meaning out of those perceptions. As we started to gather and shape several forms of society, stories were there to let us share experiences, exchange information about life (and life preserving!), suggest hierarchies and political structures, and even explain the origin of the universe.

When we study and teach about storytelling, one of the most popular references is the consistent work of American anthropologist Joseph Campbell, released worldwide through the book “The Hero of a Thousand Faces”. In the preface of the 1949 edition, Campbell defines it as “a book about similarities” rather than differences among cultures. In the next paragraph, he quotes the Vedas: “Truth is one, the sages speak of it by many names.”²

In fact, Campbell's work tracks analogue events in myths from several human groups, conceiving a general narrative structure that could broadly speak for any society. For decades, the *monomyth* set by Campbell has been the main reference for an overwhelming majority of the stories produced in the mainstream. The fluid communication of the model suggests a capacity of connecting with many diverse cultures, pointing to the language basis of “Mankind's one great story”, to use the author's own terms.

As we get to the context of a “complex world” – or at least the notion of the world's complexity –, some questions arise: what if the analogies between symbols of different cultures were biased by a

eurocentric thought, conveniently aligned to a hegemonic view of the world? If so, wouldn't it drive the main questions to the prospect of a (failed) colonial project? Finally, what good believing in the possibility of one single truth ("Mankind's one great story") would really do?

As much as we totally respect and admire Campbell's vigorous, deep and eclectic work, we sense that its boundaries are now clear: the concept a single story can no longer handle the contemporary world's complexity.

On the other hand, we're not trying to formulate any sort of opposite theory, but rather putting together principles to reach alternative models from similar methodological premises: based upon mythologies from peripheral cultures, can we come up with different symbolic journeys – or narrative structures – and thus deal more directly with the diversity of human perspectives?

Our research at NIX – CESAR School's Narrative, Imagination and eXperience Design Lab – starts with the state of the art established mostly by the structuralist narratology and compared mythologies. Then, we bring Brazilian authors to add cosmological views from Africa and from the native folks of South America, in order to *enlarge the grammars by crossing cultures* (and not going through syncretism nor decolonialism). As a common trace of the non-eurocentric traditions that shape the core of Brazilian culture – the African and the Indigenous folks –, we take the principles of *Encantaria* and *Brasilidade* as an attempt to break a hegemonic approach of storytelling.

VIEWING THE WORLD THROUGH STORIES

The assumption of Campbell is far from being wrong: stories do express the human experience in the world. In fact, early manifestations of human language relate to stories: rock paintings exposed the everyday pursue for food, as speech evolved within reports of intrepid adventures around the bonfire.³ From there to an attempt of explaining the world and what lies beyond, the *myths* emerge. Mircea Eliade sees them as "an extremely complex cultural reality, which can be approached and interpreted by multiple and complementary perspectives", that can be defined as something that "tells a sacred story, (...) it narrates how, thanks to the feats of supernatural beings, a reality has begun to exist."⁴ Even before the first rites praising the gods of creation were founded,⁵ the myths were already telling us the story of the existence.

Comes the 20th Century, and a structuralist approach to society studies seems entirely reasonable. The metaphor of language is quite powerful when it comes to explain the way we see, sense and act on reality.⁶ Solid studies such as Jung's archetypes and collective unconsciousness⁷ influenced talented scholars to deepen their field within the same perspective – such as Joseph Campbell.

Most people who study, teach or work with storytelling know the outcome of that perspective: a rich material on the way we realise the facts, make sense out of it and turn them into meaning, or into another story. This is how we face the *monomyth*.

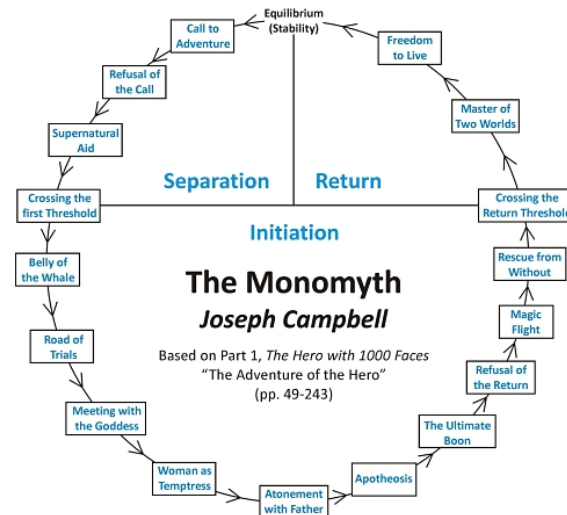


Figure 1. A synthesis of Joseph Campbell's Monomyth.

(Font: <https://www.skillshare.com/en/blog/the-heros-journey-stages-and-structure/>)

By “the outcome of that perspective”, we mean “the achievement of a brilliant and hard-working researcher devoted to track common traces among widely different cultures to achieve a model that could lead us to converge of values that make us feel belonging to human race”. In a way, he actually made it. Unfortunately, there was still a lot of humanity out of the radar.

The one truth and the western thought

Until this very day, racial reality escapes from western perception. Most people – especially most white people, like Campbell – seldom realise the layers of violence within a mindset that reinforce the eurocentric thought as the world leader.⁸ Cosmological, mythological and philosophical premises from the Old Continent were imposed to all sorts of people and defined the basic conventions about “what makes us humans”.⁹ Under those premises, ultraconservative morality, severe austerity and even slavery were not only justified, but also established as a rule to the “civilised world”.

Yes, that is a complex matter *da per se*. So, in order to focus on narrative, let's look at what Campbell's monomyth – the western way of telling stories – has to say:

The adventure of the hero is constructed around a character, the so-called hero. Although we refer to it as a structure – so an actual presentation varies according to a particular story –, it is composed upon a single person: the archetype of the hero, usually an altruistic man, available to sacrifice his life for the others, for the cause, for the world. Any stage of that journey is driven by an individual perspective: from the call to adventure to the freedom to live (the first and the last stage of the adventure, respectively), one single character goes through challenge, trials, temptations, losses and a lot of pain to fulfil a mission. Furthermore, the material world doesn't mean much: most of the motivation for the journey is provided by an inner strength, inspired by ethereal values (goodwill, idealism, redemption, etc.). It also assumes the service for a greater good – which seeds the reasons for the sacrifice: what does a single life mean before the lives and happiness of a whole population, or the sake of the world itself? Therefore, although the general appeal of the whole journey is the ascension of a hero – an individual –, it will only occur if that person is serving a collection of virtues and values, which on their turn are defined by a dominant ideology of whomever tells that story.

After such a long time, in such a diverse world, why are those mechanisms still so strong and make so much sense? When it comes to what is relevant in terms of mythology (taking myths as stories that explain how and what we exist for) and how it deals with philosophical principles (given the way

western contemporary society views and think the several layers of immediate reality), it's reasonable to consider a convergence of transcendence and metaphysics. The dissociation between the material world and the immaterial spirit is reconciled on a symbolic, non-pragmatic level, with ethical premises cloistered in the dome of idealism, attainable only by people who somehow earned to be there – “heroes” that went through a specific journey and, as chosen individuals, have achieved the “mastery of two worlds”. From Plato's idea to the fallacy of meritocracy, concepts as righteousness, power, leadership, and even freedom rise from the achievement of a journey pre-determined by destiny, chance or *the gods* – whoever they are in the capitalist world we live in.

Peripheral myths: notes from other truths

If we want to reach a wider range of humanity in our attempts of representing complexity, we must look at cultures with different presumptions. Rather than searching for exotic and eventually unknown cultures, we started with who the ones muted by the hegemonic colonial project. In Brazil, in addition to the native folks, we have more than half of the population composed by African-descendants. So the first question in our research was: what African and Indigenous stories – and later, other *peripheral myths* – can tell us that the western thought has not? According to Campbell's premises, the “one truth” would manifest itself also there. Nevertheless, when we look more closely to some of the common principles of those people, we can see a completely diverse way of reasoning and setting symbols.

Although originally separated by the Atlantic Ocean, there are common traces among most of African-matrix and Native cultures which may converge under the large field of *Encantaria* (in a free translation that could eventually fulfil the concept, we would name it “Enchantery” or “Enchanted Sciences Set”). Compared to the dominant western thought – from the Christian transcendental cosmology to the metaphysical epistemologies – the main distinction relies on the relation between the ethereal and the material, or the spirit and the body. While within the eurocentric view the body is a source of sins presented often as opposed to the soul, within the *Encantaria* the body is *the only way* to reach the divine.¹⁰ A whole system of beliefs and attitudes is elaborated according to that principle. As for the personal perspective, also the idea of temple (or holy ground) is defined by a dynamic relationship between the community and the space. Thus, it is more connected to animistic ancient traditions (seen by many scholars as a “primitive” religious conception), rather than a construction consecrated by a priest or any authority so it could serve as a channel to the spiritual world.

We can spot some of those differences by the comparison of the two perspectives in the table below:

EUROCENTRICAL VIEW

- > TRANSCENDENCE / METAPHYSICS
Dissociation between BODY and SOUL,
(the MATTER and the SPIRIT / ABSTRACT / DEITY)
- > THOUGHT and SILENCE
MIND beats BODY / CODES beat LIFE EXPERIENCE
(I think therefore I am)
- > INDIVIDUAL FREEDOM
Autonomy of the PERSON
(singular prospect)
- > NARRATIVE AND TIME
A LINE of analog events setting “the Truth”
(about Mankind and Time itself)

NON-EUROCENTRICAL VIEW

- > ANIMISM / COSMOLOGY
BODY and SOUL are inevitably connected
(the BODY is the only channel to the DIVINE)
- > THOUGHT and SHARING
Oral tradition and collective perception
(I vibrate / dance / play the drum / die therefore I am)
- > COLLECTIVE FREEDOM
Autonomy of the COMMUNITY
(plurality and dialogue)
- > NARRATIVE AND TIME
CYCLES of dynamic events setting “TruthS”
(about Humans and Time itself)

Table 1. a comparative board of general western values and an alternative to eurocentric thought provided by the Encantaria principles – connected with African and Native Brazilian traditions.

In the left column, the Eurocentric view is expressed starting by an immaterial prospect, dissociating the body and the soul and establishing the spiritual dimension as a higher value to be searched by humanity. In that sense, many believe that silence and resignation are forms to reconcile a troubled mind and come up with a superior thought to conceive existence and the human experience – which echoes in the Cartesian maxim “I think, therefore I am.” Besides, the search for a higher status is individual: freedom to live is an achievement, not a general right. Finally, the chain of events in a story is disposed in a line that leads to a single end. Even in narrative pieces with multiple paths and endings, such as games and interactive films, the experience to each is usually linear: even though we can have many options to go through the story (a *multilinear structure*), when we decide for one line we’ll be led to one end for that particular experience.¹¹

The right column collects a number of concepts come from the tradition of *Encantaria* presented as an alternative to the hegemonic premises: an animistic perspective establishes that body and spirit are inevitably connected, as it is the material and the immaterial through enchanted bodies and enchanted words. In fact, oral tradition, for that matter, is the main vehicle of knowledge, instead of thoughts immortalised in books or manuscripts. As Brazilian historian Luiz Antonio Simas would paraphrase: “I vibrate, I dance, I play the drum, I die – therefore I am”.¹²

Going further, the conception of freedom, knowledge and existence is directed to the community, whereas any action is discussed and mediated by a plural and dynamic context. An example of that is how justice is symbolised. While variations of Greek Goddess Themis (such as Lady Justice) are often depicted blindfolded (representing the assumed impartiality of the juridical system), the Orisha Sangô is described as a fair king who watches and rules (so the application of the law is not conducted by an immutable code, but by the interests of the community).

Last but not least, the conception of time: not a line, but tangential circles and spirals. Here, evolution is seen as a cycle in a constant dialogue with the past and the ancestors. That means we don’t move “forward”, towards a changeless destination; we just *move*. And by moving, we can notice mistakes coming and going, and reconsider the path we’ve taken – and eventually get another way.

FACING THE MYTH AND EMBRACING COMPLEXITY

Now, how do principles like those could suggest other types of journey, or other approaches on storytelling? Based on that first exercise of casting diverging components of eurocentric and non-eurocentric thoughts, we set four axes of discussion so we can build alternative structures, reviewing some of the *monomyth* aspects.

Hero vs Community

Let’s start with the main character of the mainstream adventure: the hero. Usually, we study the monomythical structure as an individual journey, run somewhat by a powerful chosen one (or at least someone who can develop the exact abilities the challenge demands) with a necessary strength of mind. Moreover, that character may also be a kind of synthesis to moral codes, and at a certain point should be ready to sacrifice something utterly important (personal goals or life itself).

When we contrast that individual adventure with some sense of community, we can consider more clearly collective journeys and multifocal stories. Besides, a plural perspective of protagonism may favour the composition of characters that question heroic stereotypes – such as the anti-hero or characters in the so-called “grey zone”.

Body vs Soul

Admitting the value of material existence is to accept not only what we have at hand, but also how much we can understand realities that are historically different of our own. The conflict between body and soul in societies influenced by an idealistic mentality gives rise to a systematic oppression of complexity. The domestication of enslaved bodies was one of the key strategies for the colonial project, for the only life possible to people who kidnapped from Africa or submitted to the European invasion in America was to serve the hegemonic (white) society in the form of work, sexual relief, or procreation. When the body is considered something inferior, then any violence justified for a supposedly “greater good” is permitted. Then, the elevation of the soul through the sacrifice of the body is a way to redemption, which minimises the guilt upon slavery, torture and even genocide.

On the other hand, if the body is integrated to the mind and the spirit – “the only way of getting to the Divine” –, then *any* body or social condition is worthy and should be taken seriously. Thus, the adventure can assimilate more subtle aspects of human existence, adding the social dimension to the values expressed within the journey. Consequently, a political layer joins the dramatic purposes. The journey is not restricted to the individual, but expanded to how one acts in society.

Timeline vs Time Spiral

There’s an old Yoruba saying: “Esú hits a bird yesterday with a stone he threw today”. For the Candomblé – one of the most popular African-Brazilian cults –, Esú is an *Orisha*, a supernatural being analogue to a god in a pantheon. For other cults, such as Umbanda and Omolokô, Esú is a category of entity who intermediates the energy flow between the material and the immaterial world.

The saying reflects the conception of time not just to the Yoruba people, but to a lot of the western African folks. The events are not disposed in a chronological line, but into interconnected circles. So narrative terms as “storyline” or “chain of events” and “causality” are less important than the *meaning* made out of memories. So here more than in any other context, time is relative: not in phenomenological terms, but rather in affective issues. Consequently, the stories originated from that conception of time may be better structured: multiple timelines, flashbacks / flash-forwards, etc., just to number a few of possibilities.

Conflict vs Conciliation

Finally, the western adventure leads to triumph on opposite forces. It’s common to see heroism represented by characters like Perseus presenting the head of Medusa – the achievement of a male hero over a condemned woman turned into a monster that threatens humanity.

In *Encantaria*, we have the character of *Preto Velho* (Old Black Man), who is an ancient sorcerer that performs powerful spells by just lighting his pipe. Usually, he’s represented as a man of good rhetoric, capable of dealing with all sort of adverse situations. Following that model, the hero is driven to solve conflicts through conciliation over confrontation – even though “conciliation” here means not running away or giving up a fight, but undermining the enemy’s violent power.

FROM REPRESENTATION TO RE-INVENTION

According to Simas,¹³ that last point represents a reaction guideline to a ruthless well-succeed state project. Rather than a direct resistance that could fight back (and here he diverges from a general decolonial thinking), the strategy that keep alive the many oppressed groups in Brazil is *Brazilianness*. the capacity of re-inventing life by acting in the cracks of dominant culture and by enlarging the grammars – integrating multiple cultural elements to reassert and recreate identities, views, prospects, and practices.



Figure 2. African-Brazilian martial art Capoeira movements.

As an example, we can consider the development of Capoeira, an African-Brazilian martial art. At a first glance, someone could consider it not a fight, but a dance or a game. Nonetheless, it is a very effective combat style: the fluid expansion and grace of the movements cover up the hit, prepared and executed with strength and accuracy.

Expanding the same logic to broader popular manifestations (such as Carnival, samba, football, etc.), we can sense the core characteristics of Brazilianness, even risking a general definition: a transgressive strategy to find life in the midst of a violent precariousness or, in other words, a scream of joy opposed to a founding hatred.

So, we believe that Brazilianness is one of many possible keys to compose storytelling structures alternative to Campbell's monomyth, for it works at the level of an enlargement of grammars (intersections among different cultures) to provide a re-invention of the reality, poetically subverting the *meaning* out of the common *sense*.

Ritual structure: the siré of Nagô

That assumption is not merely theoretical or idealistic. *Motherhood*¹⁴ ("Mães do Pina", 2015) is a documentary feature film about five Canbomblé old priestesses (*yalorishas*) from a peripheral community of Recife, in Northeast Brazil.

Escaping from the Aristotelian structure, the narrative is organised according to the *Siré of Nagô* – a collection of chants and beats dedicated to ten Orishas. Aspects of life and nature represented by each Orisha are driven to define each subtheme about the history of the community and the main characters – the *yalorishas*. In the table below, we may find the due analogies between the spiritual significance of the represented Orishas and the journey excerpts presented in the film:











EXÚ		PATH OPENER, MESSENGER, DEALER, CROSSROADS MASTER	<i>The chant and beat for Exú opens every ritual in Candomblé. Before starting to work, we have to open the paths to deal with the forces. In the film, the opening sequence enters the community, as if we asked for permission to start the journey.</i>
OGUM		WARRIOR, TECHNICIAN, INVENTOR, TRAVELERS' PROTECTOR	<i>Then the gate opens, and we must be prepared for the road – that is, provide all the skills, tools and knowledge we might need for a battle. Here, a sequence on the preparation of a rite takes place on the screen, as we understand the routine of the community.</i>
OXÓSSI		HUNTER, PROVIDER, THE ONE WHO BRINGS FOOD	<i>To hunt is to provide food, and thus, the necessary energy for facing the challenges of life. But it's also a metaphor that we must fight for our nourishment. The Mothers and the younger girls tell how they got into a better life – also in material terms.</i>
OMOLÚ		HEALER, PHYSICIAN, PAIN CARRIER	<i>Now we must take care of our body, gathering strength for the journey. That is to know that is through the matter we connect with the spiritual world, and that exchange of energy can heal us and the world. The Mothers start to talk about their stories, first full of pain.</i>
NANÃ		ANCESTOR, THE LAKE MUD, MOTHER OF THE MOTHERS, DEATH GUARDIAN	<i>Most of African rites have a direct connection with the ancestors, the enchanted. That connection guides us during several moments of life, evoking wisdom and inspiring strength. Now the Mothers remind the ones who came before and led their way.</i>
OXUM		PROUD, SELF CONSCIOUS, BEAUTY, RICHNESS, THE RIVER WATER.	<i>After the victory (the hunt, the battle), we can celebrate the glory and the richness we achieved. The sense of pride is remarkable: the best way we may honour our community, our ancestors and our own story.</i>
YANSÃ		RESILIENT, EMPOWERED, THE STORM & THE WIND.	<i>The wind comes to keep things moving. Life is a constant movement, sometimes as violent as a storm. But rather than scary, that storm is inspiring. The action of the Mothers within the community show that any oppression can be reverted into something else.</i>
YEMANJÁ		MOTHER OF ALL WORLD CREATURES, THE SEA & THE OCEAN.	<i>Then we reach the sea, which is both our origin and our destiny. Seeing the ocean as a mother that embraces us, we are properly protected to go on, and generosity rises in our life. A new generation is presented, and the Mothers know their legacies will be carried on.</i>
XANGÔ		KING, FAIR JUDGE, THE JUSTICE WHO WATCHES, FIRE & LIGHTNING	<i>When the day is done, we bring on the sense of justice. Those who fight for their family and community will be rewarded, facing the challenges with the tranquility of the powerful. In the film, the rite has been prepared and it's about to begin.</i>
OXALÁ		WISE, PATIENT, POWERFUL, THE WORLD CREATOR, ASCENSION	<i>Finally, we celebrate the creation: having gone through all stages of our journey, we are ready to ascend. Then the film ends with a ritual dance which reflects the harmony of the community, expressed by the hug of the Matriarch and the Next Mother.</i>

Table 2. *The Siré of Nagô and the narrative structure of the documentary film Motherhood (2015).*

For the record, the film's première took place in Recife's most traditional film theatre, having as guests a great number of local representatives. Until this day, the film is remembered and celebrated by the community, and often still discussed in academic, cultural, and activist circles.

THE END (AND SOME NEW BEGINNINGS)

As we could expect when facing complexity, the conclusions of this paper will probably give rise to new sets of questions and possibilities – at least we hope so. Here are some key points we can highlight:

First of all, we have proposed a review to structuralism (and post-structuralism, for that matter) assuming the eurocentric thought can no longer handle the diversity of humanity – or rather the symbolic relevance of historically oppressed people, whose voices have been silenced for way too long. We hope this research may somehow reinforce that perspective, conceiving more representative storytelling models that may help us to achieve not one great story of humankind, but great stories from more kinds of humans.

As a result, we believe bringing those stories to spotlight may guide to new ways of seeing problems and seeking solutions, by establishing peripheral myths as inspirations for alternative perceptions and expressions of knowledge – therefore, a path to a broader and more diverse epistemology.

Furthermore, there are some loose ends to tie up: convergences between story structures and geopolitical issues; studies on oracular systems in order to find connections on the way we read and deal with problems; approaches on other pillars of narrative beyond the plot, such as scenario and characters; search, investigation and classification of other narrative structures based on a systematic and comparative study of peripheral mythologies; and finally, testing all those findings in the analysis and the development of narrative works.

Setting storytelling elements by alternative means can provide creative tools not only to tell better stories, but also to re-invent – or rather re-*imagine* – reality. Since stories connect us through curiosity, interest or empathy, the wider is our comprehension of different narrative styles, the greater is our capacity of embracing complexity – so the greater may be our imagination. And in any way, imagination seems to be the key to write better endings to this world.

After all, the question that inspired this work stands: what stories could / should / shall we tell?

NOTES

- ¹Chimamanda Ngozi Adichie, “The Danger of a Single Story” (2009).
- ² Joseph Campbell, *The hero with a thousand faces*. Vol. 17. New World Library, 2008.
- ³ Clifford Geertz, *The interpretation of cultures*. Vol. 5019. Basic books, 1973..
- ⁴ Mircea Eliade, *Myth and Reality* (Brazilian edition), (2000)11.
- ⁵ Julien Ries, *Mito e Rito*, 2020.
- ⁶ Robert Stam, *Film Theory* (Brazilian edition), (2003) 122-123.
- ⁷ Carl Gustav Jung, *Archetypes* (Brazilian edition), 2000.
- ⁸ Djamila Ribeiro, *Manual Antirracista*, (2019) 31-33.
- ⁹ Nei Lopes & Luiz Antonio Simas, *Filosofias Africanas*, (2020)15.
- ¹⁰ Luiz A. Simas & L. Rufino, *Fogo no Mato*.
- ¹¹ Leo Falcão, *Narrative Maps*, 2018.
- ¹² Luiz A. Simas, “The Macumba Epistemology”, 2018.
- ¹³ Luiz A. Simas, *Brazilianness Almanac*, 2018.
- ¹⁴ Falcão, *Motherhood*, feature length documentary, 2015.

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MEDIA LITERACY – A VACCINE AGAINST FAKE NEWS?

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INTRODUCTION

We are experiencing a shift in the media landscape as dramatic as the transition from oral to written storytelling. Over the last decade, the hybridization of information and entertainment into infotainment in legacy and social media, plus technical innovations from Deep Fakes to AI,¹ have escalated the challenge of upholding ethical principles in media creation. That no audiovisual medium can now be trusted as authentic has led to a crisis in society. A Vaccine Against Fake News is developed by our group of researchers as a combined web-based and in-classroom media literacy curriculum for High school students to address the prevalence of fictional storytelling in fact-based media. Our goal is to guide students as media consumers to understand and explore the ways in which picture editors alter facts to favour story, and thereby to decipher fact from fiction in audiovisual media and content aggregators. Borrowing from real-world narrative and editing strategies in video and audio texts, our workshops enable students themselves to exercise image and sound manipulation. By pulling back the curtain to reveal key storytelling techniques, and through hands-on video editing, our approach to media literacy empowers students to manage legacy and social media. However, the responses and feedback we received after the first trial year revealed a disturbing general mistrust in *all* media and a questioning of *any* empirical facts and established science by students – the opposite of the desired outcome of our initiative. This at times vivid response is now forcing us to reevaluate epistemic dilemma in teaching media literacy.



Figure 1. *The Frankenbite*²

The View From the Cutting Room

What do television makers do when very little happens in the real? The answer is picture editors go to work. With the “frankenbite” – a portmanteau of “Frankenstein” and “soundbite” – one flip creates conflict where there was none before. When I first learned about the frankenbite, I assumed its use was limited to Reality TV; I was engaged in documentary – what scholar Bill Nichols calls “a discourse of sobriety.”³ But when I began to critically analyze my own practices, I realized that I too sacrificed the real and “lied the truth” for a better story.

The world around us, as it is represented on screens, is permeated with artifice – a result of our pervasive hunger for entertainment. That hunger is less for information in the raw than for the stories fashioned from it. The longing for narrative structure, regardless of genre, demands a multitude of choices, both in the recording and in the editing of fact-based reporting. A documentary film shows what “happens in front of the camera,” but only after the deliberate selection and ordering of captured reality. The editing of pictures and sounds is the most significant indicator of a media creator’s point of view: what is included, left out, juxtaposed, compared, and the order in which the information is placed. All reveal what the creator considers crucial and propels even nonfiction toward the conclusion the maker has pre-determined. The audience, therefore, is presented not with *the real*, but an interpretation of reality as determined by media makers. Even so, picture editing remains on the margins of media scholarship and largely invisible to media consumers. If the audience *does* notice the editing, their attention is drawn away from the narrative and emotion of the program, hampering their engagement with the intended meaning of the story.⁴

On Story and Anti-Story

Humans are perpetual storytellers in and of our own lives – we see our lives as a journey, with a beginning, middle, and an end. Roland Barthes positioned narrative as one of the great cognitive categories through which humans understand the world.⁵ Without story, humanity would experience life as a blooming, buzzing confusion. Storytelling even pervades academic fields traditionally held to be governed by logic, syllogism, or formula, such as history – the writing of which Hayden White’s *Metahistory* equates with literature⁶ – or law⁷ and the social sciences.⁸ Yet, analysis of narrative practice has not kept pace with its proliferation and celebration in culture.

In recent times, society has delegated an ever-larger portion of its essential storytelling function to legacy media, and now increasingly, social media, where facts are regularly manipulated to create more compelling stories. *Who* tells stories and *how* they are told have fundamentally turned in a direction opposite to enlightenment, and toward profitability and ideology.⁹ Our research is grounded in the belief that stories are increasingly destructive,¹⁰ and have permeated the non-fiction media landscape where narratives are now valued more than facts.

The recent phenomenon of “Fake news” is the result of a collective attachment to narrative coherence over factual reality.¹¹ The rise of advertising as storytelling depends upon a public that behaves according to emotion rather than rational thought. Neil Postman famously pointed to a tyranny of story in which we have come to “adore the technologies that undo [our] capacities to think.”¹² The new media landscape has led to the emergence of “anti-stories,” defined as formulaic and fundamentalist narratives in fact-based mass media, serving the interests of corporate and political elites to sell products or agendas.¹³ But the ability of media consumers to decipher fact from fiction on legacy and social media has not kept pace. The prevalence of media that purports to be fact-based but really just tells stories, coupled with a lack of tools to empower the new generation of media consumers to read and analyse media, expose an urgent need for media literacy education.

The research team for A Vaccine Against Fake News hypothesized that most youth do not currently have the critical skills necessary to discern fact from fiction in fact-based programs in legacy and

social media. We further postulated a dramatic disconnect between the media studies content students currently engage with in school, the media platforms they engage with their peers, and the media landscape that informs their view of the world outside their own lived experience. We suggested two causes (and thus remedies) for this disconnect. First, student awareness of media does not consider its production and post-production processes. Second, students lack the access to “insider” knowledge regarding media content production, and while being media creators themselves, have not been given the agency of applying editing tools to create their own narratives. To address these gaps, we developed a resource called A Vaccine Against Fake News.

A VACCINE AGAINST FAKE NEWS

Audiences need the necessary tools to distinguish fact from fiction, data from story, and evidence from narrative tropes, in fact-based media. Recent research has shown that most American youth lack the capacity to discern truth from fiction in online news-based media.¹⁴ In Canada, 90 per cent of all citizens say they have fallen for fake news online, with 45 per cent listing television as the most common source of misleading reports.¹⁵ Therefore, we hypothesized that media users lack sufficient media literacy to give them agency as consumers. However, the responses we received from participants during the pilot phase of our research study challenge this assumption.

Hill defines media literacy as the viewer’s ability to analyze and respond to media with a critical distance and a degree of reflectivity about what is perceived.¹⁶ Thus, the study of fact-based programs needs to go beyond indexical concerns about objectivity, factuality, and truth claims. It needs to analyze spectatorship – audiences’ cognitive and affective perceptions of nonfiction’s mediated reality, in which the degree of mediation is as variable as a spectator’s awareness of it. Civil society’s challenge is to ensure that youth learn critical media literacy skills and build their capacities and knowledge to participate in democratic structures.

We are interested in the complex, contingent, and context-specific ways that youth negotiate their relationship to mass media. The debate on fake news has heightened academic and, to a lesser degree, public awareness of the composed and mediated nature of television, specifically television programs that claim to give true accounts of everyday reality. As viewers become increasingly media literate, ever more aware of the tricks of the trade and constructed nature of objectivity and balance, we asked whether they will be able to build up a healthy skepticism to protect themselves from fact-based media that manipulates instead of informs, narrates instead of explains. Or will they develop a cynicism that questions or dismisses all fact-based media, whatever its source?

The instrumentalist view that media owners control media content, and that the media performs ideological functions, highlights the potential effects media has on individuals. But these effects also include complex combinations of long-term and short-term processes that audiences may actively negotiate themselves. Society is paying for its media illiteracy in the steady erosion of fact by narrative. This is where our research comes in. To respond to this challenge, we first needed to learn how students use media to construct a factual understanding of the world outside their own lived experience.

We partnered with the Toronto District School Board (TDSB), one of the largest and most diverse school boards in North America, to ensure that the tool we developed would be relevant and accessible to a variety of cultural backgrounds. Exploring both the essential and dangerous qualities of narrative amidst hyperbolic technological change, A Vaccine Against Fake News came to draw on the insights of those who work with and think about story – picture editors. In user-determined focus groups, we asked students to create their own stories, applying specific video editing techniques. The process of creation had them describe, develop, and test the story, and thus provided educators with new strategies for teaching media literacy. Our aim for the pilot phase of our initiative was to conduct

post-workshop surveys with the focus groups, review the resulting data, and then finalize an interactive, open access tool for media literacy education in high school classrooms anywhere, using browser-based dynamic media creation that allows users to create nonlinear narratives in fact-based media. The survey responses we received, however, would raise fundamental questions about the purpose of media literacy in general and our approach in particular.

OUTCOME

After eight months of presentations in eight high schools, working with 20 media literacy teachers and school librarians, and more than 270 students who responded to pre- and post-workshop surveys, we analyzed the collected data and formulated the following key take-aways. Among the English teachers who teach media literacy education, only one quarter expressed a *very comfortable* level of doing so, while more that 80 per cent of media literacy teachers confessed of having no experience creating media themselves.

8. How would you rate your level of comfort when teaching students about the media?

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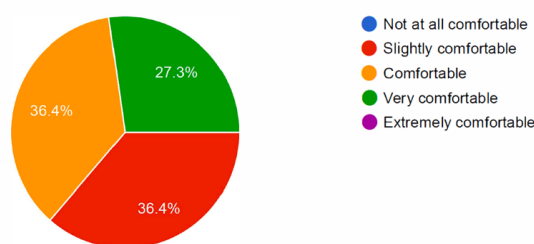


Figure 2. Teacher survey¹⁷

Of these teachers, 70 per cent are *not* or are just *slightly satisfied* by the learning their students achieve in media education, and wish they had more time or access to better teaching resources. None of the teachers subscribed to any theoretical media literacy frameworks like Critical Media Literacy¹⁸ or the Digital Competency Framework.¹⁹ All of them declared that their students deserve better:

I have always felt underprepared to teach media and that even though I discuss what we see and encourage students to question creator bias and think about the choices made in delivery of various media pieces, I only scratch the surface.

The 270 grade 10-12 students who responded to both the pre- and post-workshop surveys did so with guaranteed anonymity. More than 50 per cent of the pre-workshop survey respondents said they had little awareness of how fact-based programs are created.

How aware are you of how non-fiction videos are made?

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246 responses

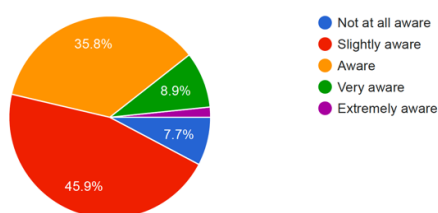


Figure 3. Student survey¹²⁰

However, these same students said they pay attention to story second to information and factual content.

When watching non-fiction videos, what factors do you pay attention to?
(Select all that apply)

243 responses

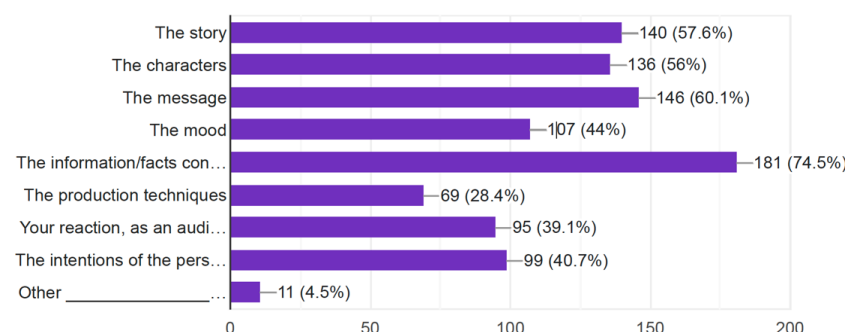


Figure 4. Student survey 1²¹

In the post-workshop survey, students reported an increase in their awareness of how nonfiction media is created from less than 50 per cent to 90 per cent.

2. Now that sessions together are complete, how aware are you about how non-fiction media is made?

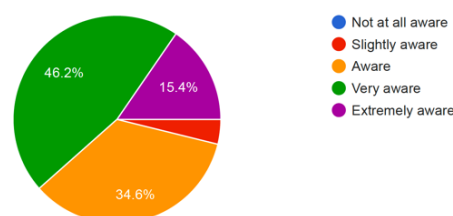


Figure 5. Student survey 2²²

“They [the workshop facilitators] changed the way I look at news and other similar things. Before, I didn't know that they edited media that much, and to that extent, like changing the order of words, lengthening silence.”

“These sessions made me take a more careful look at the media I consume.”

“Now I'm more sceptical about if what I'm watching is actually the truth.”

“I am more sceptical, and I feel like I know what to look for and think about that our emotions are easily swayed with simple editing, how you can tell a different story by putting things in a different order.”

“I've learned how what you see can be manipulated and changed by people who have power and control over what we view which can affect people's opinions.”

Student's trust in what they watch and hear on screen *always* or *often* dropped to 22 per cent, from 40 per cent in the pre-workshop survey.

11. How often do you **trust** the non-fiction videos you watch?
101 responses

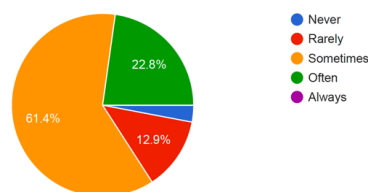


Figure 6. Student survey 2²³

Asked about story in nonfiction media, student attention to story replaced factual content as the main factor.

9. When watching non-fiction videos, what factors will you pay attention to? (Check all that apply)

101 responses

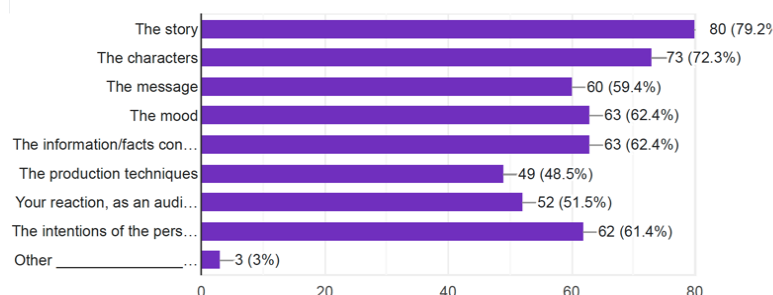


Figure 7. Student survey 2²⁴

“I learned how much people/editors manipulate videos to fit the narrative they want.”

“You can create a context/story by curating completely different pieces of media and provoke an entirely new message.”

KEY TAKEAWAYS

The two main takeaways from the pilot phase of our workshops come from teacher feedback:

Please get the students off screens and interact with each other doing in-class exercises. Teachers are overworked as is and don’t need another well-meant website they have to work through. There is plenty of those. But having someone from the media industry in the room is unique!

This sentiment was endorsed by students and other teachers. One teacher who planned to deliver the workshop content without one of our group in the classroom concluded:

We will not be able to do justice to your work. I think, too, that you should lead the material. The delivery is best with your expertise and familiarity.

Likewise, students found the teacher-led workshops difficult to follow: “It was confusing, I never really understood what’s going on.”

As a result, rather than emphasize an interactive website, we have decided we will continue the workshops with a dedicated instructor who is also a media practitioner, to give students an opportunity to directly interact with a director, writer, or editor working in the media industry. This approach will unburden teachers from having to familiarize themselves with a website, deliver content they may be unfamiliar with, decipher editing and story construction terminology, and prepare assignments. Teachers are overworked and short of time as it is.

The second takeaway pertains not only to the delivery of A Vaccine Against Fake News but the very purpose of our project. From the beginning, we had postulated that the fake news problem cannot be fixed at a systems level but only by empowering individual media consumers and creators. The information environment is built on telecommunication infrastructures and services developed following free-market ideology, where “truth” or “fact” are useful when commodified as market products. Controlling media “noise” is therefore less a technological problem than a human problem, a problem of belief and ideology. Agency for sifting fact from fiction, we believed, had to remain with the receiver of information. However, post-workshop comments from participants in A Vaccine Against Fake News strongly suggest another – different – impact. Increased awareness of the way fact-based media is created doesn’t empower a healthy skepticism but gives room to cynicism or even fatalism:

“The media is becoming less and less real and reliable. With media being such a huge part of today’s society its almost scary.” “Although something may seem to be completely real on tv, it’s often not. People just want to keep viewers engaged, so they’ll achieve that by editing and changing the truth. There are a lot of lies.”

“Almost nothing is genuine on the media. False news that are spread are assumed and posted to be very believable.”

“I understand how even the simplest parts of the media are manipulated to elicit a specific reaction from viewers.”

“Although something may seem to be completely real on tv, it’s often not. People just want to keep viewers engaged, so they’ll achieve that by editing and changing the truth. There are a lot of lies.”

These sobering statements address a fundamental question: How can media consumers find and apply accurate information that contributes to understanding large social and political problems? There is a growing deficit in society of commonly accepted facts and common cultural ground. The result becomes a question of epistemology itself. The real danger of Fake News is less media consumers believing the *wrong* thing – inaccurate information – than it is doubting that the *right* or correct thing is true. If these students’ question everything, all the time, does it matter if their source of information is QAnon, which weaponizes narrative to an absurd degree, or *The New York Times*, “all the news that is fit to print”?

The effect of the perception that nothing is genuine on the media has already led many citizens to declare the epistemological bankruptcy of legacy and social media. It is sobering to read how the vice of epistemic obstruction in contemporary habits of media consumption influence the relationship of media consumers to the real. Is it belief systems, not truths, that cement identities and make sense of the complexity of being? Belief in ungrounded things, both sacred and profane, existed long before fake news. But now, media consumers have become increasingly suspect of *all* news sources outside of their echo chambers of comfort; the entrenchment of mistrust makes people more and more likely to deem any source outside these chambers as “fake news.”

In a private email several years ago, communications scholar Patricia Aufderheide wrote me that often media literacy efforts could be counter-productive, even “blaming the victim,” in the face of overwhelmingly deceptive techniques.²⁵

In hindsight, Professor Aufderheide’s challenge of media literacy itself seems far less severe than when I first encountered it. If not through media literacy, then, how are young people to cope with the contemporary tsunami of information? As a result of feedback from student participants, we have decided to dedicate the final of the three workshops to an open-ended discussion about the impact of our media literacy approach on the level of mistrust that students experience. If cynicism or even fatalism is a widespread response to the workshops, can our media literacy approach be redeemed? Is A Vaccine for Fake News an antidote to the epistemic crisis created by media manipulation or does it

contribute to it? The experience, data and responses from the next phase of our work with students will suggest an enhanced perspective on this knotted question. Maybe a combination of good regulation, antitrust, a more participatory society - one in which the ordinary affordances of the middle class are available to all), and of course decent education is the past forward.

One response from a student participant in our workshops will provide a good discussion starter. They simply appropriated our paradigm and turned its language right back on us:

“Will these researchers take our opinions and twisting them to a certain narrative to prove the[ir] study?”

NOTES

- ¹ For an example of an AI-generated film see, The Visiblemaker, "The Great Catspy – AI text-to-video Movie Trailer," YouTube video, April 27, 2023, accessed May 13, 2023, https://www.youtube.com/watch?v=ITq-mG67qiE&ab_channel=TheVisiblemaker.
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- ⁹ Christian Salmon, *Storytelling: Bewitching the Modern Mind* (Reprint Edition), (London: Verso, 2018).
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- ¹¹ Walter R. Fisher, *Human Communication as Narration: Toward a Philosophy of Reason, Value and Action* (Reprint Edition) (Columbia, SC: University of South Carolina Press, 1989).
- ¹² Neil Postman and Andrew Postman, *Amusing Ourselves to Death: Public Discourse in the Age of Show Business* (Revised Edition), (New York: Penguin Books, 2005), xix.
- ¹³ Amnon Buchbinder, The Biology of Story, accessed January 13, 2023, <http://biologyofstory.com>.
- ¹⁴ Joel Breakstone, Mark Smith, and Anna Saavedra, "Students' Civic Online Reasoning: A National Portrait," *Educational Researcher* 50, no. 8 (2021): 505–515, <https://doi.org/10.3102/0013189X211017495>.
- ¹⁵ Elizabeth Thompson, "Poll Finds 90% of Canadians have Fallen for Fake News," *CBC News*, June 11, 2019, accessed January 13, 2023, <https://www.cbc.ca/news/politics/fake-news-facebook-twitter-poll-1.5169916>.
- ¹⁶ Annette Hill, *Restyling Factual TV: Audiences and News, Fact Based Media and Reality Genres* (London: Routledge, 1993).
- ¹⁷ A Vaccine Against Fake News: Teacher Survey
- ¹⁸ Critical Media Project, accessed June 1, 2023, <https://criticalmediaproject.org/media-literacies/>.
- ¹⁹ Digital competence frameworks for teachers, learners and citizens, accessed June 1, 2023, <https://unevoc.unesco.org/home/Digital+Competence+Frameworks>.
- ²⁰ A Vaccine Against Fake News: Student Survey 1
- ²¹ A Vaccine Against Fake News: Student Survey 1
- ²² A Vaccine Against Fake News: Student Survey 2
- ²³ A Vaccine Against Fake News: Student Survey 2
- ²⁴ A Vaccine Against Fake News: Student Survey 2
- ²⁵ Patricia Aufderheide, Private e-mail communication with the author, November 6, 2020.

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MAKING THE CASE FOR A MORE INCLUSIVE APPROACH TO SOFT SKILLS PROGRAMMING IN CANADIAN HIGHER LEARNING

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INTRODUCTION

Historically, career advancement was about transitioning through a linear pathway by climbing from the bottom to the top of a career ladder. Today, contributors can add value in many ways, and careers can follow a less linear path.¹ This means individuals have to constantly learn new skills to navigate more varied approaches to participation in less predictable career journeys. Therefore, skills that are transferable across industry and region are very valuable.² These transferable skills are frequently referred to as “soft skills.”

For over a century, there has been debate about the specific value of soft skills development. However, there is widespread agreement that the acquisition of a set of soft skills has a positive impact on learning and labour market outcomes.³

While soft skills have to be transferred across borders among diverse people, western conceptions of soft skills preclude more varied understandings, interpretations and evaluations of soft skills.⁴ This has resulted in differential outcomes, particularly for learners from traditionally marginalized groups within higher education and the workplace.

As a result, not all learners experience the predicted labour market outcomes required to prosper in an “interconnected, global economy”.⁵ This results in deepening income inequalities, which impact the ability for some groups to achieve favourable outcomes.⁶ Soft skills programming is one of the variables in a myriad that impacts the outcomes of people from traditionally marginalized groups.

Therefore this paper argues for approaches to soft skills development and evaluation that are more inclusive of the needs, culture and experiences of diverse learners in higher learning, particularly for learners from traditionally marginalized groups.

WHAT ARE SOFT SKILLS?

Soft skills are essential to career readiness and the future of work.⁷ Yet there is no agreement on the label “soft skills,” or what constitutes soft skills. Soft skills programming tends to lack consistency in rigor, delivery and evaluation. Furthermore, soft skills are interpreted and evaluated differently based on context, culture and careers.⁸ Simultaneously, methods for engaging and developing learners are shifting. There are more learners from international markets who may not have had exposure and experiences that enhance the soft skills required in western contexts.

What exactly are soft skills? First, a “skill” is a method of doing something that allows you to perform with predictable results.⁹

No matter what form work takes, it connects us to people. So it is essential that we develop the soft skills to effectively navigate relationships with others personally and professionally. In many instances “how” we treat others may outweigh “what” we do for them. However, the subjective nature of what it means to conduct ourselves appropriately and work with others effectively is the crux of the problem.

THE SOFT SKILLS PARADIGM

The Soft Skills Paradigm posits that a key goal of higher learning is career readiness, which the literature attributes to the development of soft skills.¹⁰ This paradigm further posits that there are designated soft skills that learners need to acquire to improve their chances of success in learning and career.

The instruction of teaching paradigm and soft skills development

Linda-Darling Hammond argues that although higher learning provides access to learners from traditionally marginalized groups, the teaching and learning structures present immense barriers to improving learning and career success.¹¹ Mahendra highlights the need to balance the acquisition of soft skills while maintaining culture, so that learners do not feel disconnected from their homes, families and cultures in exchange for soft skills acquisition.¹²

Phillips et al. argue that participants must see that these soft skills are relevant to them and important to their personal and career success.¹³

This paradigm is useful, especially since higher learning is now reflecting what Cruse, Eckerson & Gault refer to as the “new majority.”¹⁴ This majority represents an increasingly diverse range of learners by age, sex, race and family status, who are attending higher institutions in larger numbers. This new majority is mostly female, older than twenty-four years old, ethnically diverse and married with children.¹⁵ At the same time, higher learning is making efforts to address concerns for the widening economic gap impacting learners from traditionally marginalized groups such as black people, Indigenous people, people of colour (BIPOC) and those with intersectional identities.¹⁶

The cultural paradigm and soft skills development

In his work on the Cultural Capital Paradigm, French sociologist Pierre Bourdieu,¹⁷ echoes the sentiment that “success is not simply the product of hard work and academic skill.”¹⁸ The preferences of powerful groups have been normalized and legitimized as a means of maintaining existing socioeconomic hierarchies, which impacts the development, perception and exchange of human capital.¹⁹

As a result, soft skills can promote or inhibit success by providing “signals” about certain backgrounds, which are subject to biased interpretations in how value is ascribed.²⁰ Beardmore²¹ argues that not everything can be valued equally so there will be trade-offs and the “importance of any value is relative to other values.”²² He suggests that when labour is thought of as human capital, it reproduces the social structure – learners move “horizontally” from their location within higher learning hierarchy to corresponding roles within the occupational hierarchy.²³

Parents participate in this process of converting social capital into cultural capital and the corresponding power.²⁴ Privileged groups can therefore accumulate cultural capital and exclude other social groups under the guise of meritocracy.²⁵ This confirms that cognitive skills do not account for the whole picture of career success, some of this success is attributable to intergenerational

persistence of status within families, which reproduces and normalizes privilege in learning institutions and the workplace, and is codified into soft skills.²⁶

Likewise, for traditionally disenfranchised groups, the intergenerational persistence of marginalization reproduces and normalizes disadvantage and discrimination.²⁷ So soft skills are layered with cultural capital, power and privilege. In addition, this entrenches the corresponding attitude and perception that the soft skills of the dominant group are the most desirable version of soft skills. The outcome is upward social mobility for those who successfully acquire these soft skills — or are perceived to have acquired them — while disenfranchising those who do not or are not perceived to have them.²⁸

For Hora et al., the perspectives shaping the soft skills discussion are not sufficiently diverse and nuanced. They argue that many other realities such as labour market dynamics, business cycles and deep structural inequalities are to be considered in soft skills programs and discussions. Soft skills, the authors argue, are culturally constructed, reflect the values and interests of certain groups and can inhibit success by exposing information about certain backgrounds which may signal to others that individuals belong or do not fit.²⁹ Membership in certain clubs, teams, boards or institutions cultivate particular affiliations that others from outside those groups are not privy to. The ambiguous nature of soft skills leaves them open to being codified to suit different needs.

For example, Borghans et al. link childhood experiences to soft skills required in adulthood.³⁰ This has significant implications for traditionally disenfranchised groups whose lived experiences are defined by racism and other forms of oppression, such as Indigenous peoples with histories defined by colonization and black people with histories defined by enslavement.³¹ A study conducted by Bell identified the disappointment experienced by Indigenous trainees working on a diamond mine in the Northwest Territories. Bell found that some trainees were deemed “not ready” because they “lacked” the right attitudes, including the ability to speak in predefined ways.³² In addition, matters of cultural importance to the Indigenous trainees, such as family ties, were seen as “an infringement on success in the workplace.”³³

Human capital theory and soft skills development

Borghans, Green and Mayhew linked the heightening importance of soft skills “to the labour market outcomes of underrepresented groups.”³⁴ This will be predictably exacerbated after a pandemic as those who are unable to acquire these soft skills will see their labour market outcomes impacted. But the other side of the coin is the fact that not all employers perceive some traditionally marginalized groups as capable of demonstrating these soft skills equally in the first place.

In fact, Borghans, ter Weel and Weinberg found that in the US fewer minorities and immigrants were hired in occupations in which soft skills were important.³⁵ Human Capital Theory states that a worker’s probability of being employed and the wage of the worker are directly proportional to the worker’s potential productivity.³⁶ Since productivity reflects the outcome of both hard and soft skills, the question is how is the westernized soft skills model and metric accounted for.

Moss and Tilly highlight that due to managers’ stereotypes and biases, when they evaluate potential workers’ skills, their own attitudes likely impact their evaluative lenses. Moss and Tilly confirm that “skill” distinctions often incorporate racially discriminatory attitudes and perceptions underlying skill assessments.³⁷ These “unexplained tastes” or “distastes” impact outcomes for certain groups. Indeed, soft skills assessment is context dependent and judged subjectively, intuitively and subconsciously.³⁸ Furthermore, Fan et al. highlight that there is limited rigorous empirical research in assessing soft skills impact on the labour market.³⁹

Soft skills are important across industries. These skills are expected to help graduates demonstrate that they have the capacity to solve real world problems. Learners need to hone these soft skills alongside their technical skills to gain and retain their job in the 21st century-knowledge economy.⁴⁰ “Re-

skilling” and “up-skilling” are becoming keywords to gain and retain jobs.⁴¹ Yet the playing field is not level for acquiring and demonstrating these critical skills.

The argument is that every graduate requires certain soft skills to succeed in confronting increasingly competitive situations effectively. That is probably part of the motivation for international learners to invest in a Western education or higher learning. A chance to learn these coveted soft skills, a chance for that better career opportunity, a chance for a better life.

The challenge is that the post pandemic marketplace is changing so rapidly that by the time current learners graduate their programs, the jobs and professional enterprises that they are being prepared for may look very different or no longer exist. Changes in the labour market and the nature of work are outpacing changes in education and soft skills training, which will result in even more massive mismatches in skills in the future.⁴²

It is essential that higher learning pivots to a more inclusive soft skills programming model that considers the cultures and perspectives of the multicultural Canadian citizenry. Moss and Tilly argue that assessments of soft skills will be influenced by cultural differences and the corresponding biases and normative perspectives.⁴³ Moss and Tilly note in their study, very few employers would articulate that differences by gender, race or ethnicity exist.⁴⁴ This is symbolic of the discomfort or reluctance to engage in these sensitive conversations which are crucial to progress, and part of the problem contributing to the growing soft skills gap. Therefore as this divide becomes more evident, the westernized soft skills model will lose its relevance in the Canadian context.

CONCLUSION

Diversity presents many opportunities for individuals, organizations and countries, it also creates significant challenges. The demographics are shifting at a much more rapid pace than the programming. Yet tiny steps like balancing bottom up and top down approaches,⁴⁵ leveraging a more individualized, learner-centred approach, and creating space within the soft skills curriculum for non-westernized voices and approaches would all represent steps in the right direction.

Although soft skills development is critical to the academic and career success of traditionally marginalized groups, the current programming in higher learning may not adequately address their unique needs. This deficiency then impacts their labour market outcomes. Although labour market outcomes are much more complex and nuanced than the acquisition of soft skills, more inclusive soft skills programming has the potential to improve outcomes for learners from traditionally marginalized backgrounds. While existing research indicates that soft skills assessments can disproportionately impact BIPOC in the job search, more research needs to be done to paint a better picture of how soft skills education impacts career outcomes in the western contexts. This is a gap in the existing literature which requires further exploration, especially as soft skills become more important.

Therefore soft skills programming needs to be more carefully considered to be meaningfully engaged with and equitably experienced. The ability to execute this more inclusive soft skills agenda in itself requires soft skills such as intercultural competence and humility, which some key stakeholders may not have acquired themselves. Herein lies part of the problem.

In the aftermath of Covid-19, Black Lives Matter and growing calls for greater social justice, meaningful conversations have begun that include more voices, perspectives and lived experiences, which will be necessary to support this change. This critical moment in history is the perfect time to reimagine a more inclusive soft skills programming in higher learning.

NOTES

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AN VIRTUAL HYBRIDITY: A NEW PLACE TO DESIGN?

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INTRODUCTION

This paper documents an investigative action-research project which explores a new virtual hybridity for design studio activity. This work specifically challenges how creative teaching and learning are facilitated in a traditional design school studio environment and adapts to embrace a new virtual studio paradigm which parallels and supports an interactive corporeal studio setting unbound by the confines of location. The research explores a new methodology for creative educational practice introducing a hybrid environment where participants simultaneously practice, interact and communicate design through virtual, digital and physical locations. The paper details the investigation and forms analysis and commentary of a new expressive pedagogical form.

This new hybrid studio impacts the way design is taught, forcing a change in how design thinking can be transmitted and used in educational and commercial settings. Significant impact is demonstrated through new methods of connecting and transferring knowledge in a local educative setting (peer to peer) and out into the professional design marketplace. The paper uses experimental practices to frame a new virtualized collaborative space (X-Studio) which is modelled through a series of cognitively mapped case studies and an experimental pilot virtual studio simulation that embraces the haptic and proxemic learning environment.

CONTEXTUAL EXCHANGE

The studio environment conjures images of an action space that scaffolds creativity, develops new thinking, builds collaboration and encourages reflection. An environment that communicates, connects and links thoughts and practices in a cooperative process. It embraces many creative actions (discussions, prototyping, sketching, mockups, mind-maps, storyboards, personas, mood boards etc.), cultures¹ and universal investigative methodologies.² Often swirling and chaotic, a creative studio links disconnected ideas, places and insights to form important relationships between the idea of tolerance of ambiguity and the tolerance of uncertainty.³ The studio embraces the unknown: a place for experiments and investigations connecting many creative practices and situations. A creative studio is a signature place that embraces many different forms, activities and propositions. Thoring et al.⁴ suggest 10 propositions that help explain the impact of different spaces on the creative process through the definition of 13 process-led design activities. This helps to underpin the criticality of the studio as a complex and integrated environment that connects different forms of creative practice. Shreeve⁵ describes the studio as a form of “exchange”, where ideas pass fluidly back and forth in a form of suspension. This suspension holds creativity aloft, allowing for the nurturing and flourishing of activities to produce a completed and agreed outcome around a range of explored existing and

created “possibilities”. However, the professional sector is still divided on how best to integrate the traditional with the new.

PEDAGOGIC PLACE

Traditionally, the studio has been a place that promotes a distinctive creative exchange: mirroring the pedagogic and professional practice landscape whilst centralizing idea development. With the rise of virtual and augmented technologies, the power and authenticity of the human idea has never been so important. This technology allows for an extension of the design studio into a virtual space and facilitates new design practices that can embolden the intensity of episodic knowledge⁶ exchange using the criticality of studio practice. This project set out to draw these aspects together. By using the design studio as the heart of design education, it uses the physical studio as a place for a series of experimental workshops that develop new insight and an empathetic response to a design brief (see below) set by a large multinational client. This is achieved through four modes of working, set out through a set of principles (below). The existing physical studio is underpinned by Schon’s⁷ reflective practices and normative design domains which separate deciding and doing by promoting the use of surface, strategic and deep learning⁸ and the learning by doing model.⁹ This is then supplemented with an experimental virtual environment that replaces and augments the physical world, stretching and boosting the reach and condition of the studio in a new hybrid creative “place”, enhancing the range of potential outcomes.

Project Brief – extracted from the collaborative student brief:

“This hybrid project uses a collaborative circular consumerism design brief to frame and support the idea of extending the physical studio into the virtual realm. By collaboratively working with a live client, the studio (physical and virtual) is tasked to develop key concepts (driven by insight and empathy) for a sustainable value arena of consumer laundry (products and processes).”

PRINCIPLES

Using the brief as a starting point, the project uses four principles as a framework for understanding the context of the brief and the exploration of modes of hybrid mixed reality working. The solid lines denote reality and the dashed lines, virtuality (Figure 1). These have been used consistently across all the levels of the project.

Principle 1 is effectively a control and works with a completely physical reality environment (PR) populated with physical objects. This is the traditional context for a reality where the studio is presented in real time and is viewed through normal sensory perception. Principle 2 is a mixed reality environment that uses a real environment that is populated with virtual objects (termed augmented objects - AO). This is considered a fixed environment but uses virtual objects (virtually constructed) to animate and populate physical space. Principle 3 is also mixed reality and uses a virtual augmented environment (AE) with real objects embedded. Principles 2/3 helped position the project brief with the client where insights were explored into consumerism and object desirability, blending real and virtual conditions. The two principles require the use of optical VR (Virtual Reality) goggles to be able to embed virtual elements into the environment. This also applied to Principle 4 where all components of the environment were virtual. The project and the brief employed all four principles to develop project outcomes for the client.

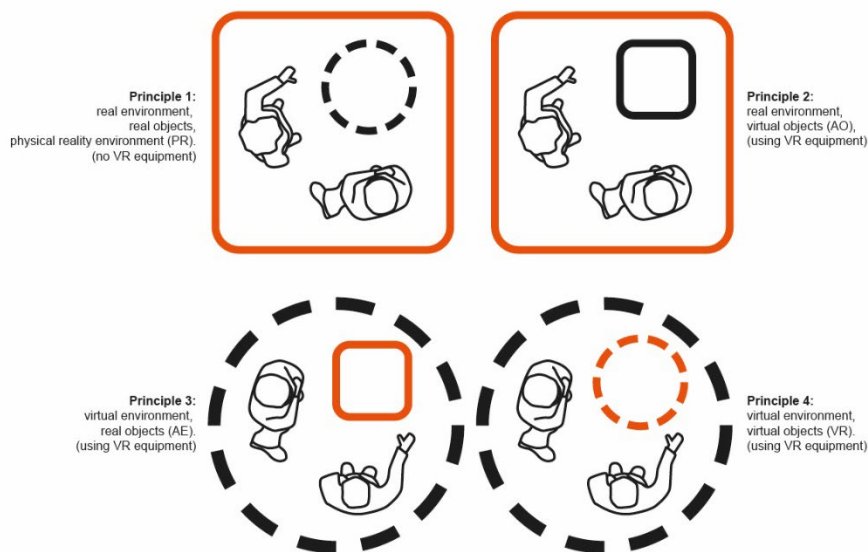


Figure 1. Principles framework of the hybrid mixed-reality studio

PROJECT AIMS AND OUTCOMES

The live project delivered a series of case studies produced by the students detailing their insights and deliverables. The student solutions produced an empathetic commentary on consumer needs and the tensions associated with domestic laundry in several international locations. The project is located within the physical and mixed reality studio environment and explores how creative knowledge and process alter as it moves between the physical environment (Design School Studios) and a new mixed reality environment, termed the “X-Studio“. Whilst the project acknowledges the newness and hybridity between these two environments/principles and the diagram above suggests a separation, the project has revealed a clear hybridity and overlap between these two conditions and an acknowledgement of the place of betweenness that exists within the four principles above. Students used and worked within all four environments to trigger their creativity and develop insight for the brief. The project builds theoretical content and process, creating a new form of collective action and process (embodying many of the 10 propositions suggested in Thoring¹⁰) and, specifically, how the virtual space mirrors or matches the experience of the physical design studio using current VR equipment. The brief creates a pedagogic focus but explores and extends the studio in new modes (and overlaps) by developing new design knowledge through collaboratively learning by doing (Figure 2).

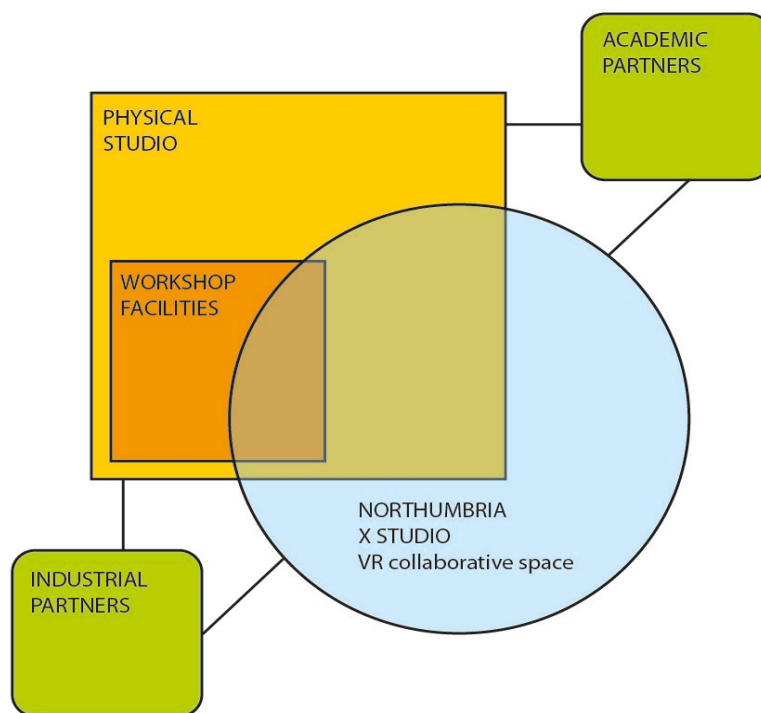


Figure 2. Positional diagram of the Northumbria “X-Studio” mixed reality collaborative space.

Project observations and insights

To understand the complexity of the challenge, this section documents some of the project observations including students, tutors, commercial partners and the outcome of the project. Key project challenges were:

- Using virtual reality/augmented reality as part of a hybrid mixed-reality creative studio.
- Embedding VR/Hybridity across all levels of the brief and design process.
- Developing a brief with a global consumer products company using 30 Postgraduate students focused on creating new insight and communicating with empathy.

Empathetic design is user-centric, positioning the use of technology as an innovation driver for a more specific focus on human-orientated design solutions. Virtual reality has been referred to as an ‘empathy machine’¹¹ for its ability to alter the perspectives of the viewer, virtually placing the user in other people’s shoes, and offering a sensorial experience which can make users feel as though they have encountered ‘real life’. Ongoing emergent research frames the ability of VR to elicit empathy in users.¹² This is pioneered using multiple (and imaginary) environments and characters. It offers alternative viewpoints that allow for a variety of material to be explored. The active role of the viewer standing, moving, and looking around the space creates an embodied experience, which together makes for powerful and effective story-telling and perspective-taking.¹³

There is potential to create a design studio within a VR environment that allows users advanced design and rapid prototyping tools, for example, interactivity, physics-based models and data collection tools.¹⁴ This would be advantageous to designers who wish to develop more advanced design prototypes and test these prototypes with their user base, the design community and their clients.

PROJECT OBSERVATIONS

The project was made up of six groups of students (Figure 3) who were tasked to propose a design for a laundry product, presenting their research into consumer trends and insights in a way that evoked empathy with the consumer. This was then presented as case study scenarios to the client, who critiqued the use of VR/AR technologies and their designs.



Figure 3. X-Studio - Students using VR equipment to develop mixed-reality design solutions

The students were inducted into VR, training them in how to use the technology and import facilitation media. Two groups utilized the technology in their work, and the other groups were influenced by it but did not engage with it. This may be through rejection of the technology or that the technology was not the best method for the project outcome. The main technology we explored was the Oculus Quest 2¹⁵ platform, running Open-Brush,¹⁶ an open-source VR 3D painting technology, and Gravity Sketch,¹⁷ a 3D VR design platform. The two groups that used VR technology took similar approaches in engaging the technology by creating 3D storyboards of their product designs, which helped to justify the use within their design method.

RESEARCH SUMMARY

The aim was to discover to what extent VR could enhance and expand the design process, by altering perspectives, displacing the viewer and creating closer connections through exposure and proximity techniques. Ultimately the projects aimed to use VR to produce empathetic communication of their designs to the client. In general, the student projects were successful, demonstrating knowledge and insightfulness to the process. The students employed the technologies in novel ways to present their design ideas, but at this stage, they lacked a fully integrated process that contributed to the overall design outcome. The completed case studies produced and demonstrated a multitude of benefits for incorporating design practice within an immersive environment but were limited to establishing that the VR/ AR technology could be integrated conclusively and exclusively into the design process. The clients were intrigued and excited about the use of VR in the design thinking and presentation processes, seeing great potential in the technology for training, customer research, product testing, and design.

AMPS Conference Presentation

Discussion at the Toronto 2023 AMPS conference highlighted two important concepts:

1. Memory through empathy as applied via the design process.
2. The development of the 'Liminal Studio'.

Conference participants commented on the current limited use of VR/AR technology within teaching attributed to two things, 1) the need for students to learn the technology before they can competently use it and 2) the final quality of the outcome, compared with traditional physical approaches to teaching and learning in design.

Whilst students were initially overwhelmed by the prospect of learning the new technology alongside other module challenges, those who felt that the VR approach to their work was appropriate and applicable did find new learning beyond the module requirements. One key outcome learnt was the ability for the virtual presentation to go beyond the 'projected storyboard' approach, allowing for the students to visualise the end user/product use. This visualisation enables the generation, interpretation, and manipulation of information through spatial representation. Visualisation enables the designer to understand the design problem, develop design solutions to the problem, and then evaluate the potential solutions that have been developed.¹⁸ Beyond this, students were able to create an empathetic (though rough) environment for the client to inhabit and use the product in. This created an 'event' allowing the client to both interact with the proposed product design and crucially to remember it more vividly. This could be termed 'VIRTUREAL MEMORY', a memory created through virtual means that is recalled as a real event. This concept became apparent through the questions at the end of the AMPS presentation and was not until then, fully reflected upon as part of our research. The ability to create a physical memory through a virtual experience could be efficacious for presenting in both teaching and industry environments.

The development of a multi-modal shared environment (real, mixed and virtual) is an emergent theme from our research (Figure. 4). This new space needs to ultimately encompass all elements of the physical design studio, within a hybrid setting to the point that its use is experienced as seamless - as natural and similarly sensuous for a designer as working in a physical design studio. What has become apparent through the research and the student project is that this space could be utilised in a third way too, involving the client both in collaboration and presentation.

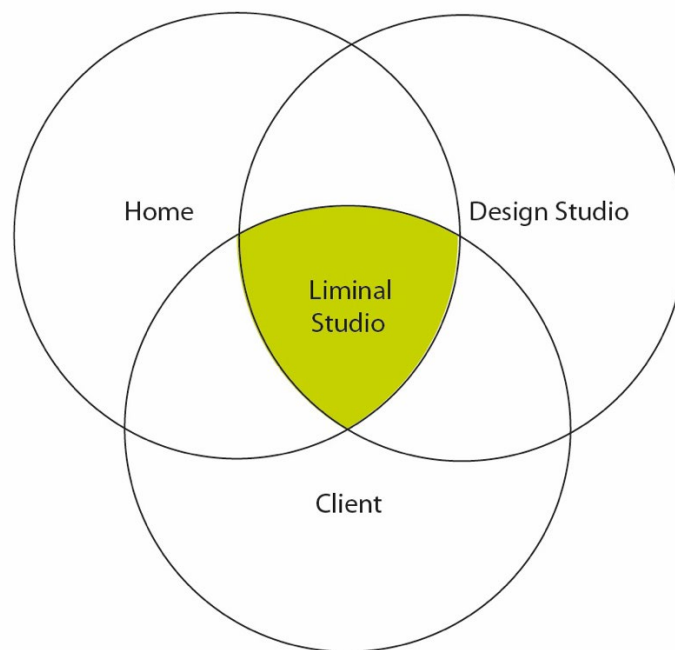


Figure 4. Diagram of an emergent studio carousel where a liminal space becomes a centralized overlap between the different modes of creative working.

The virtual space, however, can be a lonely area, and VR fatigue is a reality that potentially limits the collaborative potential of studio activity. Many work situations and activities from a physical studio are currently difficult to mimic in a VR world. For example, accidental collaborations (‘watercooler moments’) where designers or students share a problem informally often leading to ideas being triggered and solutions developed. There are also concerns within the profession of the inability to read a virtual room of avatars in the same way that you can in a real space and apprehension around security issues that may compromise the studio’s “fuzzy” and “safe space” qualities, essential for lateral and creative thinking to take place. However, with the continued development of new technologies across the sector and the way design adapts to new and emerging methodologies, such as Apple’s Mixed Reality headset,¹⁹ some of the issues holding back the development of the “Liminal Studio” space may be starting to be addressed.

“It signifies how mixed reality is likely to have more viable use cases in the business-facing side of things” Urho Konttori,²⁰

STUDIO – PHYSICAL MEMORY

Designers find it important to compare the universal with the particular. In other words, to compare their abstract idea with their experience of the physical. They create sketches and build mock-ups, models and prototypes to compare their physical memory (sensory neural network) with their universal idea (conceptual neural network).

We have found that VR can allow us to build ways of exploring the sensory neural patterns involved in developing physical memory without ever experiencing the world of physical states. This means we can achieve a closer relationship between what we can imagine and what we can experience. This is helpful when designing because it provides us with tools to prototype affordances.²¹ It allows us to

achieve a more developed perception of the actions we might envisage concerning designed objects and environments. English (2010)²² states, “Designers need to dynamically and simultaneously model both themselves and the objects of their attention, this is like Piaget’s²³ idea of ‘Schema’ in which the ordering of our mind is the ordering of our world.” By developing our physical memory, we can prototype affordances and appreciate what it feels like to move in space and to move in relation to others.

STUDIO ALIGNMENTS

This paper (and project) describes a staged process of augmentation between live environments, visualized objects and virtual entities. By utilizing the normative design domains of “representation and explanation” set out by Schön,²⁴ it is possible to make direct links between the languages and notations of design and the virtual world. Schön used the domain of “explanation” to build context for the interaction between the designer and the augmented outside world. He uses the notion of “implication” to describe how one entity will affect the other. This is distinctly echoed in the relationship between the physical and the virtual.

The 4 principles that are used within the paper show an emergent and staged position of augmented environments (AE) and augmented objects (AO) which produce situated contexts between the real physical world and the imaginary virtual world. These simple principles outline a relationship between the two states but also mask the complexity and collaborative working potential of the two.

Currently, virtual collaboration is still limited and lacks a genuinely collaborative process. The virtual environment operates like a closed environment that you have to enter to be part of. This is not unlike arriving at a physical space and removing the concept of distance, but this practice is still not as fully integrated as it might be in the physical world.

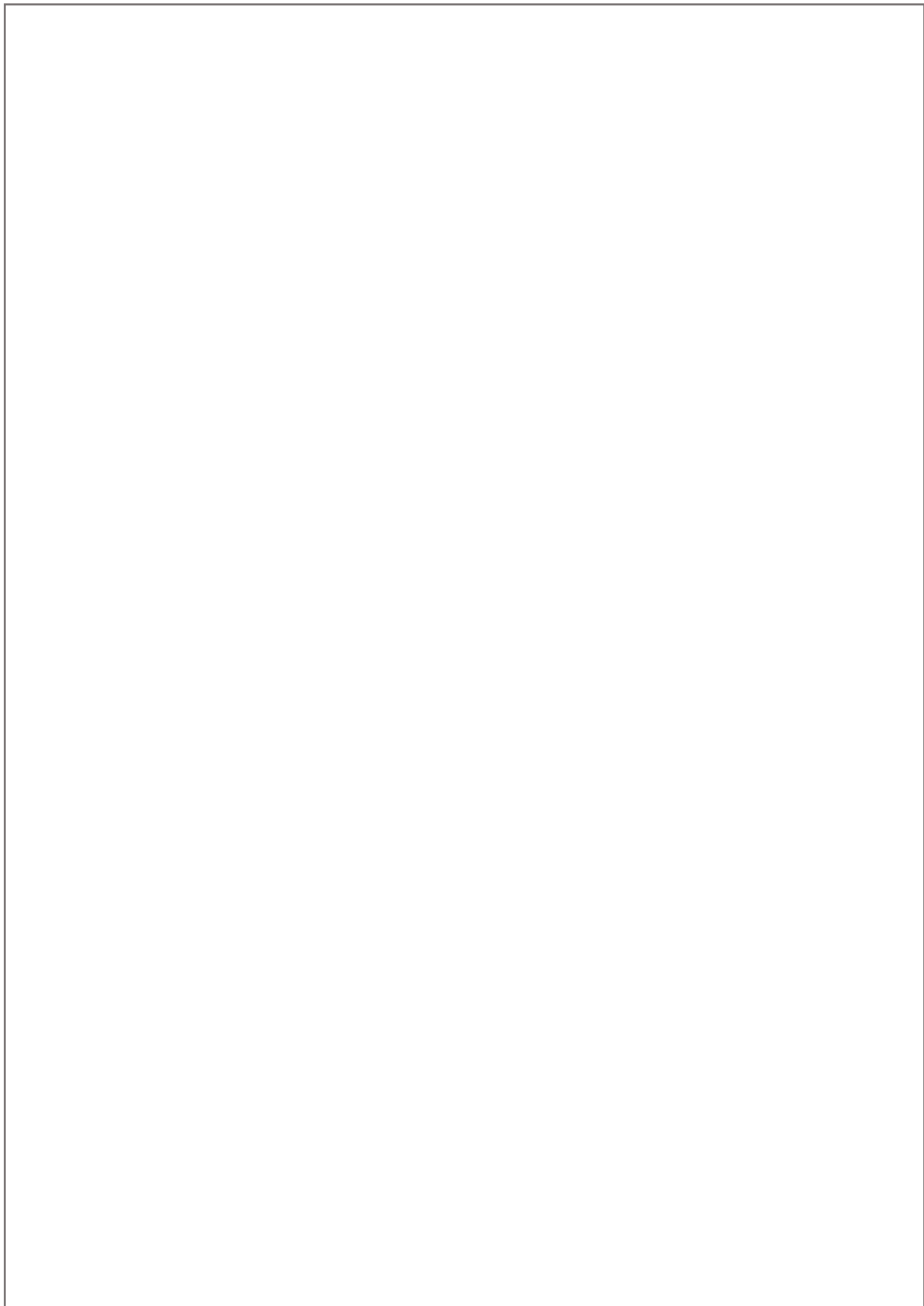
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