

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 buildings. The map is oriented vertically, matching the text. A small, square, white, grid-like object is visible on the glass facade, positioned near the center of the image.

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.

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SYNTHESIS OF TEACHING APPROACHES

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INTRODUCTION

At, Razia Hassan School of Architecture, studio is a teaching method that encourages experimentation, reflection, and a hands-on approach to learning. Through this process of productive criticism and discussion, we helped the students develop critical thinking. Studio projects were designed to be more focused on learning through the process of making and modeling. The nature of these assignments encouraged student student-centric approach which in return led to progressive teacher learning methods. This studio introduced students to rigorous projects that were designed to challenge their perception of the known through the process of unlearning the existing observation. To experiment with the material, it was important for the student to be familiar with the properties and characteristics of each material. Therefore, basic materials like fabric, plaster, paper, etc. were used by the students to develop an understanding of geometry, structure, and form. Social media platform was used as a tool for reflection and communication within and beyond the four walls of the studio, which ensured the channeling of knowledge more swiftly in the world of distractions. The possibilities coming future holds can only be uncovered through the critical mind. To nourish the mind, it is imperative to ensure that the students experiment and learn through their experiences. It is important to initiate a dialogue among different disciplines to create connections and enrich the mind with curiosity that creates intelligent solutions.

Teaching Approaches

The focus of this course was to build a relationship with and among the students. This enabled us to build a platform where together, as a team, learning and unlearning was an auto-setting and with self-freedom individuals made connections of their experiences, hopes, and skills through the role of a critical thinker. It is essential to be critical to begin a journey where growth is the agenda.

In this studio, hands-on and immersive learning was encouraged to help students explore, experiment, and develop critical thinking through a collaborative studio environment. Mediums like social media integration, collaborative learning, idea exchange, documentation, and promoting the idea of self-reflection was practiced inviting students to collaborate, to share their rich and diverse backgrounds to make informed decisions and to share ideas.¹

Eunbae Lee and Michael J. Hannafin stated that scaffolding is a teaching approach that is celebrated by tutors as it builds curiosity within the individuals and provides a foundation to think critically.² Scaffolding sources may include peers, instructors, and technology. They are effective when provided together rather than applied separately.

Eunbae Lee and Michael J. Hannafin explain that students come with limited background and experience in a domain, they need special structure to make sense of content, make informed decisions, monitor the progress, and adapt to emergent challenges. Scaffolding assists students to participate meaningfully by supporting efforts to identify relevant goals, pursue and monitor progress towards those goals, reconcile differences between existing understanding and concepts yet to be learned, and construct and refine artifacts.

Studio teaching fosters the idea of reflection, a vital role in deepening understanding and facilitating growth. Like such, several methods were employed to encourage reflective practices and collaborative learning that were in sync with the advancements in technology and its uses among the young individuals at RHSA. Given the ever-changing landscape of communication tools, it's imperative to develop methods that effectively convey message through today's mediums.³

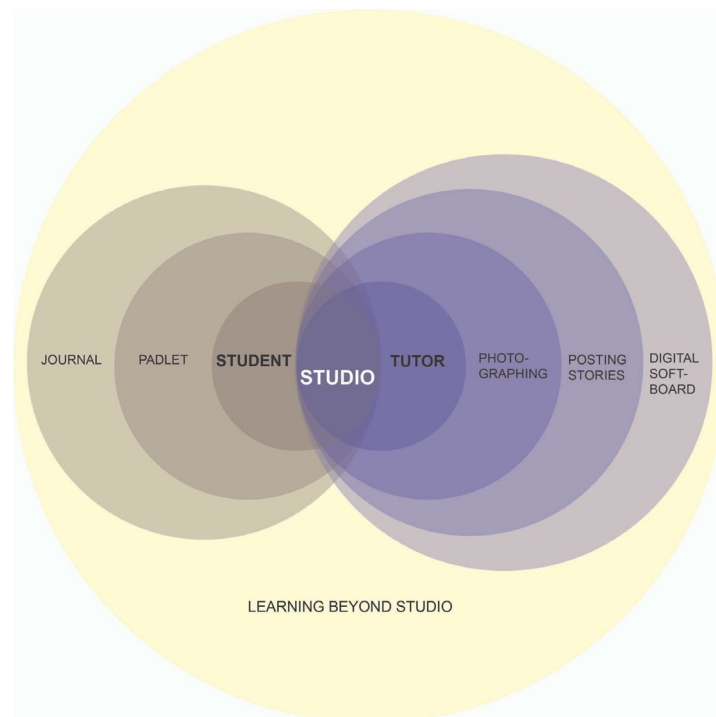


Figure 1. Framework of applied teaching approaches in Making and Modeling Studio.

The Third Tutor: Social Media Integration and Photography

It is essential to introduce the learners to different tools for experimenting and kick-starting the creative process journey. In the world of ever-evolving times, social media is playing a very important role. The pace of change is accelerating, and mobile phones are a key component of it. Mobile phones are now an essential part of a human's life, because of their handy nature and the idea of staying always connected. We as tutors used this technology in our studio to connect with our students as social media carved a pathway of communication that was beyond the contact hours and studio walls. It created a newfound language that reached an audience with a variety of interpretations, enriching its meaning and value.⁴

1. Integrating social media in learning and teaching environments yields new forms of inquiry, communication, and collaboration among students.⁵ Social media platforms, particularly Instagram, were the third tutor that imparted knowledge to the students. It became a teaching tool that was channeling information to the learners of this era where attention spans are decreasing and visual

learning is more effective. Its instantaneous nature facilitated the swift transmission of knowledge, enabling learners to receive and process key insights in a matter of few seconds. Tutors started to use it as a device for demonstrating ideas and new perspectives to students. It was used as a digital soft-board to celebrate outstanding projects that not only motivated the student whose project was posted but also others. This gave students time to reflect on the stories uploaded on Instagram while they were away from their work and students across the year would be inspired throughout the day. The positive feedback encouraged students to stay true to their process of learning throughout. Visual storytelling took responsibility to help students grasp and visualize what was expected of them. Integrating Instagram into the learning process not only motivated the students but gave birth to many new ways of thinking.

The use of social media introduced a new form of education that was informal yet informed the formal education at RHSA. It brought the culture of the university closer to the student in the first year that learning is a collective experience.⁶

2 Tutors utilized photography on social media as a medium of documentation for students, this was a way of teaching them how to capture instances important in their 3-D creations. It was also encouraged that students document their design process along the way while teaching them how to do it. Photographing students' work allowed students to understand what was essential to record in a setting/context and what did not serve a purpose.



Figure 2. Students photographed during the assignment; Pictures posted on Instagram Stories.

Collaborative Learning and Idea Exchange:

Students were asked to end the day with a reflective note on the given assignment. This self-reflective exercise was done on Padlet, it was utilized as a medium for students to share their daily progress, ideas, and reflections. This generated room for the exchange of ideas, and meaningful dialogue. Students were learning from one another and gaining a broader understanding of the given topic.

Stitching exploration:

Journal-keeping was a way of recording/stitching the entire progress of the given assignment. It was a beneficial tool to practice as students were recording their entire design process, outcome, research, personal reflections, observations, discoveries, and outcomes during studio hours. It helped students with the articulation of their ideas, analyzing their design decisions, and documenting their growth over time, helping them to become more aware of their creative understandings.

Students' comprehension of the design process was deepened using reflective practices and collaborative learning techniques, with the help of social media platforms, photography, and journaling. These resources let students express their ideas, participate in discussions, and hone their design thinking abilities. Photography offered a visual viewpoint on design development, while social media platforms made it easier to share work with a larger audience. Maintaining a journal improved their capacity for reflection. Overall, the teaching practices applied improved students' design thinking abilities, created a dynamic learning environment, and were able to view their strengths and weaknesses while reflecting on the process. It created an opportunity to interact with people from different disciplines and get an insight into how the world perceived their work, which resulted in a sense of ownership of their work.

Material Realization

The concept of learning to unlearn lies at the center of the process of material realization. Students were challenged to question preconceived notions, which led them to learn multiple perspectives and engage in constructive criticism to refine their ideas. When testing on different materials students were encouraged to engage in hands-on experiences to develop a deeper understanding that led to emphasizing the importance of learning by doing. Understanding the physicalness of various materials, their limitations, and strengths was one of the main focuses while designing this curriculum. The idea was to align the structure of this course with the five-year architecture program. Edward M. BAUM states the importance of beginning in his article *Comparative Anatomy: A Beginning Course in Architectural Design*. “How to begin? The question is not just about starting; it carries symbolic weight as well- about origins and priorities and “first moves” that shape the outcome of enterprises.”⁷

The framework of the Making and Modeling course led to collaboration with the Structures course, this enhanced students' comprehension of how materials and structures work together, which developed a deeper understanding of geometry, and form.⁸ Students got familiar with the composition of materials and very quickly worked their way around it; they were soon devising their own orders to construct with the given material for each project.⁹

The material realization through design and construction supports a holistic approach that blends academic understanding with practical application. Enhancing interdisciplinary collaborations and making use of technological breakthroughs will broaden the options for material investigation. By advancing teaching methodologies, architecture education can effectively prepare students for complex and ever-evolving challenges in this field and help students engage on many levels of learning – emotional, physical, spiritual, and cognitive.¹⁰

Projects: Outcomes and Analysis

Over the course of the semester, 90+ students were divided into four sections and engaged in six meticulously designed projects. With classes running four days a week, each section dedicated time to experimentation and exploration. In the subsequent discussion, we will examine each assignment individually, uncovering its intended goals, evaluating the achieved outcomes, and drawing meaningful insights. Throughout their journey, students grappled with some of the main concepts

such as balance, center of gravity, and strength, all within the context of working with a non-orientability. Their objective was to create objects that exhibited stability and equilibrium while navigating the unique challenges posed by assigned material. These projects were design problems that students were resolving through decision-making.¹¹

Paper Manipulation

The first material introduced to students was ‘paper,’ which has the qualities of tearing apart, not being stable but also if external forces are applied to it, will hold a good amount of load. In this assignment, students were given a task to select a few words from Richard Serra's List of verbs and use them as inspiration to explore paper as a material that can be manipulated into different forms. The students were presented with the challenge of confronting their preconceived notions of construction and were encouraged to develop a profound understanding of the material by involving their whole body in it.

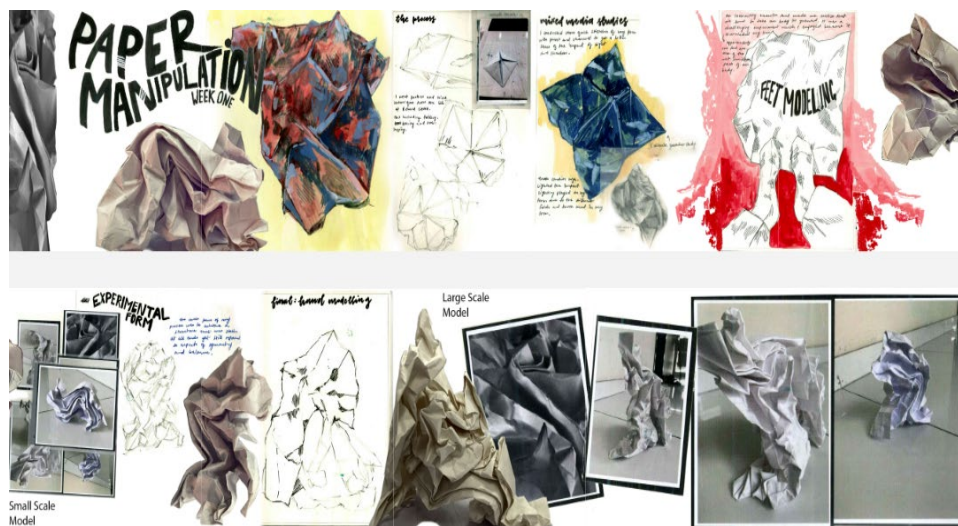


Figure 3. Student's Work (Journal) Snippet from Instagram Post.

This assignment was a start for students to develop a solid foundation in understanding the language of three-dimensional design and the relation between material, forces, and form. The outcome that was learned by students from this assignment was; how a two-dimensional surface is transformed into a three-dimensional object by manipulation of the material. This occurrence happened due to applying external forces using different parts of the human body, such as arms, elbows, chin, and feet, students gained insights into the structural integrity of paper as a material. They also examined the inherent strengths and limitations of paper through various folding, cutting, and shaping techniques, considering the balance, and center of gravity. Despite the flexibility and fragility of the medium, students aimed to create objects that maintained stability and equilibrium.

Object of Design

Following their exploration of paper as a material, students were introduced to a diverse range of materials, specifically "found objects." Their task was to recreate a memory from their past using these objects while manipulating their legibility. It was designed to encourage students to bring their lived experiences into a form that communicated the time–memory–execution. This exercise injected empathy within the students and initiated conversations that fostered multicultural thinking.¹² The

outcome was a creation of spatial and formal compositions that showcased complexity and dexterity, ultimately redefining the objects, and exhibiting new levels of functionality and structural potential.



Figure 4. Student's Work, Snippet from Instagram Post.

Students were encouraged to establish connections between tangible and intangible elements, including emotions and expressions, by applying elements of design in the creative process and comprehending the material and its joinery with other materials. They learned to envision existing forms in new contexts, assigning them fresh value, and emphasized the importance of connections and joinery between different materials.

Balloon Sculpture

The introduction of plaster of Paris and latex marked the third material exploration in the assignment. Spanning over three days, the task encompassed material study, form creation, and the examination of organic forms through sectional study. Students were instructed to pour plaster cast into flexible latex balloons, using a custom-made tool called a "Jig" to control the configuration of the forms. This assignment provided students with insights into the limitations of the material and its response to external factors. They were responsible for designing and constructing the jig to apply controlled forces, guiding the formation of plaster forms within the flexible medium. The resulting plaster bodies effectively captured the imprints of the forces involved, allowing students to investigate the relationship between gravity and form.



Figure 5. Student's Work, Snippet from Instagram Post and Stories.

This assignment's learning outcomes were; developing awareness of material limitations and malleability, exploring the expressive qualities of the material in shaping forms, understanding the impact of gravity on form, interpreting results obtained from controlled settings, and studying the translation of movement into solid forms.

Surface Manipulation-Fabric

This assignment immersed students in the practical application of fabric as a material, enabling them to explore its structural capacities. Surface Manipulation exposed students to the potential of fabric as a dynamic and adaptable material. It urged them to challenge their preconceived notions and explore the intricate relationship between material, forces, and form within the realm of fabric structures. They were tasked with affixing stretchable fabric onto a wooden frame, known as a "jig," while documenting the material's strength in terms of tension and compression. The primary objective was to create a fully stretched form capable of supporting weight. By engaging in this project, students aimed to comprehend how fabric behaves under external forces like compression and tension, informing their design decisions and setting the stage for more sophisticated explorations in future endeavors.



Figure 6. Students photographed during the assignment; Pictures posted on Instagram Stories.

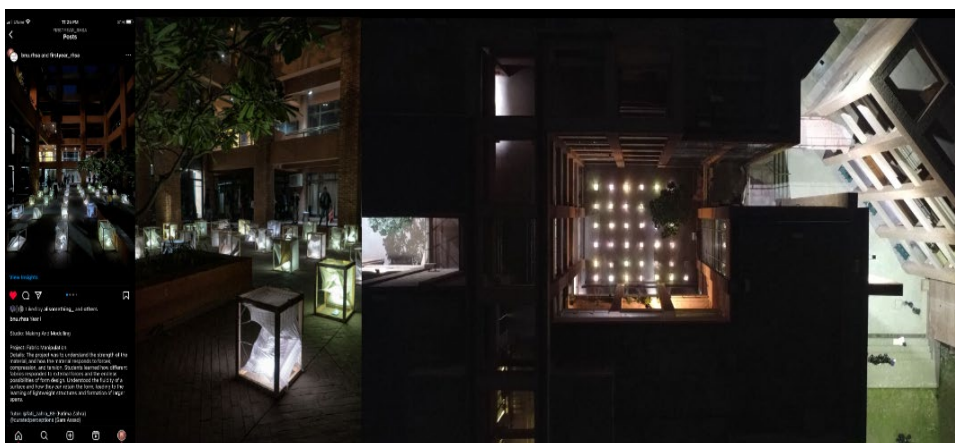


Figure 7. Students' work photographed outside the studio and posted on Instagram Feed.

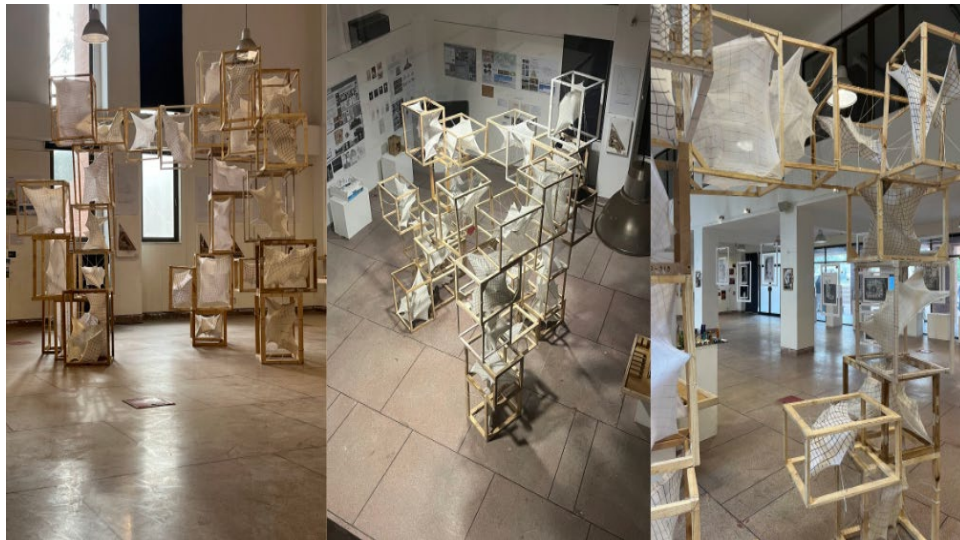


Figure 8. Students' 'jigs' formed into a pavilion and displayed in an in-house exhibition.

Through active involvement in designing and crafting fluid forms with fabric, students made deliberate choices that delved into the structural geometry of their creations that can maintain their forms under tension. It fostered an appreciation for lightweight structures and the creation of expansive spans, striking a harmonious balance between material efficiency and structural stability. Lastly, fabric manipulation unveiled boundless possibilities for form design, allowing students to explore distinct and characterful architectural expressions through the relation of fabric properties, tensions, and configurations. The result brought the entire batch together when this assignment's outcome was presented outside of the four walls of the studio, giving students and tutors a sense of pride.

Cantilever

For the fifth assignment, students were challenged to design a cantilever structure inspired by the intricate form of a bird's wing. Through a detailed examination of the wing's physical characteristics, including its stretch, main structure, sub-structure, spread, flexibility, movement, shelter, and balance, students gained valuable insights into the system that generates such a form. The material used was bamboo skewers. The cantilever structure they designed required minimal contact with the surface while supporting itself.

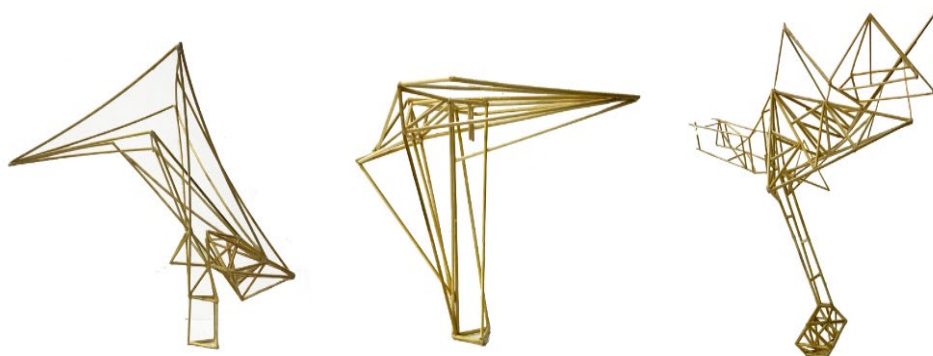


Figure 9. Student's Work, Snippet from Instagram Post.

The learning outcomes of this assignment included comprehending the development of a structural system that gives rise to a specific form, recognizing the influence of materials such as lines and planes on the structural response, understanding load distribution principles, and grasping the behavior of visually unsupported parts under the force of gravity.

Space Manipulation

Students explored the potential of paper as a material, beginning and ending their journey with it. For their final assignment, they ventured into designing three-dimensional forms using thread and nails within specific locations in the architecture department. These forms were then translated into paper models, representing their interventions in existing built spaces. By introducing unfamiliar objects into these environments, students examined the interrelation between their interventions and the surrounding context.

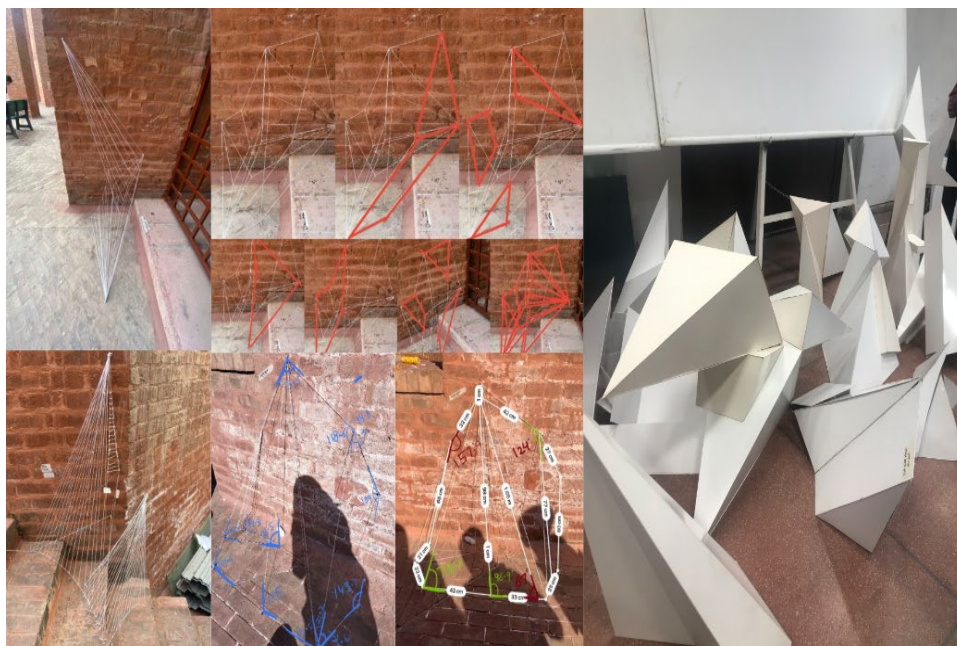


Figure 10. Student's Work.

Lines and planes played a pivotal role in shaping the response and perception of space, underscoring the material's influence on the built environment. This project fostered essential learning outcomes, including an understanding of space through scale. They developed an appreciation for space as a composition of diverse elements, encompassing positive and negative spaces, enclosed and open, and fragmented and cohesive environments.

CONCLUSION

The synthesized teaching approaches were put to the test in the first semester of the architecture program to nurture the learners' creativity and critical thinking. Through the process of making many skills set like, problem-solving and reflection were addressed and students became familiar with the language of critical learning. Through making and modeling they were introduced to the prospects of the future. They were empowered to create new narratives and explore multiple disciplines to develop outcomes that not only fulfilled the requirements of the assignment but also allowed them to see that work evolve, and refashion meaning as it shifted from one medium to another, from one social media platform to another. The projects were designed to provide the students with the opportunity to

explore everyday materials and give them a new outlook. Social media has played a vital role in helping students connect with a larger pool of audiences from diverse backgrounds. It has inculcated the importance of recording their work, sharing it with people from all walks of life, and creating dialogue to further reflect. The work archived through social media allows the students to reflect on their journey along with getting a fresh perspective every time they look back at it.

NOTES

- ¹ Darlene Brady. "The Education of an Architect: Continuity and Change" *Journal of Architectural Education* (1984-), Sep., 1996, Vol. 50, No. 1 (Sep., 1996), pp. 32-49
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- ¹⁰ Liz Grauerholz. "Teaching holistically to achieve deep learning." *College teaching* 49, no. 2 (2001): 44-50.
- ¹¹ Jonassen. "Designing for decision making." *Educational Technology Research and Development*, April 2012, Vol. 60, No. 2, pp. 341-359
- ¹² Timothy Kubal, Deanna Meyler, Rosalie Torres Stone, and Teelyn T. Mauney. "Teaching diversity and learning outcomes: Bringing lived experience into the classroom." *Teaching Sociology* (2003): 441-455.

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RESEARCH VS DESIGN INTELLIGENCE

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INTRODUCTION

Every architectural school must periodically question itself and review what it has inherited from previous generations by asking the following questions: What is architecture? What is its significance? How should it be taught? How should it be made? How are topics chosen, and why is one topic chosen over another? The question of what is essential and what is secondary in the curriculum is hardly ever concerned with purely technical matters. It often arises from significant changes in the worlds of theory and practice, relating not only to the necessity of a certain topic but also to preparing students for reality. If you ask the faculty members – especially those in administrative positions – about certain types of academic content, they will most likely say they are essential and that removing them would be unthinkable. Sometimes we do things simply because we are used to doing them because they have become habits or, perhaps, because they create a sense of continuity with the past. The question is not just what the topics are and in what measure each should be taught, but also what the relations between theory, practice, and research should be, and to what degree they prepare us for technological and cultural changes. Still, to me, the methods and tools of the creative act that integrate existing practical knowledge and research remain something of a puzzle. The obvious fact is that the lecturers want their students to study and appreciate architecture, its inherent applicability, its intellectual properties, and the beauty it embodies.

Practical Skills Versus the Discovery of New Knowledge: Linear Versus “Open Source” Processes

An architecture student acquires theoretical knowledge as well as professional skills. Most schools practice the same linear studio stages even if the order and combination of each year is different. The first year constitutes the fundamentals, the basics of design practice and thinking. The second year covers the first stages of planning and designing. The third year usually includes more complex problems, such as urban scale or the demands of multi-layered thinking. The fourth year integrates the previous phases and culminates in the final project. Though summarized somewhat superficially, this is the normal progression. Each stage consists of the development and acquisition of existing professional knowledge, skills and conventions and the attainment of new forms of knowledge, usually understood as research. It seems that there is a difference between the discourse of architecture as providing solutions or addressing problems and a more integrative, though not necessarily Aristotelian, way of thinking. In other words, it is the difference between solving a problem and reformulating it into a new way of thinking.

In some instances, architecture is perceived as a broader field, as a means of examining things and not just constructing them. There are, for example, John Hejduk's fascination with the genesis of symbols and his reference to “the house” in the wall house (1968/1973) (Fig. 1) or Raimund Abraham's spatial concepts of dwelling in his house without rooms (1996) (Fig. 2). Quite a few architects inquire into space, walls, shelter, dwelling, light and other aspects of architecture.

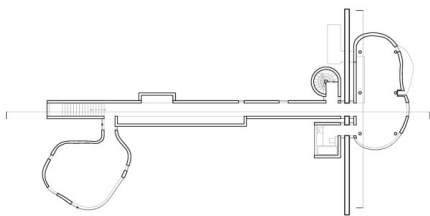


Figure. 1- John Hejduk- Wall House, 1973

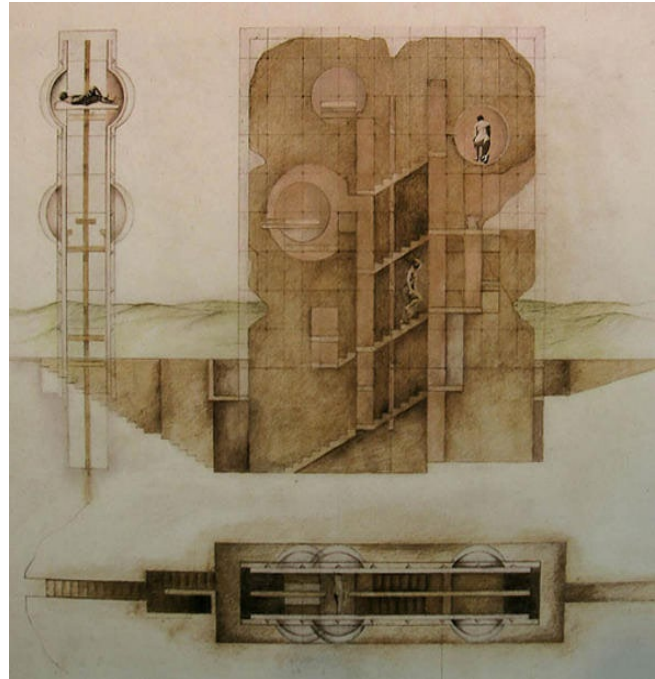


Figure. 2- Raimund Abraham- The House without Rooms, 1971.¹

During their studies, students encounter instructors and new bodies of knowledge at two main levels: the first is the level of knowledge and experience of the instructor, acquired through research and practice. The instructor is perceived as an expert advisor through which students acquire existing knowledge. This is first-order knowledge.

Knowledge ➡ Instructor Research ➡ Student

Second-order knowledge is the result of collaborative work between the instructor and the student in the context of the studio, which leads to the creation of new knowledge through design research:

Instructor Research + Student = New Knowledge

Watzlawick, Weakland, and Fisch² distinguish between these two types of new knowledge. They discuss the phenomenon of duration, the process of changing human actions, how change occurs, and how one can initiate and execute it. They distinguish between spontaneous processes, first-order change processes, and second-order change processes.

The “first order,” which seems to be intended mainly for the student, is new knowledge within a given framework. The new knowledge of the “second-order” originates from outside a given framework, intended for the student and instructor alike. Though certainly, every good project involves “thinking

outside the box,” the curriculum is built on a scale that varies between the acquisition of recognized knowledge, professional skills, and mediation (all of the first order) and reflections about them (of the second order). The dominance of each of the orders is evident at the end of the student's process of architectural training. The less work on skills, the more room remains for new knowledge, and vice versa. In today's generation, the question remains, to what extent does the critical discourse practiced in the studio become inherent in the student's practice? Or, in the words of Brunelleschi, to what extent can a person enter the world of architecture “with his own voice”?

Quite a few students learn that on an academic level architecture is limited to arguments based mostly on an arbitrary authority – i.e., the lecturers – and not necessarily applicable to life outside the studio. During conversations with instructors, I sometimes hear, “I am not a theoretician but a practitioner.” This betrays the prejudice that if you engage in theory your creativity is inferior and vice versa. Needless to say, it would be ideal to integrate the two. One can always practice mindless art or artless theory, and one should beware of both.

Moreover, as one thinks about methodology and studio work, one wonders if there might be a way to replace the linear curriculum with a set of changing problems posed by a mentor or adviser. These studies, as well as the studio work, can be an “open source” process, a certain democratization of information. Rather than organizing architectural study in a linear hierarchy of problems of size and complexity, each with particular and critical fields of interest, architecture could become a means of creation and existence. It is, if you will, thinking of architecture as an array of issues conceptualized by and open to communication with other intellectual fields. Alternately, it may be described as a less centralized system that deals with changes and the creation of new, second-order knowledge. By operating outside a given framework from the outset, the student finds his or her own way of approaching the world of meaning in architecture.

INTERACTION BETWEEN ACADEMIA AND PRACTICE AND THE PROBLEMATIC OF DEFINING THE ACT OF CREATION

Meaningful professional dialog is necessary for our time, characterized as it is by growing social conflict and uncertainty. A question worth asking is: What kinds of interaction exist between academia and practice? Since the nature of practice is usually the realization of ideas and existing methodologies, I would like to suggest that, despite the prevailing view, the role of academia – beyond training and imparting skills – is to provoke innovative research approaches, theoretical issues, and concepts, even if they cannot be directly translated into concrete results (previously referred to as the second order). Academia is there to open doors of understanding and provide tools for asking challenging questions, which in the long term may support practice. In this manner, however, part of the learning activity is not directly purposeful, since it undermines the contemporary neoliberal rationale that research should lean toward the practical.

While in many other fields, research is conducted in a lab – a bubble that exists trans-nationally closed, and inaccessible to anyone who is not an expert – in architecture, our 'lab' is the studio. Our language is not “scientific,” and it is theoretically available to everyone. More importantly, the role we presume to play is not just to reveal new information but also to create a discourse and product with value to society. Since we question cultural and spatial baggage and perceptions of reality, we reflect, through material production, a change to cultural aspirations.

I argue that architectural research— and for that matter humanistic and social scientific research —is as valid as research in the natural sciences. Even if architectural research in particular moves slowly and, therefore, is perceived to lack purpose in the practical, classic sense, it is a form of research that

asks not only how to create a place but also how to create meaning, how to establish space and reality by means that cannot necessarily be explained by pure logic or scientific rules.

Unlike other types of research, a characteristic of research in architecture is the acceptance of a certain degree of subjectivity as a tool for measurement and critical analysis. Research in the creative fields usually aims to examine things in order to accumulate knowledge based on practice and on decision-making. During the creative process, a combination of tools and content is “selected” from a range of infinite possibilities ($\infty = 1$). The presentation and documentation of these selections at every stage, alongside the insights obtained and applied, constitute state-of-the-art research. Since we often put more emphasis on the final response to a research question than on the process that led to it, we are usually inconsistent about that process.

I want to go back to the meaning of “selection.” Some argue that intuition can be used as a method of selection and recognition of a wide and often unexpected range of modules. For example, Rafael Moneo in his essay on Typology argues that composition is the main mechanism for thinking and decision-making in the spatial arena.

Based on increased recognition of the limitations of the methodological tools at our disposal, I believe that what we do is produce a hybrid of positivist and interpretive worldviews. This constitutes an interim mediation between diagrams and intuition, or what I call a sort of “learned intuition.”

Alternatively, we may perform a decision-making process that aims to be completely rational. In historical examples, this would be akin to the Italian rationalists or the extreme German functionalists. A relatively more recent case is Joshua Ramus’s description of OMA’s design process for the Seattle Central Library. He describes the process as rational to the extreme, even bordering on the absurd: a development process that had no clearly stamped author. It appears that the purer this method is, the more easily it could be categorized as a classical research methodology.

However, in creative work, the process may be more varied. This may be illustrated by comparing one of Cézanne’s *Sainte-Victoire* paintings (Fig. 3) to Jackson Pollock’s explorations of color fields (Fig. 4). Cézanne paints the same object repeatedly (about 80 times) in order to refine and test the method. Pollock completes a piece of work in one fell swoop evoking an automated act of creation.



Figure 3. Cézanne, *Sainte-Victoire*, 1895³ Figure 4. Jackson Pollock 1950⁴

In the act of creation in general – and architectural creation in particular – there is always an intuitive dimension. Intuition is an amorphous phenomenon, a mental capacity for understanding reality not just through the five senses.

This intuitive aspect is not simply a whim. It is sometimes referred to as an inexplicable “gut feeling,” like spontaneous love or hate. The word intuition comes from the Latin *intuir*, meaning knowledge from within. Intuition was generally avoided by self-respecting scientists, who feared accusations of engaging in new-age speculation rather than serious science. However, contemporary cognitive scientists consider intuition as a set of non-conscious cognitive and affective processes. The outcome of these processes is often difficult to articulate and is not based on deliberate thinking. But it is nevertheless real and (sometimes) effective. If the human mind is compared to a lake into which different streams flow, some of these streams originate from internal springs but most of them come from external sources. The lake is formed from their convergence in a delicate balance of creativity. Learned intuition is in an intermediate state and most closely describes how we operate. This type of intuition comes from habit and experience. In fact, it comes from insight based on information, even if it is not always possible to follow the mental process. As Pascal said, “The heart has its reasons which reason knows not.” Learned intuition is situated in the intermediate area of different world perceptions. In *Eye and Mind* (1964), Merleau-Ponty looks into an intermediate area between the sensory and the intellectual, between the inside and the outside, and between the subjective and the objective. In other words, learned intuition originates in an uncanny place that is difficult to grasp with certainty. This intermediate area is a concrete field, Merleau-Ponty argues, although it is invisible to the eye. It is a place in which wonder occurs, turning the world into something meaningful and substantial. It is where one must recognize that the occult is an integral part of the unconcealed – the “visible of the invisible,” if you will.

CONCLUSION

A work of architecture contains countless fields of information that function simultaneously, the boundaries and the knowledge they contain merge into one another. It is reminiscent of Konstantin Stanislavsky’s system for training actors in which one does not play a character but is the character. The actor must therefore ask: What does the character want to be? This is somewhat similar to Louis Kahn’s question to a brick: “What do you want, brick?” Another example of merging may be seen in the “Parade” written by Jean Cocteau, composed by Erik Satie and with costume and scenery design by Pablo Picasso. “Parade” is not exclusively theatre, painting, or music. It is rather a hybrid of all three. Similarly, architecture is a performance composed of many fields, hence the difficulty in measuring it coherently. Here we may recall another quote from Kahn, “A great building must begin with the unmeasurable, must go through measurable means when it is being designed, and in the end must be unmeasurable”.

I understand architectural research as the ability to engage in methodical reflection on the world. It is a way to revisit the past while understanding the intuitive, intellectual, aesthetic, and social mechanisms that activate us. Attempting to demonstrate this notion structurally, I would say that the core of architectural action takes place between architectural thinking and teaching, on the one hand, and practice and research, on the other (Figure 5). These reciprocal relationships can be understood through an even more complex three-dimensional form. The phenomenon of architectural action is in the space between two rings, one inside the other (Figure 6).

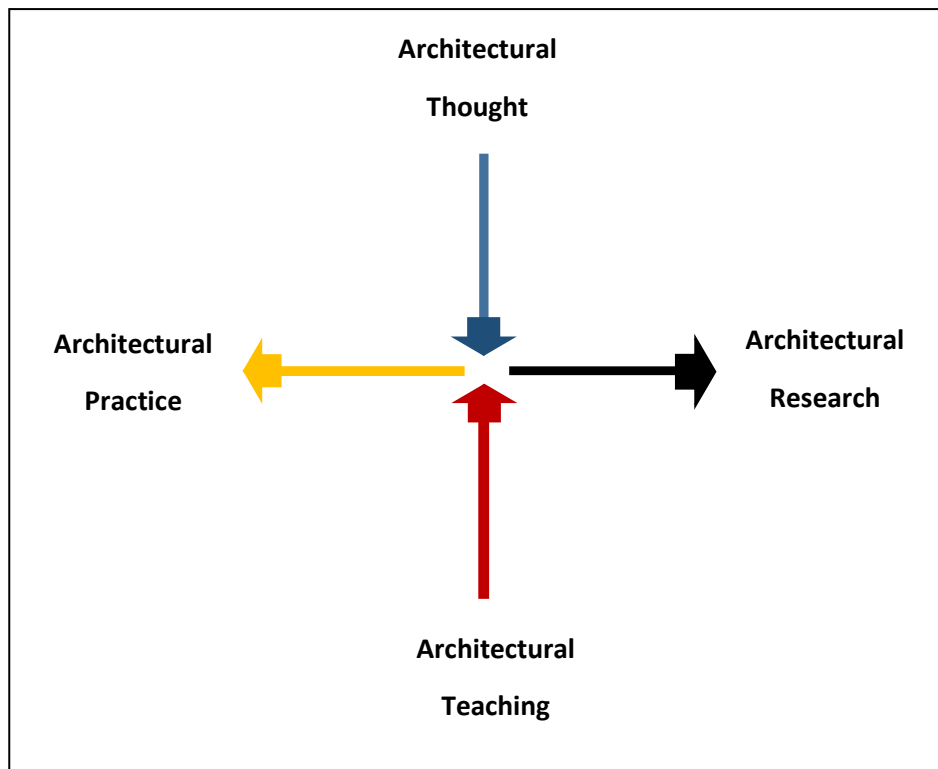


Figure 5

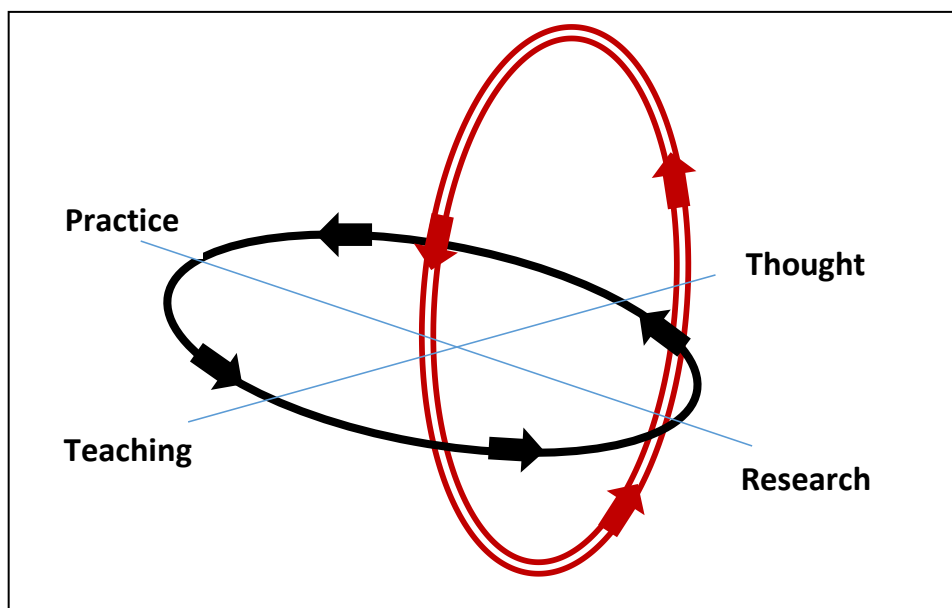


Figure 6

NOTES

¹ Figure 1: Architect: John Hejduk, Description: Wall House 2, originally designed by John Hejduk in the 1970s. Build in 2001 in the city of Groningen, the Netherlands, Author: Wenkbrauwalbatros, This file is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported;

Figure 2: Architect: Raimund Abraham, Source:

<http://www.keywordbasket.com/cmFpbXVvZCAgYWJyYWVhbnQ/>, This work is in the public domain, Source: Architectural Design Unit at Greenwich University run by Caroline Rabourdin and Luke Olsen

² Paul Watzlawick, John H. Weakland, Richard Fisch, Chang. Mental Research Institute, Palo Alto 1979.

³ Figure 3: Artist: Paul Cézanne, Title: Mont Sainte-Victoire, Date: circa 1887, Collection: Courtauld Institute of Art, Source: National Gallery of Art, This work is in the public domain in its country of origin and other countries and areas where the copyright term is the author's life plus 100 years or fewer

⁴ Figure 4: Artist: Jackson Pollock, Source: https://en.wikipedia.org/wiki/File:Namuth_-_Pollock.jpg, Copyright is owned by the Hans Namuth Estate, Fair use rationale for Jackson Pollock, this is covered under fair use because: It is a limited resolution photo from which the original cannot be created. This particular photo by Namuth is one of the more widely used Namuth photos of Pollock. Namuth's photos given by far the best view of Pollock's techniques, which are covered in the article. No free photo can be used in its place, as the subject is deceased, and no free versions will likely come forward. Namuth's photos themselves should be discussed, as they are an integral part of understanding Pollock. The abilities and rights of the copyright holder are not infringed upon s covered under fair use because: It is a limited resolution photo. The image is a low-resolution copy of the original work and would be unlikely to impact sales of prints or be usable as a desktop backdrop.

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THE IMPLICATIONS AND EFFECTS OF THE LEVEL OF EXPOSURE TO KNOWLEDGE ON THE ABILITY OF CREATIVE THINKING IN ARCHITECTURAL THOUGHT

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INTRODUCTION

In this article, I would like to point out a phenomenon that is difficult to ignore and share with you a feeling that I believe accompanies not only me but also my fellow teachers and architecture educators in the learning environment. In my perception and pedagogical approach, we do provide architectural knowledge, but in the student's personal experience, we do not teach him to be an architect but are close to the student as he shapes his architectural persona himself. I want to share a feeling with you, as I understand it, about what has happened in the last three decades and focuses on how we encounter knowledge, the vast amount of knowledge. And the way we are constantly inundated with a huge level of stuff. We can access things in one second. Next to this fact, I want to ask us if it doesn't somewhat stifle, depress and suppress our creative thought.

EDUCATION AND CREATIVITY

In order to examine this phenomenon. It is right for us to learn from the greats of education, and their approach regarding the connection between creativity and the power of knowledge that surrounds the creator. Ken Robinson, a famous professor of arts education, died a year ago, and who has the most views on the Internet on YouTube.¹ He corresponds with Professor Tim Leunig, a teacher of economic history in the Department of Education, and it responds to him in Ted lectures.² Both discuss the relationship and mutual effects between the amount of knowledge and knowledge in general and how our creative thinking is affected, with an emphasis on the drive that takes us to discoveries of innovation.

Ken Robinson convincingly argues that we must first meet this person, who has the creative drive, to see how the potential inherent in him is taken and nurtured, and only then, according to him, does he have the infrastructure to access and the ability to reach knowledge and develop it. Since the adolescent is curious by nature, and has the thirst to know, he will have curiosity and inquisitiveness. And according to him, a one-year-old baby explores the world alone and with the learning impulse built into it. We will call This in the article a type of knowledge based on curiosity.

Tim Leunig does not really oppose him, but although he agrees with him, he claims otherwise. The ability to start thinking creatively will come based on a broad infrastructure of knowledge and education, given to a person. Only after you are knowledge-based, you are able to develop creative thought. This approach will be called in the article: technologically based knowledge.

A RESEARCH EXPERIMENT IN CREATIVE DESIGN

In order to research and examine this subject in the field of architecture, I asked to establish the relationship between the factors; Knowledge, and creative thinking, and the priority and prioritization of each of the factors according to the different approaches.

For this purpose, I conducted an experimental exercise and analyzed it. The experiment took place in the School of Architecture at Ariel University in Israel. As part of a basic design course for first-year architecture students. 2021.

I presented the students with a short exercise, divided the group into two small groups of eight students, and placed in front of their brushes and black and white gouache paints, and large white drawing sheets. I read them a short biblical story from Genesis; The story of building the Tower of Babel. The participating students were asked to draw the Tower of Babel on the drawing sheet. In the first stage, they were asked not to coordinate or talk to each other about how the work was done. Everyone is required to participate and express themselves to the best of their understanding and interpretation. It is important to note that some of them did not even know the story. I asked them to use creative thinking from their personal imagination. For me, and for the purpose of experimenting and assuming the research work, the first drawing is under the category; of Curiosity based knowledge.

The second part of the exercise, which also lasted about four minutes, allowed them to talk and coordinate with each other about the piece and plan the painting. They were given the opportunity to exchange knowledge, surf the net, read and learn from the Internet, Wikipedia, Pinterest, or any other source of knowledge they want. The second drawing is in the category; Technology-based knowledge. Here are four paintings, two (Fig. 1, Fig. 2) from the first phase of separate groups.



Figure 1. Intuitive creativity (based on curiosity). Group A.

Figure 2. Group B.

And what we see above in the pictures, are two drawings of the Tower of Babel, of each of the groups that had no connection between them. And the work is based on creativity based on personal imagination. And in the second two (Fig. 3, Fig. 4) drawings, you can see the two drawings drawn after the acquisition of knowledge and exposure to sources, in what is included in the category of creative



Figure 3. *technologically based knowledge. Group A.*

Figure 4. *Group B.*

In my humble opinion, and I leave it up to you, the readers, my question is, where is more creative freedom evident and identifiable, in the first stage or in the second stage? And if we probably agree, that is, that creative thought is more evident, before the exposure to broad knowledge, for me this - turns on a kind of red light. I would like to point out that the students also felt the difference between their works created under different prerequisites for each work. They realized that in the first phase of the exercise, they did not know or see the Tower of Babel, not even through the mediation of later representations of it.

This is where my research question arises, what is the strength of the effect of exposure to knowledge overload on creative thinking? Undoubtedly, the mentioned biblical story serves as a starting point for discussing the connection between human and cultural knowledge and technology, leading to creative thinking, to reach the sky by existing means. This point of thought was used by the subjects of the conference held at Ariel University in Samaria, Israel, in 2020 under the title Tower of Babel - Infrastructure as a Paradox, for which I conducted the experiment with the students.

KNOWLEDGE BASED ON CURIOSITY AT THE BEGINNING OF HUMAN HISTORY

I recommend you to look and observe through the glasses that stand in contrast between knowledge and creative thinking. The story of the Tower of Babel is a good starting point for discussing the subject. For this reason, that it is possible to research and focus on the relationship between existing knowledge that does not depend on time and the correct creative thinking for that period.

Already there and already then, we recognize in the biblical text, a possible interpretation relevant to the discussion. None of us have been to the area attributed to the Tower of Babel which is in today's Iraq and Iran (as presented in Figure 5). The place is a sandy desert. And the quarrying of the stones is known to be difficult even in Egypt for the construction of the pyramids.

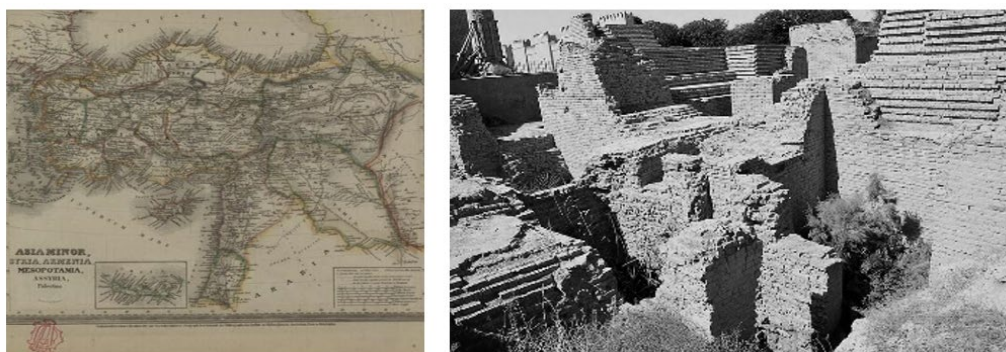


Figure 5.

Here I emphasize in the text - what people say to each other, "Let's make clay bricks, and burn them into building blocks".



Figure 6.

In the picture (as presented in Figure 6), you can recognize a small group of people, who recognize a vital need for building materials and a limited time, because the rest of their friends who are building the tower, want to get to God and quickly. This small group is technologically curious and understands that it is necessary to prepare molds and variable sizes and to produce furnaces for burning.

Such an understanding indicates creative thinking for the technological development of tools, devices, and means that did not exist before this period. Acquired knowledge accumulated by the force of the creative impulse. Beyond that, this whole story of lifting a building, and even in today's terms, this requires developed technology, the ability to control and organize, and the ability to manage work teams. It is not simple and even complex on a large scale technically and humanly. The questions that arise from this are, what knowledge did they have at their disposal, even then? How was it passed between them? What expressions of innovation and creative thinking are marked in the mentioned period?

From an anthropological point of view, we tend to distinguish and understand the millennia-old phenomena described here, in terms and tools that are available to us today. That is, looking at the very distant past of thousands of years, or towards the more recent past of hundreds of years, is done from a contemporary perspective.

TECHNOLOGICALLY BASED KNOWLEDGE THOUSANDS OF YEARS LATER

In the same matter related to the Tower of Babel, and from a research aspect of creative thinking alongside existing technological knowledge in one or another period of time, I wish to move in time, and still remain in the past, and examine the creativity of a famous painter and his famous work, Bruegel the Elder (1525–1530 – 9 September 1569) and his painting Tower of Babel (as presented in Figure 7).



Figure 7. Pieter Bruegel the Elder - The Painter and the Buyer

We see in front of us the famous painter Bruegel. and in the spirit of research, we will ask the following question; Before he put brush to canvas, what early technological knowledge did he have at his disposal? And how does his creative mind interpret the biblical text and allow him to visually present the tower?

His life stories recorded in the literature testify to Bruegel how he became an apprentice of Van Aalst (Bruegel married Pieter Coecke van Aelst's daughter) who was a painter, sculptor, architect, woodworker, jeweler, and carpet weaver³. Bruegel has been working under him for fifteen years, as far as he is concerned, he is not yet ready to paint the Tower of Babel. And if he asks himself, which breeder do I know? So, the knowledge available to him at the time and place where he lived, was a building that was only about nine meters high (Fig. 8).



Figure 8.

He travels to Rome, and for ten years he paints landscapes, and urban drawings, and only after that, he is free to paint his famous painting. In other words, he collects, accumulates, and acquires vast knowledge - similar to Tim Leunig's approach - and then he is able to unleash creative thought.

What can we learn from these two test cases? and with an emphasis on creative thinking. So, let's focus on the discoveries of innovation and creative thinking and to what extent it is based or not on existing knowledge.

EXAMINING THE ABILITY TO THINK CREATIVELY WITH SCIENTIFIC TOOLS

As most of you know, the so-called psychotechnical test, is the most popular test for evaluating creative thinking. This is the Torrance⁴ Tests of Creative Thinking – TTCT.⁵ The measurement values in this test are these: Imitation - copying and imitation of an existing thing - a manipulative action on the original until it is converted into an independent object. Absorption from a variety of sources - reading literature, media, personal interviews.

Guilford⁶ added on Torrance in his theory of branching thinking, which should also be examined: the flow of thought - many ideas. Mental flexibility - a variety of ideas. and the relationships that are reflected in the product and representation. Improvement, development, compilation - filling in ideas, using ideas, and personal interpretation of concepts also taken from other fields. Originality - use of ideas, which are not self-evident or banal, or statistically correct. An integrative connection, unexpected in materials and methods. Aspiration for innovation - an idea, concept, story, or narrative that takes on a new meaning. Creative function in reference to layers of information and layers from another point of view. In conclusion, according to the recommendation of these theorists and researchers and based on their experience in the field, it is important to understand that a good mission approach is original and smart and does not categorically stand between right and wrong.

The premise of Torrance and Guilford isolates through their test the possible parameters that may influence creative thinking and which are not only what the examinee himself brings with him but also what came with him. Renzulli and Hartman⁷. they added a new aspect from a research point of view and raised an additional condition for the realization of the potential of creative skills. According to them, even if we all have an innate creative drive, when the trait is realized and can be expressed, is it influenced by something else? What is it? They call it a gifted gift, (Fig. 9 The three-ring conception of giftedness). Although it is quite clear to them, they claim that creative thinking also relies upon, and perhaps mainly, on:

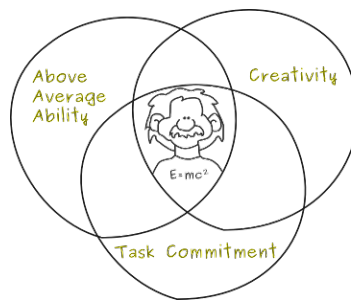


Figure 9. The three-ring conception of giftedness.

An inventory of personal traits, biographical characteristics (habitats and learning environments), and the personal opportunities that enable the acquisition of cultural capital. For their approach, for the examinee, the ability to deviate from the conformist and unconventional requires multiple uses for a familiar and accepted object, and this depends on the gifted gift. That is, the cultural and educational baggage that the creator carries on his back must be recognized.

Returning to the research claim in this article and its examination, and in light of the preliminary review dealing with what creative thinking is and how the accumulation of knowledge serves creativity and creation or not, I would like to move to our time.

We have reached the year 2023, I want to refer to the facts. There is no doubt that the amount of information and knowledge that has been accumulated to date is of a strength that was not evident in the past. Which makes us multiply the facts by the square of the exposure speed. How do we check, if at all, the amount of knowledge that takes over us? What then is his credibility? What is the innovation information in it? What is the medium used to transmit it? Perhaps, these cause the essence of the thing and its meaning to be diluted, perhaps affecting the time spent and the ability to delve into it. Perhaps, a level of exposure favors the quantity of representations over insisting on them in depth and insisting on their quality. And with full confidence, it can be claimed that the exposure to visual knowledge outweighs the exposure to textual knowledge. Additional phenomena known to us during

this period receive a behavioral definition in relation to exposure to knowledge. (F.O.M.O-fear of missing out)

The same fear of missing out. The need to minimize the lack of knowledge leads to an action of detection and discovery, which leads to over-searching, to the feeling of missing out on the coverage of the multiple materials. Stimulation of creative thinking and knowing the unknown independently, are lost. And what about us, the struggle between independent creative thinking and the amount and power of the information that reaches us, puts us on an infrastructure that may prevent us from building towers in the air? Furthermore, in the encounter with a vast pool of knowledge, the subjective internalization arises and may be overcome, that in fact everything has already been done in the world and on a large scale, and in light of this, do we lead to the death of the creator?

Even the experience of access and accessibility of knowledge has changed. In the past we would go to the library, locate the original on the bookshelf, open books, and turn pages one by one, we could smell the book, new from the printing house or stale and worn. Today we receive everything on a small screen and only the finger shifts the information, to the right or to the left, all body movement is reduced, and the body is less involved in learning.

(Pictures from above to down- Fig. 10).



Figure 10.

DISCUSSION

There is no debate that a lot of knowledge is a good thing for the world and to discover it and discover many people in it. But his presence, his appearance and his direct and focused approach to us, and his influence have significant consequences. And maybe it undermines our creative thinking. What

should we do? There are actually no patents or solutions. I mainly refer to the development of skills from the past that has a place today and in the human and personal world.

Every effort must be made to educate for intellectual independence. High exposure to knowledge should be allowed but with restraint.

Self-control must be cultivated against the flood of official expressions. The tendency to essence must be increased and strengthened. This skill can be achieved through presence, deep observation, and insight. One must take care of the transition to strengthen the creativity drive. To question things. Encourage an experience that breaks boundaries. Enrich manipulative mechanisms.

Travel on a journey to the edge of the possible. Observe the inner experience, and have the face for independent and innovative technological development. To believe in ourselves, to develop, shape and stabilize a space for personal expression about our relationship to the world. That means, taking a position, to shape our thinking.

NOTES

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FIGURE SOURCE

Figure. 1 School of Architecture, Ariel University in Samaria I Basic Design Course I First Year I 2021 Intuitive creativity (based on curiosity). Group A.

Figure. 2. Group B.

Figure. 3 Technologically based knowledge. Group A.

Figure. 4. Group B

Figure. 5. Wikimedia, Adrien-Hubert Bru  . Asie-Mineure, Armenie, Syrie, Mesopotamie, Caucase.1822.jpg. In the right- Ruins of the ancient city of Babylon in Mesopotamia, Iraq reign of Nebuchadnezzar II, 6th century BC.jpg

Figure. 6. https://upload.wikimedia.org/wikipedia/commons/thumb/a/af/Confusion_of_Tongues.png/170px-Confusion_of_Tongues.png

Figure.7. Pieter Bruegel the Elder - The Painter and the Buyer - WGA03533.jpg. In the right- Pieter Bruegel the Elder - The Tower of Babel (Vienna) - Google Art Project.jpg

Figure.8. (<https://www.britannica.com/summary/Nimes>) In the right- https://he.wikipedia.org/wiki/%D7%A7%D7%95%D7%91%D7%A5:Colosseum_in_Rome-April_2007-1-_copie_2B.jpg

Figure .9. The three-ring conception of giftedness.

Figure .10. <https://libraryshenanigans.files.wordpress.com/2013/11/book1.jpg?w=300&h=244> In the right- (Graphic editing by the author of the article, combined with a cover image of the monthly. GA Architect, Journal 6/September/2000).Clockwise-. (Graphic editing by the author of the article- <https://en.unav.edu/web/doctoral-program-in-architecture>). (Graphic editing by the author of the article, Collection of photographs, <https://alc.nebo.edu/content/architecture>).

NATURE-BASED EXTENDED REALITY FOR INCLUSIVE LEARNING IN ENVIRONMENTAL DESIGN

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INTRODUCTION

University inclusivity statements often aspire to create a more diverse, equitable, and inclusive environment. In architectural education, the experience of real environments is the foundation of the educational experience. But is the immersion in real environments that architectural education demands available to all? Poor, urban, and minority students, for instance, have traditionally been underserved by environmental education. Nature-based extended reality (NXR), as described here, may provide a path for all learners to experience the immersion in real environments that is the foundation of environmental design education. This article describes several innovative online learning strategies and technologies in NXR courses for inclusive learning in environmental design. These strategies were developed by the author for use in an NXR graduate architectural design course at North Carolina State University (NC State). Employing these strategies, the author offers a framework for structuring ideas, activities, and resources in NXR courses in environmental design curricula. The fundamental research question asked in this research project is, “As inclusive learning gains importance in higher education, can online education help make the virtual experience of nature and design in nature available to all?” This question weaves together three strands in architectural education: inclusive learning, extended reality learning, and environmental education.

XR Technologies: Benefits and Limitations

Nature-based extended reality employs the technology commonly referred to as virtual reality. Extended reality (XR) encompasses “All real and virtual environments combined together, where the interaction between human and machine occurs through interactions generated by computer technology and hardware.”¹ In this definition, XR includes virtual reality (VR) and augmented reality (AR). Nature-based extended reality grounds the XR experience in nature-based learning concepts, strategies, and learning activities.

In a typical higher education setting, XR requires the use of VR headsets, head-mounted devices allowing the wearer to experience a virtual or extended reality environment. Such devices are required for students participating in a nature-based extended reality course. VR headsets are not inexpensive, and this can be a challenge in creating and running a nature-based extended reality course, since each student must have one to participate. Few universities can provide VR headsets for an entire class. But how inclusive is a course that requires the purchase of expensive equipment by its students? In the

case of the author's university, VR headsets are available on loan from the library, offering some relief from the cost of purchase, but only for a few students.

Another resource of value to a nature-based extended reality course is a VR Lab. Such a lab can be nothing more than an empty space, since the space the students occupy is virtual using the VR headsets. A nature-based extended reality course can be run with students scattered across the globe, but in the author's experience, the "class" aspect of an NXR course benefits greatly from having the students in a lab (nothing more than an empty room) where issues can be addressed face-to-face as well as in the NXR virtual environment. But this is not to say that a remote NXR course with spatially dispersed students could not be a successful course.



Figure 1. A North Carolina State University student modifies the virtual environment in the CAVE at the University's Virtual and Augmented Reality Lab, led by Professors Karen Chen and Xu Xu.

If the economic hurdles of accessing VR headsets can be overcome, NXR students "can be immersed in a virtual environment and experience the sense of actually being there."² Improved performance and reduced dropouts among historically underserved students have also been documented, as have reduced race- and income-related performance gaps.³ Virtual reality also "enables relaxation and enhances resistance to stress which can alleviate symptoms of anxiety and depression."⁴

STRATEGIES FOR NATURE-BASED EXTENDED REALITY

While the strategies proposed here were developed for use in an architecture course, they are intended to provide lessons for all design studio courses. Their goal is to create interactive, immersive, virtual experiences to all students. In architecture, this means virtual experiences in site analysis and collaborative building design. Their goal is also to make such experiences available to all students regardless of ability and resources. Strategies for NXR courses should also be aligned with course learning objectives. As an example, the course proposed for this study employs the following learning objectives:

Nature-based Extended Reality Course Learning Objectives

1. Assess ecological and social issues associated with environmental design.
2. Interpret a human ecology approach to problems in design for extreme environments.
3. Compare how different human ecology concepts are related to design problems in extreme environments.

4. Create new design solutions based on on-site ecosystem analysis and social-environmental systems modeling.

Virtual Field Trips

Even before COVID, field trips were a problematic part of the educational experience. For both learners and instructors, finding the time and resources to conduct meaningful field experiences has been a challenge. With COVID, traditional teaching moved abruptly online, and field trips largely disappeared. This left a critical gap in the educational experience. But the value of experiential, place-based learning activities like field trips is well-established. Can the new educational experiences of online learning be adapted to support virtual, online field trips in the future? Just as we have learned to make our online courses interactive, engaging, and inclusive, can we create new models for interactive, virtual field experiences for our students? The resulting virtual field trips can provide a model for a new kind of learner experience liberated from the constraints of traditional, in-person field trips. With an instructor in the field and technology as simple as a smartphone, students can experience a new kind of learning activity that is interactive, collaborative, and engaged yet freed from the cost, time and logistical challenges of traditional field trips. An instructor with a smartphone can visit a wetland, construction site, or any other field trip destination and create dynamic, engaging, and interactive learning experiences for remote learners via Zoom and other platforms.



Figure 2. Students from the Imhotep Academy take a virtual field trip in the CAVE at North Carolina State University's Virtual and Augmented Reality Lab.

Technology is not the hurdle to creative, virtual field trips. Any instructor with a smartphone can do this now. But to create meaningful learning experiences requires planning, precedents, and best practice models. NXR courses provide an opportunity to develop just such models of successful, virtual field trips. The development of these models should include testing best practices in virtual field trip planning, design, management, and technology. It should also address integration with course learning objectives and activities, assessment, and instructional materials. Developing pedagogical models for NXR courses may also include field testing of virtual field trip strategies such as the integration of online learning and outdoor education with pedagogical processes of learning activity design, assessment, and learner-instructor interaction. Technologies such as smartphones, cameras, microphones, and remote data transfer for pre-program recordings can also be included.

These experimental strategies and technologies can be developed and tested in courses. The intended outcome of pedagogical models for NXR courses is a tested collection of best practices, a how-to manual, for successful, virtual field trips to be shared at the department, college, university, and global levels. Empowered with such a collection, instructors could lead new kinds of field experiences for learners that combine the adventure, excitement, and haptic learning benefits of traditional field trips with the advantages of online learning. Virtual field trips and office visits could provide a model for a new kind of learner experience liberated from the constraints of traditional, in-person trips. With an instructor in the field and technology as simple as a smartphone, students could experience a new kind of learning activity that is interactive, collaborative, and engaged yet freed from the cost, time, and logistical challenges of traditional field trips.

Virtual Design

Architecture is almost always a virtual art, relying on facsimiles of actual spaces and materials for the design portion of the building process. The learning of architecture, however, remains almost entirely a face-to-face activity. Educational models based on the atelier method of teaching developed in the Middle Ages remain firmly in place in the studio model employed at virtually all universities. But the media of design and representation have moved from the drafting board to the computer, and these computer-assisted drawings (CAD) are typically compatible with online sharing and critique. With their virtual imitation of real, three-dimensional buildings and spaces, extended reality devices move the computer-based design process from 2D drawings of 3D spaces to 3D experiences of them. Recall that a study cited earlier found that students “can be immersed in a virtual environment and experience the sense of actually being there.”⁵

For this reason, XR offers an enticing environment for the design of spaces and structures. Less exciting in the minds of many is the prospect of education moving increasingly online. The advent of COVID brought with it the adoption of what some have called emergency teaching methods. The result was a scramble to move from classroom teaching to online teaching that was not always successful. The atelier model employed in architecture and art studio classes is founded on the face-to-face “desk crit” or critique of an individual learner’s work by an individual instructor. There is strong sentiment that the benefits of these face-to-face encounters between student and teacher cannot be achieved in an online environment.

To address these concerns, the author created a hybrid learning environment. With the studio class meeting three days per week, one day was dedicated to face-to-face desk crits in the studio, one day to face-to-face meetings of the entire class in the studio, and one day to individual online desk crits. In a post-course survey, all but one of the students preferred this hybrid online/offline method to any other. Students cited the focus and flexible scheduling of the online desk crits as benefits. Because of the success of this hybrid learning model, the author will continue to develop it as future nature-based extended reality courses are developed.

Virtual Collaboration

While most of the learning in the inherited atelier model of architectural education is one-on-one with an instructor, the professional practice of architecture is much more collaborative. In the office, work is handed off and discussed at length by groups to the point where individual authorship is nearly impossible to attribute. For this reason, it is important in most cases for students to learn collaborative design methods in school. Does donning a VR headset and cutting oneself off from other students in a virtual design environment reduce collaboration? Not necessarily. In virtual design, designers meet represented by avatars in a virtual environment to design a building or space.

Several software applications are now available for architectural design in extended reality. The VR-based architectural design application used in the pilot project described here is called Prospect. Prospect is a VR-based 3D design modeling software that enables its users to test concepts quickly in an immersive, true-to-scale environment. It is compatible with the design software that students are familiar with including SketchUp, Revit, Rhino, and Grasshopper. With Prospect, students in the pilot course can design in the virtual reality environment, in effect designing in three dimensions in a way that is not possible in 2D-based modeling software. And because it is VR-based, students can work together simultaneously on the same 3D model. Student work can also be presented in 3D experiences such as walk-throughs and flythroughs. This NXR technology, as well as others too numerous to describe in detail in this paper, can support the learning objectives and learning experiences of nature-based extended reality courses. Some can even be integrated with existing natural sites to create hybrid, augmented reality environments offering some of the advantages of virtual design and those of direct, on-site experience of building sites and nature.

CONCLUSION

Inclusivity is not inherent in nature-based extended reality educational practices. However, as the experiments leading up to NXR implementation in this project have shown, it has the potential to enable people who might not be able otherwise to experience nature and environmental design to connect with collaborators and take part in experiences such as virtual, collaborative design and virtual field trips. The cost of VR headsets, however, may pose a challenge to some students, and universities may soon face some of the same challenges they faced when considering requiring laptop computers. If these challenges are met successfully, it appears that higher education can create a more inclusive environmental education experience for all peoples through NXR experiences. In addition, the innovative educational strategies and technologies proposed here may provide a path for all people to share in the benefits of nature-based learning which are the foundation of environmental design education.

NOTES

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MUSEUM EVALUATION AS A PRACTICE OF EDUCATION TO COMPLEXITY AND SOCIAL INCLUSION

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INTRODUCTION

Museums, in their traditional sense, have long been esteemed as gateways to knowledge—reservoirs of historic artifacts, artistic masterpieces, and scientific marvels. However, with evolving societal dynamics, the roles that museums play are undergoing a paradigm shift. They are increasingly becoming centers of social discourse, interaction, and inclusion.¹ One proposed way to facilitate this transformation is to harness a multidisciplinary approach that stems from the Groupanalytic theory, the Reggio Emilia Approach,² and the epistemology of Complexity to redefine the human relationship with museum institutions.

Through these lenses, museums take on a new identity, becoming places of hermeneutic and epistemological interpretation. Their collections and proposed itineraries play a pivotal role in fostering the art of questioning. They no longer exclusively serve the museum's users but extend to anyone keen to partake in this transformative journey. The interpretation of the museum's functions thus becomes a dynamic process, constantly evolving, and encouraging the very essence of creative activity celebrated within its walls.

This multidisciplinary approach serves several purposes. Firstly, it uncovers unconscious layers intertwining the nature and purpose of museums. Secondly, it collectively acknowledges the museum's potential for inclusivity. Lastly, it acts as a tool for self-assessment and process evaluation, enabling the construction of meanings, education to complexity, and implementation of democratic participation practices.

ANALYTIC THEORIES TO SUPPORT A NEW VISION OF MUSEUMS

Discovering intersections between the principles of groupanalysis and the contemporary context of museums can yield enriching insights about how museum institutions function and can be improved. Incorporating principles of groupanalysis into museum practices could lead to more engaging, inclusive, and transformative visitor experiences, ensuring that museums continue to evolve as dynamic spaces of learning, dialogue, and social connection. Let us focus on some revealing concepts. Similar to the spaces created in groupanalysis, museums act as shared spaces for exploration, dialogue, and learning. They offer a common ground where individuals from different backgrounds and experiences can converge to engage with art, culture, history, or science. This shared exploration often sparks dialogue, facilitating mutual understanding and cultural exchange, often touching level that go well beyond cognition and intentionality. Both group analysis and museums provide safe

environments for reflection and potential transformation. In groupanalysis, individuals are encouraged to express their thoughts and feelings, leading to self-understanding and potential personal growth. Similarly, museums, through their exhibitions and narratives, can provoke introspection, challenge assumptions, and promote personal and social transformation.

The concept of the matrix in groupanalysis pertains to the intricate web of communications, experiences, and relationships within a group³. Similarly, museums are a matrix of interactions and learning. They connect various artifacts, stories, and people, fostering a dynamic network of experiences that impact visitors differently based on their backgrounds, interests, and perspectives. In accordance with Foulkes' theory, a museum can be envisioned as a groupanalytic matrix. Each visitor forms part of this matrix, bringing its unique experience and perspective. Through shared explorations and conversations, it is a network of interactions, a transformative learning setting. Like a temporary institution, a museum is a place where individuals come together to form a community, engaging with each other and the exhibits. The interaction between visitors, staff, and the exhibits shapes its identity and purpose. This dynamic nature of the museum helps to continually re-evaluate and reconstruct its narratives, much like a process of "working through", which involves questioning and re-evaluating established norms and beliefs. The visitors in this 'learning matrix' gain a broader perspective and challenge their own preconceived notions. Thus, museums, like Foulkes' groupanalytic matrix, become spaces where diversity and plurality are not only recognized but appreciated as sources of new knowledge and perspectives.

The term 'transpersonal' typically refers to experiences that transcend the individual's personal identity,⁴ delving into the realm of shared human experiences, spirituality, or the collective unconscious. Museums, in a similar way, can provide transpersonal experiences. By presenting artifacts and narratives from various cultures and periods, they offer insights into universal human experiences, connecting individuals across time and space.

Finally, both groupanalysis and museum experiences deal with unconscious elements. In groupanalysis, understanding the unconscious dynamics within the group is crucial for transformation. In the museum context, the choice of exhibits to visit, the interpretation of artifacts, and the emotions evoked are all influenced by the visitor's unconscious. Recognizing this could allow museums to better facilitate meaningful visitor experiences. As keepers of history and culture, museums are custodians of our collective unconscious, carrying tales of joy, triumph, pain, and suffering from different generations and cultures. The artifacts and narratives within museums often trigger collective memories, both pleasant and traumatic. This collective remembering can foster a sense of unity, empathy, and understanding, aiding in the process of social inclusion.

THE SOCIAL INCLUSION POTENTIAL

When museums, several decades ago, began to abandon their institutional role as sacred temples of artifacts and evidence of knowledge, rethinking their role towards the public, there was a proliferation of initiatives specifically conceived and organized for categories of citizens considered fragile or with special educational needs: disabled people, refugees, asylum seekers, first and second generation immigrants, members of the LGBTQ+ community, prisoners, low-income people, unemployed people, citizens living in areas of economic and social marginality, or in any case associated with educational poverty and cultural impoverishment.

While this shift recognized the public as a diverse and evolving entity rather than an abstract, unchanging concept, it still perpetuated a linear sender-receiver relationship. The museum was the sender, delivering one-way messages to its various audiences. However, the museum-public-inclusion relationship in the contemporary world is better depicted as a complex system. This system consists of

different components continuously interacting in non-linear, unpredictable ways. The relationship embraces the fact that every user is a complex individual who cannot be categorized neatly and whose behavior is unpredictable and often unexpected.

To elucidate this point, let's consider individuals with autism. The autism spectrum includes numerous variables depending on the individual's functioning, and each person with autism has unique neurological characteristics. Similarly, commonly used categories like age can be imprecise; a distinction must be made between chronological age and cognitive developmental age.

Therefore, the museum-public relationship can be conceptualized as a non-linear complex system, wherein the museum dynamically interacts with each visitor on an individual level. Unpredictability and unexpected occurrences must be embraced as opportunities for enriching the relationship and invigorating the process of meaning creation.

In light of this complexity, social inclusion in museums should not be viewed as a fixed set of rules, but rather as an ever-changing and evolving landscape. The museum becomes a place of possibilities, where alternative behaviors, content, strategies, and configurations can be chosen. The unexpected becomes a resource for understanding the world and oneself, and creativity thrives amidst unpredictability.

The application of S.H. Foulkes' groupanalytic matrix,⁵ provides a fitting framework to address these complexities in museums. Foulkes' matrix underscores the unconscious group dynamics and the constant interplay of individuals within a group. Moreover, it emphasizes the importance of psychological understanding in the functioning of social systems. By recognizing these factors, museums can develop a more profound, empathetic understanding of their visitors and cultivate an environment that fosters true social inclusion.

Museums can be seen as facilitators of profound social exchanges. By creating spaces for interaction and dialogue between educated elites and vulnerable sectors of the population, museums in fact serve as 'temporary institutions' of human relationships: they foster community-building, bridge cultural divides, and nurture mutual understanding among diverse groups of people. In this light, museums have embraced their potential as agents of social inclusion. They have become spaces where differences are not just accepted, but celebrated; where various forms of knowledge coexist, intertwine, and complement each other; and where the collective experience of discovery and learning is given precedence over the individual one. Social inclusion is not a set of recipes to be followed slavishly but must be embodied each time by becoming a place of possibility, in which design, contents, and communication strategies allow the unexpected to become a resource for understanding the world and oneself and for creativity to develop in contact with the unforeseen.

THE REA'S DOCUMENTATION AND ITS PARTICIPATORY PURSUIT

How to implement inclusive practices so that they can be increasingly appropriate to the complexity described? In the light of what was said in the previous paragraph, the evaluation parameters of a given educational intervention in the museum need descriptors that arise with the educational experience itself, that adapt to the experience implemented, which is different every time, personalized according to the human material involved and the objectives that are defined from time to time.

The Reggio Emilia Approach (REA),⁶ originally conceptualized for children's education, applies to museum science, especially concerning documentation practices and analysis of social matrixes. The REA progressive education philosophy that promotes child-led, experiential learning provides a framework for democratizing museum experiences. In fact, this approach emphasizes the idea of children as capable constructors of their own knowledge. Transposing this approach to the museum

context allows institutions to recognize their audiences, not as passive recipients of knowledge, but as active participants in a shared process of discovery and interpretation. This perspective promotes a more interactive, immersive, and personal experience for museum-goers, thereby enhancing the inclusivity and accessibility of these institutions.

In REA, documentation is viewed as a collection of meaningful traces of our reflections about significant experiences. This may take various forms: verbal annotations such as notes or comments; visual representations like sketches or photographs; and digital content like videos. This evidence is collected not only by educators but also by users, encapsulating their unique perspectives and individual experiences. Documentation accompanies the entire educational journey: from planning to implementing, to assessing the outcomes and finally, sharing the experiences. This process is highly collaborative, inviting each participant to share their interpretation and meaning-making, thereby fostering a constructive dialogue. The practice enhances collective understanding and simultaneously promotes an appreciation of differing perspectives. It propels individuals towards a continuous self-transcendence, facilitating a deeper understanding of the world and an acceptance of its complexity.

This process cannot be performed in isolation. It requires a collective approach, acknowledging that different viewpoints and experiences can enrich the construction of thought and the educational process. Here, the principle of groupanalytic transpersonal becomes pivotal, as it provides the framework for understanding the intertwining of the individual and the collective levels, being the subject in constant relation, since birth, with the other (the caregiver, the family, the ethnic group, the culture...) for its own survival: humans, as 'deficient beings', are forced to form institutions and cultures to offset biological inadequacies, making the other truly inclusive within the individual⁷. The process begins with an initial documentation carried out by museum staff and then transitions towards self-documentation. As the experience unfolds, it broadens to include the other at a transpersonal level, allowing a reciprocal exchange of perspectives during and after the educational activity. This back-and-forth interaction enriches the participants and promotes social inclusion by actively integrating the other into the process of participation and meaning-making.

Documentation, therefore, is characterized by a dynamic and ever-changing *modus operandi*. Its flexible and open structure, which doesn't follow rigid phases or predefined levels, readily adapts to the complexity of the unique experiences. With each new visitor, the process renews itself, sparking fresh interpretations and nurturing an environment of inclusivity and learning that epitomizes the very essence of the museum in the contemporary world.

MUSEUMS AS COMPLEX INSTITUTIONS FOR SOCIAL INCLUSIONS

The diversity captured through the narrative practice of documentation becomes an opportunity to welcome many points of view simultaneously, demonstrating that there is not a single absolute and authoritative truth, but that the synthesis that is made is only one of many possible interpretations and that as such it can be re-discussed again, enriched, reviewed in the light of new awareness. Through continuous reflection, the museum becomes a "place of multiple listenings"⁸, of elaborating questions rather than creating answers or executing accessibility protocols towards labels of users identified *a priori*.

Museums curate and display artifacts and narratives that often reflect the dominant societal norms, values, and histories, which may inherently marginalize certain perspectives, histories, and identities. Recognizing and addressing this bias is essential for promoting inclusivity in museum spaces. Hopper's concept of the social unconscious⁹ can help explain why certain narratives and groups may be underrepresented or misrepresented in museum spaces. Unconscious societal biases and prejudices

can unknowingly shape the way that collections are curated and displayed, thereby reinforcing exclusionary practices and viewpoints.

Museums play a critical role in shaping shared cultural memory, which is deeply interlinked with the social unconscious. By presenting selective histories and narratives, museums can inadvertently contribute to the marginalization of certain groups and narratives within the social unconscious. Understanding the impact of the social unconscious is crucial for implementing inclusive practices in museums. This includes questioning and challenging the dominant narratives and biases that influence museum collections and displays, and actively seeking to represent a wider range of perspectives, histories, and identities.

Museum professionals play a vital role in shaping museum spaces and narratives. Their understanding and acknowledgment of the social unconscious can inform more inclusive practices. This includes diversifying museum staff, investing in ongoing bias training, and fostering a culture of openness to critique and change. Involving diverse communities in the curation process is a powerful way to counter the influence of the social unconscious. Co-curation and participatory practices can provide a platform for marginalized voices and perspectives, fostering a more inclusive and representative museum environment. Museums can serve as important sites for dialogue and understanding, challenging the assumptions and biases embedded within the social unconscious. By presenting alternative narratives and fostering conversations around them, museums can help shift societal norms and expectations towards greater inclusivity.

Museum initiatives that are offered as inclusive and accessible, if examined through the feelings of each one, from pre-established formats can become a training ground for the complexity of reality. While you represent your point of view to others, you represent it to yourself, acquiring awareness of your own way of being, of your own values and of the other people involved in the process. Thanks to everyone's contribution, new language and knowledge are produced, self-learning becomes shared acquisitions, co-constructed together, negotiated in the difference through comparison and exchange and never definitive, because they are destined each time to be called into question and enriched by new contributions, exponentially multiplying the possibilities.

In this way the museum becomes a place conducive to didactic and scientific research at the same time: if through its initiatives it manages to destabilize our given perspectives and acquisitions, allowing us to narrate the difference and welcome that of the other, if it is able to listen, observe, document and provide multiple opportunities for interpretation, it make us available to re-learn, to re-discover and re-study the object in a common investigation that actively and in a non-linear way involves the learner and solicits, through reflection, the ability to discover new relationships between experience data.

The opportunity for knowledge offered by museum objects, conveyed by the gaze of several museum operators through the mechanism of discovery and subsequent cognitive reordering. This is well suited to the complexity of users who, with different learning profiles, have the right to educational customization that takes into account individual characteristics or perceptive and cognitive problems.

Educational messages, as an opportunity for participatory, common, collective growth in which to experience the values of civil and community life, can thus be easily vectorized according to the cognitive levels and potential present in the educational context and lend themselves well to work on perception of a membership.

In particular, the museum, by its very vocation, is a place where one has the experience of learning to read reality using other codes, to put cognitive, emotional, and relational resources to the test by reconfiguring values, identities, behaviors and learning. This process is based on the construction of the interactions between the research subject and the research objects, to choose, once made explicit

through the documentation, what to value because it is considered significant within these relationships.

Therefore, the Museum is an "ecosystem of learning" and by its own constitutive mission of public service, from a static place of reiteration of "original and historical meanings", should become a dynamic space of "semantic collaboration", not between categories of people but between complex individuals in relationship, greatly expanding the learning possibilities that are inspired and enriched by the looks of each one and the relationships that are generated in sharing this experience together.

The construction of everyone's identity passes from being part of a multiplicity that is conveyed through the museum's proposals, and through this epistemological approach it allows us to experience diversity as an enrichment for understanding the self.

Simplifying reality by dividing diversity into categories towards which to direct action means considering all systems of relationships similar and betraying the truth in which instead the details and/or variables are the vital elements to grasp in order to keep the process of understanding of reality, because it enriches the relationship "between individual and individual and between individual and world"¹⁰.

The imagined actions, supported through the documentation process that allows learning to be made visible, must be problematized in order to hybridize and contaminate themselves with new perspectives offered by anyone who wants to be part of the process. Only in this way will we discover that we are all different and all the same in this recognition of being different, and the museum will become, through education in complexity, a democratic place of inclusion and social promotion. The term evaluation must therefore be understood as the willingness to collectively choose what to value among the elements that emerged from the process itself to which they have all contributed with their specific ontology and offering their own interpretation. For this reason, the term education in complexity becomes a paradigm for understanding reality as a constant exercise of self-redefinition with ourselves and with the world.

CONCLUSION

As we transpose Groupanalysis and the Reggio Emilia Approach to museums, we are not merely expanding their function but redefining their essence. They cease to be mere repositories of artifacts but evolve into spaces where social barriers dissolve, dialogues flourish, and new understandings are born. Through this prism, we can truly appreciate the museum's role as an agent of social change and inclusivity.

By understanding museums through the lens of the epistemology of complexity we can reimagine museum institutions as living organisms, that dynamically engage with the complexity of human experience. They serve as places of multiple listenings¹¹ and perspectives, embodying the heterogeneity of human experiences and fostering an inclusive space for dialogue, exploration, and learning. With an approach that acknowledges and values complexity, museums can indeed promote a democratic environment for social inclusion and become agents of change and social promotion. Addressing the bias in the social unconscious offers, in fact, a transformative potential for the future of museums. Museums that consciously acknowledge and counteract the effects of the social unconscious can become truly inclusive spaces that celebrate diversity, foster mutual understanding, and contribute to social justice.

By allowing the REA to inform museum practices, we invite every individual—irrespective of their backgrounds—to perceive, engage, and partake in this shared cultural and educational space. The museum's exhibits thus become not just works of art or historical fragments but significant tools for dialogue, learning, and social inclusion.

Museums, through this innovative approach, can become a locus where cultural exchanges happen, where differences are not merely tolerated but celebrated, and where all individuals are acknowledged and valued. This vision reinvents our perception of museums and their capabilities, sparking endless possibilities for inclusion, understanding, and shared human connection.

NOTES

- ¹ "Museum Definition", International Council of Museum, accessed September 30, 2022, <https://icom.museum/en/resources/standards-guidelines/museum-definition/>.
- ² "Reggio Emilia Approach", Reggio Children, accessed October 30, 2023, <https://www.reggiochildren.it/en/reggio-emilia-approach/>.
- ³ «Group Analytic Concepts: The Matrix». *Group Analysis* 47, n.1_s (march 2014): 40-42.
- ⁴ Franco Di Maria, and Ivan Formica. *Fondamenti di gruppoanalisi*. Bologna: Il Mulino (2009).
- ⁵ Siegmund Heinrich Foulkes, and Malcom Pines. *Selected Papers of S.H. Foulkes: psychoanalysis and Group Analysis*. London and New York: Routledge, Taylor and Francis Group (2018).
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- ⁷ Arnold Gehlen. "Between social science and cultural criticism". In Muller, Jerry Z. (ed.). *Conservatism: An Anthology of Social and Political Thought from David Hume to the Present*. Princeton, NJ: Princeton University Press (1997).
- ⁸ Carlina Rinaldi. *In dialogue with Reggio Emilia: listening, researching, and learning*. Contesting early childhood series. London: New York: Routledge (2006).
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GARDENS AGAINST THE “NEW IGNORANCE”

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INTRODUCTION

People, especially children and adolescents, are addicted to electronic devices and the internet. Genuine contact with nature is being lost. With the climate crisis, the Covid-19 pandemic and the challenges posed by social change, there is a renewed awareness of the importance of a more harmonious coexistence between man and nature.

Research shows that children are far removed from natural phenomena. The so-called "new ignorance", the absence of direct physical and sensory touch, is spreading.

The aim of this work is to shed light on the role of gardens in education. We look at educational gardens from a pedagogical perspective, defining the importance of experiential learning. Children are introduced to new knowledge in gardens through all their senses.

The garden is a concept of different ideas. We show the types of gardens that are educational: botanical gardens, arboreturns, school gardens, private educational gardens. They are also collected in the educational online platform eGarden.

Educational gardens at different levels of education, from kindergartens, primary schools, secondary schools and beyond, play an important role in the development of children and young people. Not only in terms of acquiring knowledge, but also in terms of developing the emotional competences and personal qualities of individuals. Research on pupils' involvement in gardens confirms good correlations between motivation and achievement in various areas. It also confirms the impact on creativity and critical thinking.

Educational gardens are an excellent way to help young people overcome their distance from the processes of nature. Experiential learning in gardens reduces distance from natural processes. The results of all the research studies have confirmed our hypothesis that gardens are an excellent educational tool. Children and adolescents' active participation in gardens enhances their mental, emotional, social and physical growth.

By integrating educational gardens more into learning processes, we can influence young people's motivation and cut through the "new ignorance". As a person moves through life, his or her worldview changes, but the values planted in him or her in youth remain. Early memories with the spring scent of freshly dug soil in the home garden, of calves peeking out from under patches of snow, of crunchy red radishes, of birds chirping high in the canopy of fruit trees, of red peony petals caressing like velvet... If you are a reader of any of the twentieth century generations, you may be familiar with these images. Are they familiar to young people in the 21st century? Certainly not to everyone.

People's lifestyles are changing rapidly, we are dependent on electronic devices, helpless without a constant connection to the internet. Smartphones in the palms of children's and adults' hands constantly guide our steps. Yet we humans are completely interdependent with nature. We feed on what Mother Earth provides. Vegetables, fruit, cereals - everything for our bodies grows in the garden, not in the supermarket. And when we need food for the soul as well as food for the body, we breathe in deeply the intoxicating scent of the rose and realise that we are a living being, a tiny part of the whole.

Through a study of the literature, we present the facts presented by various experts in this field, especially in the field of education. Based on the analysis of documentation and observation, we go on to implement our own thinking through theoretical knowledge. We are three engineers, so we also deal with the subject on the basis of practical knowledge, our own experience.

Why gardens?

After 2010, the so-called "forest pedagogy" started to develop in Slovenia. Like learning gardens, learning in the forest is something that has long been known in our region. However, with the rapid development of digital tools, forests and gardens have become a bit forgotten for some generations.

Maybe the Earth itself has reminded us of them again?

With the climate crisis, environmental pollution, the Covid-19 pandemic and the challenges posed by social change, there is a renewed awareness of the importance of a more harmonious coexistence between man and nature.

In our environment, the forest is a clearly identified, defined space. Experiential learning in the forest is easily accessible, as we are proud of Slovenia's vast forests.

We wonder whether experiential learning in gardens is also accessible and defined?

What are educational gardens and who are they for?

People, especially young people, seem to be increasingly disconnected from genuine contact with nature.

The aim of this work is to show that experiential learning in gardens reduces this distance. Our hypothesis is that gardens (Figure 1) are excellent educational tools.



Figure 1. Rural, fenced vegetable and ornamental garden (own source: TPN)

EDUCATIONAL GARDENS

Theoretical background

More than three centuries ago, Jean-Jacques Rousseau excited the teachers and parents of his day with his thoughts on experiential learning. As he wrote in his famous work on education, *Emile* or, "Teach the young by deeds rather than words", and also to observe nature and follow its path.¹

Peter Becker, professor at Philipps University, notes that a study published in Berlin in 2010 caused quite a sensation.² In a random sample of 3000 students aged twelve to fifteen, only half knew that the sun rises in the east and many thoughts that long-life milk comes from long-lived cows or even bulls. It might be amusing to learn that deer are the wives of deer, that roe deer are called Bambi, that walnuts grow on bushes, that hens lay three eggs a day, that roses have no fruit (Figure 2).



Figure 2. Astronomia rose between flower and fruit (own source: TPN)

We do not have studies on how Slovenian children and adolescents answer similar questions. But a joking question to today's secondary school pupils, posed by a teacher - the co-author of this assignment, - was left without a correct answer: "When will the roses, which the November cold has put to rest, bloom again?"

Can we dismiss the young people's answers as irrelevant nonsense, amusing ignorance, or should we, on the other hand, seriously look at the causes and possible consequences? There seems to be a lot of evidence that engaging with nature stimulates children's educational process. For educators in general, and outdoor educators in particular, it is imperative to consider the recognition situation that emerges from the pupils' responses³

What shows children's lack of knowledge is, above all, their great distance from the phenomena and processes of nature. If they do not know that walnuts grow on trees, they have obviously never seen their fingers turn brown when they pick them. If they do not know that roses bear fruit, they have probably never felt the itch caused by the tiny hairs in rose hips. This means that cognitive distance is often accompanied by an absence of direct physical and sensory touch. At the same time, we know that children's rooms are dominated by computer screens, mice, games consoles and smartphones. They guide children through a reflection of reality, which always remains a reflection. The world that enters children's and adolescents' spaces through screens does not need to be explored and understood

through the senses of touch, smell, hearing and taste. Neither autumn storms, nor spring breezes, nor sun and snow will leave an impression on the skin. If the basic anthropological assumption is correct that exposure to collisions, frictions, encounters and other active contacts is necessary for the advancement of human developmental and educational processes, it seems that in contemporary children's rooms these sensory physical encounters with the world are reduced to the cognitive visual.⁴

The so-called "new ignorance", which is emerging in Germany and elsewhere in the world, can also be confirmed in Slovenia through experience. Stories from the mouths of young people could be entertaining if they did not show their ignorance of what happens in nature. Primary school children rarely have the opportunity to meet plants, live animals or learn that owls are the bearers of useful knowledge (Figure 3).



Figure 3. Young owls on willow (own source: TPN)

In today's world, which is full of abundance for a small minority of people on the one hand and poisoned by mass-produced and chemically processed food on the other, the primordial connection with nature and people themselves is being lost. The loss of this genuine contact with nature is most evident in the younger generations. Climbing trees or playing with peers in the backyard seem alien to children. While we learn throughout our lives, we believe that education and the formation of values is most important in childhood.⁵

As an educational, learning garden, a classroom in nature, the garden facilitates the understanding of learning material, especially in science. It also gives pupils the opportunity to learn about gardening skills and the importance of healthy, garden-grown vegetables, fruit and herbs. Garden-based learning encourages and develops critical thinking skills and cross-curricular integration. The latter is a key factor in helping pupils to recognize what they learn at school as useful for life.⁶

Slovenia has had school gardens in the past. It is becoming increasingly clear that we all need knowledge from subsistence farming and that there is a generational lack of transfer of such knowledge. Schools are knowledge centers in every community. A sustainable school learning garden can be an important outdoor classroom for all generations of children and their parents. If ever, it is now, during the Covid-19 pandemic, that we need the skills and knowledge to be self-sufficient, to care for our own well-being and to preserve nature. This is where school-based sustainable learning gardens can help, combining knowledge, experience, socializing, intergenerational transfers and

personal motivation.⁷ The phrase 'sustainable development' is used at every turn. But how can we live according to the principles of sustainable development if we do not know how to listen to nature? How do we open young people's eyes to see what glitters among the autumn leaves, not just on screens (Figure 4)?



Figure 4. Green frog among autumn leaves (own source: TPN)

Education for a healthy environment, sustainable use of natural resources and local climate change adaptation - all of these must be given a central place. Schools play an irreplaceable role in educating about sustainable development by raising awareness of the links between society, the economy and the environment.⁸

WHAT IS A GARDEN, WHAT IS AN EDUCATIONAL GARDEN?

Garden is a word made up of just three letters (VRT in Slovenian language), but behind them are countless different images. Surely each of us has a different idea of what a garden is. Images of gardens are closely intertwined with images of childhood that have left a deep imprint on us. This is no coincidence, of course, because man has a primordial connection with nature, which he has always sought to order and subjugate as he pleases.

Some people think that the garden is the earliest form of human spatial planning, whereby a garden is thought of as a plot of land enclosed with branches or stones to protect it from outside nuisances. Historical records show that the garden was originally a small, landscaped area where useful plants were cultivated, and water was used for that purpose. Over time, the garden began to grow into an important complement to the built dwelling. It went beyond its original, utilitarian, cultivation purpose and became a place for outdoor living.⁹

Gardens have been a way for communities to provide for themselves since ancient times. Globalization and its problems have once again reinforced the need to create gardens that enable partial self-sufficiency and mobilize people to connect (Figure 5), sharing experiences, so that gardens

have not only a provisioning function, but also social, environmental, economic and ethical-traditional meanings, i.e. sustainable dimensions.¹⁰



Figure 5. Charity meeting in the Nekrep garden (own source: TPN)

So what is the result of combining the words garden and education?

Educational garden is a newer term, which is only just gaining ground in Slovenia. In connection with gardens and outdoor education, phrases such as: teaching gardens, school gardens, outdoor classrooms, botanical gardens, historical gardens, arboretums, subsistence gardens, etc. are in use.

The challenge of what an educational garden is was tackled some time ago by a group of students, professors and mentors from the University of Maribor as part of the project work On the Creative Path to Knowledge. Their findings and the e-garden online information platform are presented below.

E-garden platform

The Creative Path to Knowledge project (PKP, 11081-6/2018) brought together students from three disciplines: architecture, geography and informatics. With the help of teaching and working mentors, they explored a part of Slovenian gardens. They developed an online information platform (Figure 6) called e-garden: a network of educational and residential gardens (www.evrt.si).

In addition to its natural beauty, Slovenia has many interesting built garden environments. The fast pace of life indoors is leading more and more people to seek the primitive, to return to natural living. Arboretums, historic and botanical gardens are well known. But there is a multitude of ornamental living, collecting, self-catering gardens. Their owners are a treasure trove of knowledge. Yet this knowledge is being lost in intergenerational transmission. There is a huge untapped educational potential, and there is an urgent need to pass on this knowledge to younger generations and the wider community.

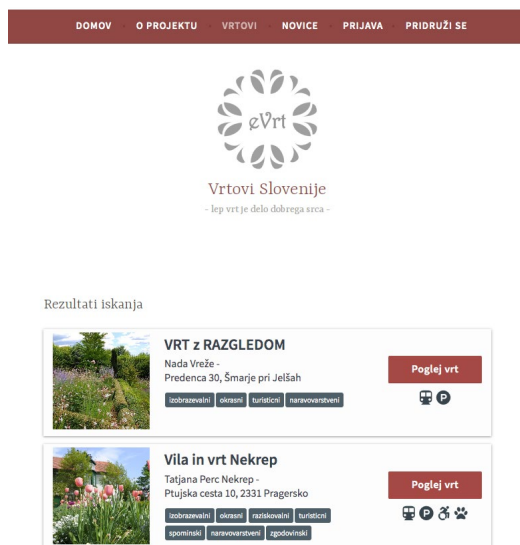


Figure 6. E-garden online platform (own source: TPN)

The project under the specific objective "Promoting flexible learning and supporting quality career guidance for young people at all levels of the education system" was implemented in eight phases:

1. Identification of gardens and development of criteria for educational and living gardens (Figure 7)
2. Analysis of a sample of educational and residential gardens according to predefined criteria (Figure 8, Figure 9)
3. Designing the common external image and user features
4. Creation of an e-Display of each type of garden according to the requirements and possibilities of the IT platform.
5. Design of an information platform with user functions for educational and living gardens
6. Creation of an information platform with pilot examples of educational and living gardens
7. Testing the IT platform on concrete cases
8. Public promotion of the information platform



Figure 7. Conceptual design of the eVrt platform (own source: TPN)

The Slovenian Gardens Database has been launched and has great educational and tourism potential.



Figure 8. Dole Training Ground, International Centre for Subsistence (own source: TPN)

The information gathered in one place is useful in the educational process at all levels from kindergarten to university. Schoolchildren and teachers will be motivated to visit gardens in their neighborhood, where they will learn experientially what nature can do.¹¹

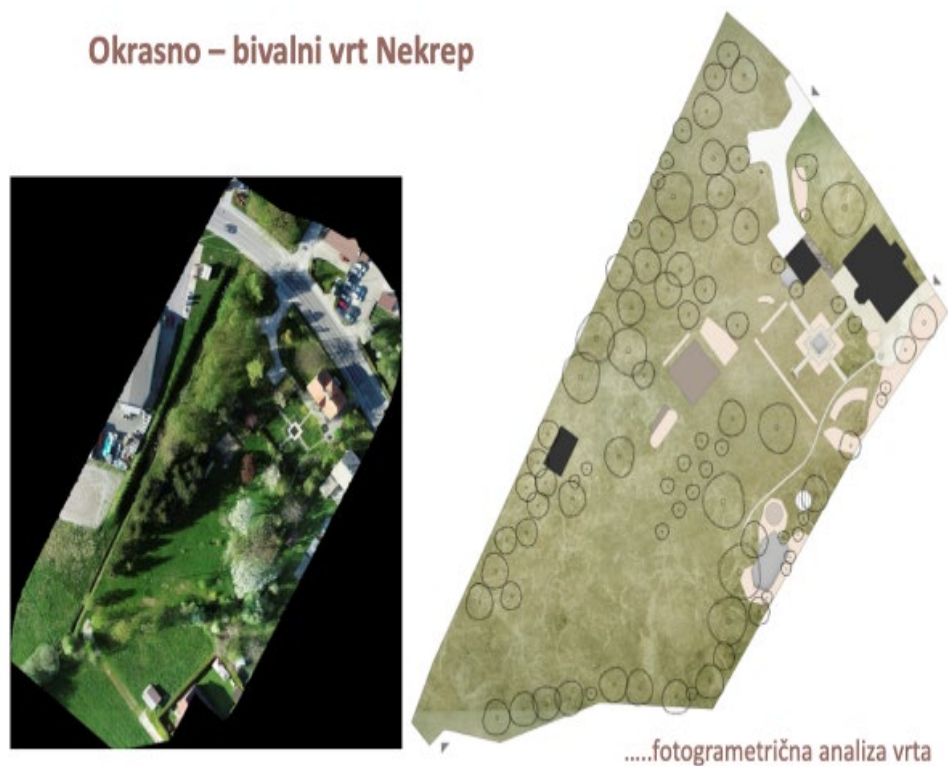


Figure 9. Garden analysis (own source: TPN)

CONCLUSION

The introduction to the thesis asks the questions: what are educational gardens, who are they for? We ask: is experiential learning in gardens accessible and defined? We wanted to know what are educational gardens and who are they for? Based on theoretical knowledge and everyday experience, it is clear that people, especially children and adolescents, are increasingly distanced from genuine contact with nature. We wanted to show that experiential learning in gardens reduces this distance.

A review of the scientific literature has been carried out to explore the field of educational gardens. In recent years, there has been some research on educational gardens in Slovenia, particularly in relation to the participation of pre-school children in school gardens and the progress of children when visiting a botanical garden. The notion of 'new ignorance', which we follow throughout the thesis, is already relevant in the field of pre-school education. It has been shown that, due to the pace of life and the decreasing opportunities for genuine contact with nature, pre-school children do not have a true understanding of plants and nature in general. Research has shown that the active involvement of pre-school children in educational gardens has improved their knowledge of nature. Research also indicates the positive effects of active involvement of children and adolescents in educational gardens in terms of developing emotional competences and personal qualities of individuals.

The phrase "educational gardens" is only just becoming established in Slovenia. We have found that this is an extremely broad field that should be given much more attention and included more specifically in the curricula of primary and secondary schools. Despite the fact that education takes place not only in school gardens, but also in botanical gardens, arboretums and various private gardens, we believe that the educational garden could be included in general education as a very useful outdoor space for learning. Educational gardens are an excellent educational tool that encourages the development of different abilities in children and adolescents. They live in an age - the Anthropocene - where technology is dominant, and they are actually removed from nature. We believe that curricula could define the content to be covered in educational gardens and emphasize the interdisciplinarity of different skills and disciplines. Active participation of children and adolescents in the garden enhances their mental, emotional, social and physical growth.

Gardening symbolizes the power of new life that comes from the child (Figure 10).



Figure 10. Animals in the garden (own source: TPN, illustration by Hana Nekrep)

So, let us take old and new knowledge, let us take up the task of teaching the younger generations to live responsibly with all living beings. In this, educational gardens are a wonderful help and a great pleasure.

NOTES

- ¹ Jean-Jacques Rousseau. *Emil or on Education*. Federation of Pedagogical Societies in Slovenia (1959).
- ² Peter Becker. To be in the garden or not to be in the garden-that is the question here: some aspects of the educational chances that are inherent in tamed and untamed nature. *Journal of Adventure Education and Outdoor Learning*, 15(1). 79-92. <https://doi.org/10.1080/14729679.2014.908514> (2015).
- ³ Peter Becker. To be in the garden or not to be in the garden-that is the question here: some aspects of the educational chances that are inherent in tamed and untamed nature. *Journal of Adventure Education and Outdoor Learning*, 15(1). 79-92. <https://doi.org/10.1080/14729679.2014.908514> (2015).
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- ⁶ Nina Levart. The school garden as a research classroom. University of Maribor. Faculty of Arts, Department of Sociology (2018).
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- ⁹ Dušan Ogrin. Garden art of the world. Pudon Publishing in cooperation with EWO Ljubljana (1993).
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LEARNING FROM...: SITE-SPECIFIC EDUCATION IN A GLOBAL CONTEXT

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INTRODUCTION

When Charles W. Moore took over the School of Architecture at Yale in the 1960s, his ambition was to bring design teaching outside the studio, reacting to a Beaux-Arts atavism that had survived modernism, where design is taught in-vitro within the walls of ivory towers. Initiated by investigating the New Haven social and urban conditions, this pedagogical project would climax with Robert Venturi and Denise Scott Brown's urban design-inspired studio in Las Vegas in 1968 and Levittown in 1970. These systematic explorations of America's backyard, from railways, dockyards, and factories to industrial edges and monumental vernacular, through sketching, painting, photographing, filming, and reading, aimed to steer design education's focus away from architectural forms and toward political space. The ambition was to address the "rapidly developing problems of the urban environment" and relate architecture to a broader culture. Venturi and Scott-Brown's seminal publication "The Significance of A&P Parking Lots, or Learning from Las Vegas" would lead to a series of "site-specific manifestos": Alan Boyarsky's "Chicago A la Carte, the city as an energy system, O.M. Ungers' "Berlin: A Green Archipelago" or Rem Koolhaas' "Delirious New York." In the 21st century, more than fifty years after Moore's pedagogical project, mutating globalization, we are investigating the relevance of site-specific education and its connection with political conditions. Is context still an operative design concept? Can we still learn from the road's vernacular landscape?

We are looking in particular at the context of China, where a new architecture school has been implemented in an American university over the last six years. How do we address the question of a situated education with American heritage on the one hand and the intricacies of the Chinese political environment on the other hand? In the first part, we will examine site-specific knowledge and education in America, from Charles Moore at Berkeley to Rem Koolhaas at Harvard, and its connection to a political backdrop. In the second part, we will see how heritage can become a method to address a new cosmopolitical contemporary context.

ARCHITECTURE PEDAGOGY AND POLITICS IN AMERICA

In retracing the genealogy of the canonical studio on Las Vegas, taught by Venturi, Scott-Brown, and Izenour, architecture historian Eve Blau explores the pedagogical and political context of the 1960s Architecture department at Yale and the influence of Charles Moore's agenda.¹ While still the chair of the Architecture department at Berkeley, Moore developed what he called "a theory of place," notably influenced by John Brinckerhoff Jackson's human geography. In 1962, Moore co-wrote one of his

seminal articles, "Toward Making Spaces," in Jackson's own magazine *Landscape*, where his opposition between spaces and places anticipated the debate around context and neo-regionalism of the 1970s and 1980s, particularly in the pages of Yales's journal *Perspecta*. During his tenure at Yale, between 1965 and 1970, Moore had students engaging with New Haven's urban and historical conditions, reacting both to the beaux-arts in-vitro studio model and modernism's ubiquitous architecture. Contrasting with his predecessor Paul Rudolf, Moore moved the school agenda toward a "concern for the usefulness of architecture in relation to the problems of life (...) in our cities, and in our backwaters locales,"² to quote Roberts Stern's description. The ambition was to address the "rapidly developing problems of the urban environment" and relate architecture to a broader culture. Answering the rapid politicization of American campus in the 1960s (the radicalization of the civil rights movement and the opposition to the Vietnam war being the tip of the iceberg), Moore supported student-led activist organizations engaged with community-design and public education and student's highly political publication *Novum Organum*.³ In this context, his absence of restriction in teaching, his broadening of the curriculum to computers and social sciences, and his interdisciplinary engagement with other design majors such as Graphic Design, reflects his political insight and his pedagogical agenda. In his 1965 essay "You Have to Pay for Public Life,"⁴ Moore took Los Angeles as a clinical case study of post-war urban America, where suburban sprawl, car transportation, and amusement parks redefined the very notion of city and public space, laying out the foundation for the Las-Vegas studio a couple of years later. Venturi, Scott-Brown, and Izenour's studio made the best of the academic freedom and the pedagogical culture laid down by Moore, from its interest in vernacular landscape to the relation between architecture and graphics, while stepping away from the gravitas of Yales' political climate⁵. The success of the studio, and the publication preceding it, led to a following up "Learning from" studio in Levittown and to a whole series of publications such as "Learning from Pop," "Learning from Hamburgers," "Learning from Lutyens" up to the Spanish publication "Learning from Everything."

The original text in 1968 and its publication in a book, including studio output in 1972,⁶ was widely commented on in architecture academia as it was analyzed by Valéry Didelon⁷ and was considered by many, particularly Fredric Jameson,⁸ as the beginning of the postmodern movement. Following Moore's critique of architectural modernism, Venturi and Scott-Brown would become the heralds of site-inspired architecture, converging with the rising contextualism and neo-regionalism trends that would soon come to dominate architectural discourse in the early 1980s as a reaction to the cosmopolitanism and uniformity of the modern movement. If Venturi and Scott-Brown's project claims to be revolutionary, it has been quickly criticized as being Counter-revolutionary, to use Robert Goodman's critique in his 1971 book "After the Planners"⁹ or as an anti-utopian New Utopia for Kenneth Frampton. Thirty years later, Valéry Didelon called it a conservative revolution,¹⁰ as it mainly led to justifying what is already here. The main critique which could be addressed to the "Learning from" project is not its focus on the existing condition or the mundane commercial environment but to look at the vernacular as an extension of the architectural canon, in other words, integrating architecture without architects as a reservoir of forms and ideas, rather than using this knowledge from the field to challenge the very way architects think and design. To quote Jeremy Till, "The title alone suggests an active intention for the high to engage productively with the low, notwithstanding the fact that Las Vegas is not quite normal in the first instance. What happened was that the imagery of the Las Vegas Strip was seized for its aesthetic and formal substance" "In the end, the process is one of reification, both in the original sense of the word—turning something into matter—but also in the Marxist interpretation—that this procedure is also one of commodification. The everyday is raided for its visual stimulus".¹¹

Learning from Learning

During the same historical sequence, Alvin Boyarsky, the then associate dean at the College of Architecture and the Arts at UIC, published *Chicago a la Carte, the City as an energy system*,¹² based on his collection of postcards of Chicago retracing the industrialization of the city from 1902 onward. Boyarsky, influenced by his education at Cornell under Colin Rowe and his experience as a faculty member in the Bartlett school with Reyner Banham, fostered in this publication the urban sensibility of the former and the interest in the industrial imagery of the latter. As Igor Marjanovic explains,¹³ Boyarsky's collection of vintage postcards bridged the early modernist fascination for the industrial vernacular and the late 1960s interest in urban history, themes which would structure his design studios, both at the Bartlett and in Chicago. However, his reading of the city went beyond the formal and artistic aspects of Rowe to embrace its political, economic, and social aspects, influenced by the political climate following 1968. His pedagogical position, bridging the experimental avant-garde and the urban interest of the early postmodern, will be implemented both in his International Institute of Design summer schools between 1971 and 1972 and in his tenure at the Architectural Association from 1972 onward. In 1972, the presentation of Rem Koolhaas Berlin's wall research and his subsequent design proposal on London exemplified Boyarsky's pedagogy.

In 1963, as he was appointed professor at the TU Berlin, Oswald Mathias Ungers developed a series of studios treating Berlin as an urban laboratory. Ungers' pedagogical project inspired Koolhaas to join him at Cornell, where he taught in 1971. Koolhaas' sojourn in the US, in 1971 and 1972, led him to combine Boyarsky's interest in local history through postcard collection with Ungers's treatment of the city as a laboratory, leading a few years later to his collaboration with the latter on a Cornell summer design studio centered around *Berlin: The City Within the City*,¹⁴ and a year later, to his magnum opus, *Delirious New York*.¹⁵ Koolhaas' collaboration with Ungers informed his own design studio twenty years later at Harvard GSD, where he achieved the Venturian project with his *Summa, Mutations, Harvard Project on the City*,¹⁶ and the two following opus *Great Leap Forward*¹⁷ and *The Harvard Guide to Shopping*.¹⁸ From New York to Berlin, passing by Shenzhen, Atlanta, Lagos, and Singapore, Koolhaas drained the recipe developed by Venturi, Scott-Brown twenty years later without departing from its ideological premise: a conservative justification of existing conditions, an endless and hegemonic extension of the architectural canon, and the treatment of the vernacular as a reservoir for architectural ideas, forms, and materials.

With *Delirious New York* and *Learning from Las Vegas*, Venturi, and Koolhaas left us the most famous retroactive manifestos, or what Sebastien Marot calls "situated manifestos,"¹⁹ but it was at the cost of the ambitious pedagogical projects set up by Moore, Boyarsky, or Ungers.

Uses and Abuses of Context

The subtext of this pedagogical fable is the rise of the notion of context as an answer to the modernist project. Inspired by literary study, the notion of context was imported into architecture in the 1950s to describe the relationship between a building and a particular historical and urban condition, similar to a word in a sentence and a sentence in a book. If for Adrian Forty, the architectural interpretation of context is credited to Ernesto Rogers' "Ambiente" or "Preesistenza ambientali,"²⁰ then for Valery Didelon,²¹ the first occurrence is to be credited to Venturi in his 1950s Master Thesis "Context in Architectural Composition." Canonized by Rowe in the 1960s in Cornell, it became a trope of postmodern production and a design gimmick at the end of 20th-century and early 21st-century global architecture. Similar to the conceptualization of the vernacular promoted by Venturi and Koolhaas, the notion of context reified the local condition into a commodity at the service of place marketing or populist political agenda. Analyzing critical regionalism, a concept which followed a fate parallel to

Learning from, as well as the notion of concept, Carmen Popescu²² talks about the flattening of history, a supplanting of time with space, appealing both to the myth of the timeless in modern architecture and the populism of vernacular sentimentalism. While attempting to address the crisis of meaning brought by modern architecture and the homogenization brought by globalization, critical regionalism, or "contemporary regionalism" as Keith Eggner²³ calls it, romanticizes the vernacular and absorbs it into a global image defined by a neo-imperialist architectural discourse or a local chauvinist one.

The idea of learning from, or situated discipline, not as a reification of the vernacular but as it was established by Moore, the notion of *Preesistenze ambientali* as described by Rogers and interpreted by Vittorio Gregotti in his seminal essay *The Territory of Architecture*,²⁴ and the critical version of regionalism explored by Lewis Mumford in his 1941 essay *The south in Architecture*²⁵ might help us to redefine these notions in a 21st-century context, beyond the parochialism of the postmodern moment, from Venturi to Koolhaas.

Emergent notions might help us to redefine what Donna Haraway calls "Situated Knowledge."²⁶ The concept of "Cosmopolitics," as developed by Isabelle Stengers²⁷ or Bruno Latour,²⁸ might help us to redefine the relationship between architecture and the built environment and design practice with global challenges beyond the local/global dialectics, as Albena Yaneva has shown²⁹ in the eponymous book. French Geographer Augustin Berque,³⁰ in his interpretation of the notion of landscape, brings the conceptual tools to bridge human and natural history, while the anthropologist Phillipe Descola³¹ interprets the Levi-Straussian structuralism tradition to deconstruct the opposition of nature and culture.

AN AMERICAN (INSTITUTION) IN CHINA

In this pedagogical and intellectual context, we started an architecture program at an American University in China six years ago. From the origins, the ambition for the School of Public Architecture on the Chinese campus of the Michael Graves College, Kean University, was "to be a 'first-person' education: learning by direct engagement, observation, documentation, and analysis of the places, spaces, buildings, and experiences that form the built environment – and through discussion with the general public that uses them."³² as the founding dean David Mohny describes it. As such, the school has aspired to engage with local conditions, both physical and social, while avoiding both the neo-imperialism of the discipline and the regionalist reification of the context. Learning from Sciences and Technology Studies, Donna Haraway uses the term "situated knowledge" to describe this form of site-specific perspective, a "particular and specific embodiment, (...). In this way, we might become answerable for what we learn how to see."³³

To develop this pedagogical idea and simultaneously explore the political dimension of the public mission of the school in a diplomatically sensitive context, we took the given conditions as a laboratory, following Ungers' Experiments in Berlin. The campus was established in Wenzhou, Zhejiang, 400 kilometers south of Shanghai. Located in the city's urban fringes, ten miles south of the historical core, the campus sits on three historical settlements, two of which have been preserved thus far. From year one, we used one of the villages, Wangzhai, as the support of the teaching for the students, having them document the vernacular architecture to learn about architecture and construction and using it as a studio site. This led us to develop a research project based on the village, training students in historical investigation, photogrammetry, and ethnography. In 2020, we were asked to work on the campus extension plan for Wangzhai Village, and in 2021 we proposed a preservation project for the village's urban fabric. Finally, last year, we bid with a local real estate investor for the adaptive reuse of the village.



Figure 1. Preservation Plan for Wangzhai Village (Drawing: Huang Tieru)

In studying the very localized villages and conditions around our immediate campus area, students have also been able to tap into broader issues that affect China as a whole. As cities play an increasingly important role in the development of China and its approach to industrialization, new questions arise over the role that the countryside will play in the future. It is also apparent that "rural" cannot be understood in the same way in China as it is in the West, where rural is somehow the "non-urban" and the urban is the "non-rural." Rather, they are fundamentally linked, and solutions in the countryside must be approached at multiple scales. The question is, as 400 million people move from the countryside to the city in the next century in China, how will people inhabit the landscape?

A pertinent question tied to the issue of rapid urbanization, and the transition from an agrarian society, has been that of large-scale demolition. This process has dramatically impacted Chinese society and has particularly been felt at the fringes of expanding urban areas, impacting migrant workers and dispossessed farmers. Much of our pedagogy has focused on this issue, reworking and investigating the traditional divisions between town and country while tapping into the collective experience of such significant and rapid transformations. In this context, students must think beyond the building, from the scale of the household to the province.

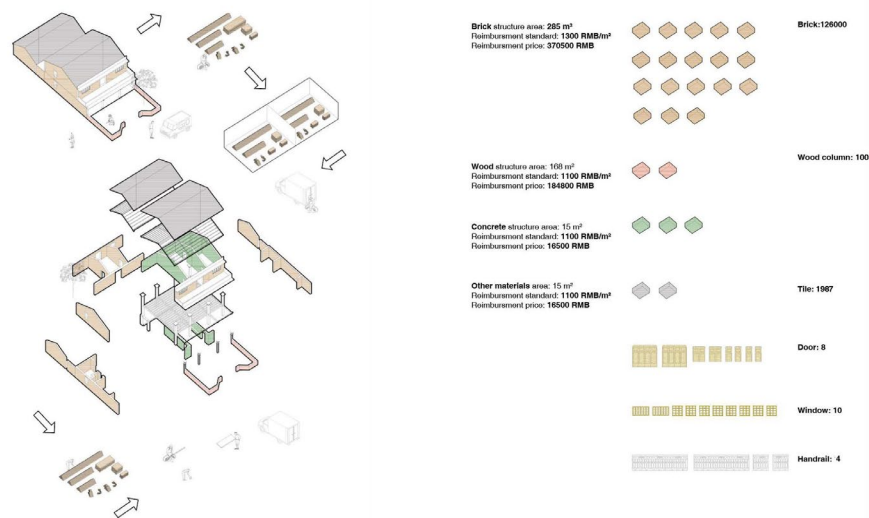
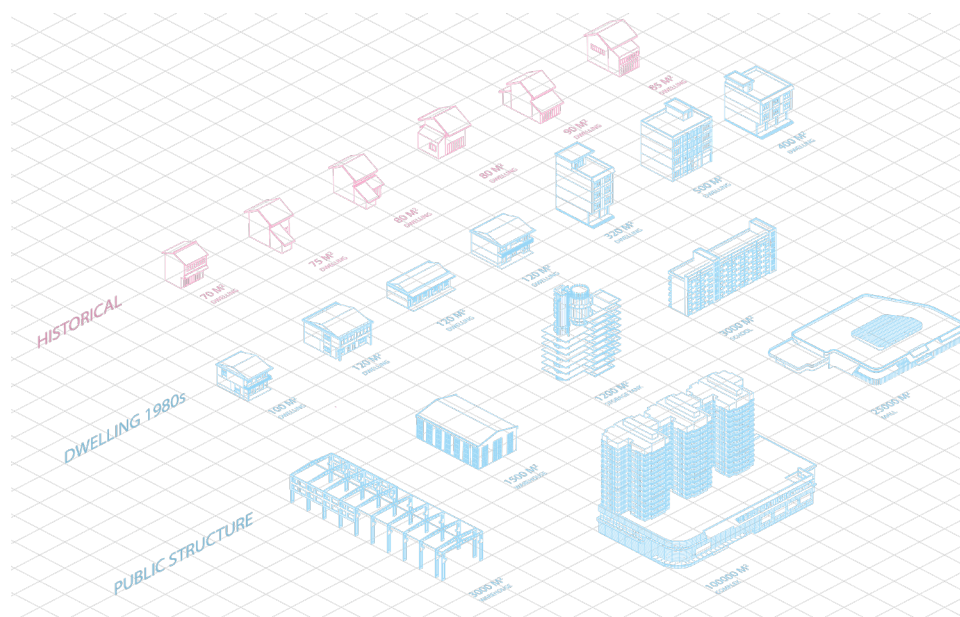


Figure 2. Analysis of Houses' Materials (Huang Tieru)

In Huang Tieru's project, a careful analysis of the village houses was done to identify materials and architectural elements that frame everyday life. Instead of being shattered, burned, or buried in landfills, she proposed a new demolition process in which the architect may act as a mediator between the demolition industry and the developer. The project reinterpreted architectural moments in one villager's life with demolition and new materials, revealing the issues and opportunities presented during the demolition process, and concluded in an exhibition format to bring collective consciousness to determine what architecture should or can do. She called it a "Demolition Recital" as a means to consider the demolition process as a performance and the fragments as having a new type of value through their transformation, processing, archiving, and retrieval.



Chen Yiding considered the scenario where even the most generic of structures were not demolished at all but were rather valued in a more nuanced way. Could an abandoned shopping mall become housing? Could an abandoned skyscraper become a school? Yiding conceived of a new matrix to evaluate existing buildings as a way to take a more surgical approach to the adaptive reuse of the built environment in China. Methods of preservation, transformation, demolition, and addition could be combined depending on existing and future types.

CONCLUSION

In the fall of 2001, a month after the September 11 attacks, which contributed strongly to the global political instability of the early 21st century, a retrospective exhibition on the pedagogical and design work of Charles Moore opened at Yale. Titled "Architecture or Revolution" and curated by Eve Blau, it replaced Moore's project within the political context of the time. Twenty more years later, there is still much to learn from Moore's Yale, both for its innovation and experimentation but also for its political dimension and engagement with the local condition. Facing environmental, cultural, technological, and political challenges will require both students and instructors to dig into the complexity of the place.

NOTES

- ¹Eve, Blau, "This Work Is Going Somewhere: Pedagogy and Politics at Yale in The Late 1960s." *Log* 38 (2016): 131–49.
- ² Robert A.M. Stern, *New Directions in American Architecture* (New York: George Braziller, 1969), 78 cited in Blau, 135
- ³ Blau, 140
- ⁴ Charles Moore, "You have to Pay for Public Life" in Kevin Keim Ed. *You Have to Pay for Public Life, Selected Essays of Charles W. Moore* (Cambridge M.A.: The MIT Press, 2001), 111-141
- ⁵ Denise Scott Brown, "On Formal Analysis as Design Research", *Journal of Architectural Education* 32:4 (1979), 9-11
- ⁶ Robert Venturi, Scott Denise Brown, and Steven Izenour. *Learning from Las Vegas* (Cambridge, M.A.: The MIT Press, 2017).
- ⁷ Valéry Didelon. "L'affaire Learning from Las Vegas : Productions et réceptions (1968-1988)." (Ph.D Thesis, Université Paris 1 Panthéon Sorbonne, 2010). <https://hal.science/tel-01587899/>
- ⁸ Cited in Didelon, 246
- ⁹ Robert Goodman, *After the Planners* (New York: Pelican Books, 1971), 164
- ¹⁰ Valéry Didelon, Denise Scott Brown. "Learning from Las Vegas: manifeste retroactive du suburbanisme", *EAV* (Ecole nationale superieure d'architecture de Versailles), 2006. Halshs-02297057, 7
- ¹¹ Jeremy Till, *Architecture Depends* (Cambridge, M.A.: The MIT Press, 2009) 138.
- ¹² Alvin Boyarsky, *Chicago à la carte, The City as an Energy System* (London: Architectural Design, 1970)
- ¹³ Igor Marjanovic, "Postcards and the Making of Architectural History: The Cases of Alvin Boyarsky and Rem Koolhaas", *98nd ACSA Annual Meeting*, 2004. And Igor Marjanovic, "Cheerful Chats: Alvin Boyarsky and the Art of Teaching Critical Architecture", *93rd ACSA Annual Meeting Proceedings, The Art of Architecture/The Science of Architecture*, 2005.
- ¹⁴ Florian Hertweck, Sébastien Marot, O. M. Ungers, Rem Koolhaas, Peter Riemann, Hans Kollhoff, and Arthur Ovaska. *The city in the city: Berlin: A green archipelago* (Zürich: Lars Müller, 2013)
- ¹⁵ Rem Koolhaas, *Delirious New York* (New York: The Monacelli Press, 1994)
- ¹⁶ Rem, Koolhaas, Stefano Boeri, Sanford Kwinter, Nadia Tazi, and Hans Ulrich Obrist. *Mutations: Rem Koolhaas, Harvard Project on the city* (Barcelona: Actar, 2000)
- ¹⁷ Chuihua Judy Chung and Rem Koolhaas Eds. *Great Leap Forward* (Köln: Taschen, 2001)
- ¹⁸ Rem Koolhaas. *The Harvard Guide to Shopping. Cambridge* (MA: Harvard University Graduate School of Design, 1998)
- ¹⁹ Sébastien Marot, "Reminder" in Hertweck, 7.
- ²⁰ Adrian Forty, *Words and Buildings, A Vocabulary of Modern Architecture* (London: Thames & Hudson, 2004) 132.
- ²¹ Didelon, 30.
- ²² Carmen Popescu, "Flattening History. A Prequel to the Invention of Critical Regionalism" *Critical Regionalism. Revisited*, OASE, 103, 49–53. Retrieved from <https://www.oasejournal.nl/en/Issues/103/FlatteningHistory>
- ²³ Keith L. Eggener, "Placing Resistance: A Critique of Critical Regionalism." *Journal of Architectural Education* 55, 4 (2002): 228–37. <http://www.jstor.org/stable/1425724>.
- ²⁴ Vittorio Gregotti, *Le Territoire de l'Architecture. Suivi de vingt-quatre projets et réalisations* (Paris: L'Equerre, 1982)
- ²⁵ Lewis Mumford, *The South in Architecture* (New York: Harcourt, Brace and Company, 1941)
- ²⁶ Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14, 3 (1988): 575–99. <https://doi.org/10.2307/3178066>.
- ²⁷ Isabelle Stengers. *Cosmopolitics* (Minneapolis: Univ. of Minnesota Press, 2011)
- ²⁸ Bruno Latour. "Whose Cosmos, Which Cosmopolitics?" *Common Knowledge* 10, 3 (2004): 450–62.
- ²⁹ Alben Yaneva and Alejandro Zaera-Polo Eds., *What is Cosmopolitical Design? Design, Nature and the Built Environment* (London: Routledge, 2015)
- ³⁰ Augustin Berque. *Thinking through landscape* (London: Routledge, 2013)
- ³¹ Philippe Descola. *Beyond nature and culture*. Trans. Janet Lloyd (Chicago: The University of Chicago Press, 2014)
- ³² David Mohny, "Architecture Program Report for 2019 NAAB Visit for Initial Candidacy", Wenzhou-Kean University, Michael Graves College, Accessed June 29, 2023. <http://design.wku.edu.cn/wp-content/uploads/2020/12/WKU-NAAB-APR-IC-final-06-12-19.pdf>

³³ Haraway, 583.

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INTEGRATING SUSTAINABILITY WITHIN BUILT ENVIRONMENT HIGHER EDUCATION

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INTRODUCTION

Driven by the climate emergency and urgent need to consider a sustainable future for all, it has become essential that Higher Education (HE) incorporates sustainable development within their curricula, primarily known as Education for Sustainable Development (ESD).¹ It appears that institutions are under pressure to integrate ESD, along with its concepts, across diverse courses and disciplines to embed the key principles of sustainable development. There are further suggestions that students could also be a driver for ESD within their learning² and have a desire to understand sustainable development within their HE courses.³ As the construction industry is one of the highest emitters of direct and indirect carbon, as well as a sector facing pressures to implement sustainable practices within its strategies and methods of working, this investigation focuses on Built Environment courses within HE.

Education for Sustainable Development (ESD)

Also referred to as Sustainability in Higher Education (SHE),⁴ ESD and its ideas align with the seventeen UN Sustainable Development Goals (SDGs). The foundations and ideas associated with ESD stem from the need to focus on overcoming the challenges to meeting sustainability, along with being linked to raising awareness and develop knowledge for sustainable action.⁵ This research combines ideas of ESD to suggest the concept aims to empower learners and provide students with the knowledge, skills, values and agency to make informed decisions for a just society, environmental integrity, economic viability and encourage innovative solutions.⁶

Embedding Education for Sustainable Development within Higher Education

For the integration of ESD, sustainable development or sustainability within HE, there is guidance that suggests the need for practitioners to be innovative with their pedagogy⁷ or alter their pedagogical practices⁸ and approaches to teaching.⁹ Similarly, there is advice that suggests changes are required to the education system for effective integration of sustainability within the curricula.¹⁰ What much of the literature suggests in terms of effective application of ESD within the curricula, is innovation within and changes to teaching practices in a variety of forms.

There is a great deal of work that has studied the requirements by practitioners and institutions for the successful integration of ESD within HE. Many of these studies have also discussed how to apply ESD, as well as the challenges of embedding the concepts within HE and teaching. The literature can

be split into three key themes that can be actioned for the integration of ESD within the curricula: adaptations to teaching practices; perceptions, knowledge and attitudes of the practitioner; and the approach to integration.

A large part of the prevailing literature discusses adaptations to pedagogical practices, which can involve deep learning, reflection on action, independent learning, seeking or enhancing intrinsic motivation of the student and diverse learning environments.¹¹ Further, there has been interest and research that focuses on the practitioner, along with their values, perhaps influence and the assessments provided for students studying and engaging in ESD.¹² There appears to be mixed views of sustainability by practitioners, as well as diverse attitudes and knowledge on the subject by those within the teaching environment. Literature suggests that a lack of value for sustainability by the practitioner can lead to a lack of engagement with the subject by students. Finally, prevailing literature touches upon the need to pay attention to the approach adopted for embedding ESD within education, where the ‘bottom-up’ approach is suggested successful for ESD integration within practice.¹³ The bottom-up approach to embedding ESD within the curricula focuses on the students, as well as the practitioner. Ideas around this approach highlight that students become central to the ESD learning process and become active players.¹⁴

There is previous research on approaches to the integration of ESD within the curricula, along with optimism towards the adoption of a bottom-up approach. There are, however, few studies that highlight what a bottom-up approach consists of, as well as a lack of clarity to the type of activities associated with this approach. There is a need to understand actions that could be adopted by practitioners for a bottom-up approach. In addition, there appears little knowledge or research that discusses successful integration of ESD from the views of the student. As the approach focuses on students being central to the process, it would be of value to gain insight of student attitudes towards sustainability, in addition to perceptions of possible bottom-up approach actions. This would extend existing literature on student perceptions of sustainability,¹⁵ as well as provide further insight on student opinions of possible practices for developing engagement of sustainability and ESD.

RESEARCH DESIGN AND METHODS

The investigation consisted of a qualitative study, which adopted an interpretivist approach to the research. Secondary data was obtained through a review of existing literature and previous research on the topic, mainly relevant journal articles, organisational reports and educational documentation. Primary data collection consisted of two semi-structured interviews with key actors surrounding the integration of ESD within HE and sustainable development within the local area, consisting of a university (HE) professor and member of the local authority (LA). Semi-structured interviews offered a degree of flexibility to the interviewer to ask the range of open questions on the interview schedule, prepared and pretested prior to the interview, as well as freedom for the interviewee to provide a detailed and open response.¹⁶ Interviews were conducted online via Microsoft Teams and were thirty to forty-five minutes in length. Each semi-structured interview was recorded and transcribed verbatim. Following the interview, transcripts were sent to interviewees for verification.

Primary data was also carried out through student focus groups to understand student perceptions and experiences of ESD in HE. A focus group allows participants the freedom to provide unique viewpoints and shape conversations that can be related to sensitive topics.¹⁷ This method was chosen to encourage open discussion and insights on teaching and learning previously experienced, as well as identify any diversity or consensus in student opinions. Two student focus groups, consisting of twenty-four and twenty students were carried out. The research project and its aims were described to participants prior to the focus groups, rapport was built with the students and open conversation was

encouraged prior and during the focus groups.¹⁸ Notes were also made by the facilitator during the conversations.

Ethical procedures were carried out prior to primary data collection. Information sheets and consent forms were sent to participants before the interviews and focus groups. The forms explained the research being conducted, the process of data collection and how the data would be used. Confidentiality and anonymity of responses were emphasised, as well as the opportunity to withdraw from processes at anytime. Consent forms were signed by participants of the focus groups and interviews and returned before primary data was collected. Data analysis consisted of content analysis, identifying themes from within the primary data, guided by both the themes from the literature and aims of the study.

RESEARCH FINDINGS

Understanding of Sustainability

Existing research attempts to understand the meaning of sustainability, as well as gain foundational insights on students' existing knowledge on the topic, as it can influence teaching practices.¹⁹ The research evidenced university students' understanding of sustainability was primarily linked to the environment or environmental element of sustainability. Similarly, both interviewees, the HE Professor and the LA officer, connected sustainability to its environmental aspects, as well as the social elements of sustainability, when asked their understanding of the term. Student focus groups further connected sustainability to the environment by offering examples such as waste management and recycling. In addition, sustainability was further connected to the community when discussing its meaning and the 'social pillar' (LA officer) as the 'community have a stake in things' (HE Professor). This theme was emphasised in both interviews, where there was a suggestion to link the community, HE Institutions and the local government. Challenges around how this could be facilitated were discussed, but the advice was to consider it when embedding ESD into teaching. Finally, the empirical work in this research adds the association of 'culture' to the ideas around sustainability, as well as sustainability being linked to 'being considerate' (LA officer). These insights resonate with the literature that claims a dominant focus on environmental sustainability, but also ambiguity in meanings associated with the term.²⁰

Along with a diverse range of ideas associated with sustainability, the empirical findings highlighted a lack of understanding of the meaning of sustainability from students, as well as little experience of the topic prior to studying at university. This was demonstrated by students stating 'I wished I had known more about it [sustainability] at school' and 'I had heard of sustainability, but didn't really know what it was.'

Attitudes towards Sustainability

A strand within the existing literature places value on understanding student opinions of sustainability for the adoption of ESD and to engage with students during practice. The LA officer also emphasised the need to acknowledge student opinions for a valuable student experience. For the consideration of practice and integration of ESD, previous literature suggests a resistance by students to the adoption of behaviours associated with sustainability.²¹ Similar, empirical insights from this investigation engaged in conversations that suggested people are not taking sustainability seriously, but the interviewee was unsure of whether it is awareness or other priorities. A theme in the discussion questioned the importance of sustainability to individuals.

In contrast, interviews demonstrated thoughts around the way in which attitudes and behaviours associated with sustainability are changing. The focus group also reiterated this, where students

stressed motivation to understand more about sustainability, along with suggesting ways to do it (see below). There was an emphasis on learning more around the topic. Drivers for student desire to incorporate ESD within the classroom were linked to employment prospectus, but also a personal aspiration to understand sustainable actions. The latter correlates with the literature, where a personal desire to learn about sustainability was evident.²²

It is essential to further highlight where conversations gave insight on attitudes of how sustainability and ESD should be taught and integrated within the curricula. As suggested by the HE Professor ‘...ideally we shouldn't have a course on sustainability. We should have it integrated fully into everything that we do...it is a way of thinking.’ This quote emphasises a deep learning approach, the need for students to have an understanding of why there is a need to study sustainability, in addition to the depth of the area for study.

A Bottom-up Approach

One of the key aims of this research was to enhance understanding of a proscribed approach to embedding ESD and sustainability within the curricula, more so to give insight into the practices that can be used within the classroom. A common theme evidenced throughout the investigation, both primary and secondary data, was the need for students to become active players, as well as making students central to their education. As suggested by the HE Professor, one way of motivating the student to become more active in their learning is to ‘give them a voice’ and ‘air their views.’ The LA officer adds by suggesting appropriate methods for use, such as the adoption of activities that ‘encourage debate in the classroom’ and ‘promote student views.’ Finally, when placing students at the centre of learning for ESD, empirical data indicates the importance of allowing the students to ask the questions. As stressed, ‘getting them [students] to recognise that they don't always have all the answers...questioning all the time what is required, what do we need? Why? Why are we doing this? Why do I have to do it this way?’ (HE Professor). This statement possibly drives curiosity to understand sustainability at a personal level, encouraging interest in what students learn.

A second theme that emerged within the investigation was linked to the type of learning for students, more specifically ‘real-world learning’. This was further extended within the primary data as learning and assessments were linked to ‘something concrete,’ as explained it can be linked to students visualising the theory of what they are doing, identify challenges and offer the reality of the real world. This finding resonates with existing work, which also suggests the need for real-world assessments to support and enhance learning ESD.²³ In reference to the Built Environment practice and teaching, creating bespoke assessments linked to building projects or construction organisations may not be new. What appears novel in this research, however, is connecting the bespoke assessments and learning to visibility for the students, or relatable, perhaps to an ongoing development within the local area. As an interviewee suggested there is desire for ‘visibility of the details in practice.’

The focus groups gave further meaning and insight to ‘real world learning’ from students’ point of view. Discussions with students were around assessments and learning activities that would be of value to their education regarding sustainability. There was a desire to learn about practice, as stated ‘I know the theory but do not know how to apply that in the job’ and ‘I want to see the process and experience the physical.’ Conversations were around questioning what the university was doing to meet sustainability targets. There was an awareness of actions by the university, but little knowledge of what these actions consisted of.

Another dominant theme within the investigation was the focus on community or ‘the community involvement approach’ (LA officer) within education. Both interviewees mentioned involving the community within teaching and practice, where conversations were around bringing together the

community, the local authority and HE institutions. Suggestions were associated with integrating community projects in assessments, talks that involve insight from the community members and specific case studies around communities that may be well known or visible within the area. As stated, there is a need for ‘...a kind of interested connected community...a community event...’ (LA officer) as the community have a ‘useful input’ (HE Professor). Similar to other bottom-up approaches, there were conversations that discussed challenges of community engagement and the need to consider how to actually do it successfully within practice, connecting institutions, the community and the local authority.

CHANGES TO PRACTICE

The research findings highlighted a number methods that could be adopted to embed ESD within the curricula, as well as further actions that could be integrated within and around the classroom to implement a bottom-up approach.

Visibility of Sustainability in Practice

The research highlighted a demand for practice to be visible, for students to see and explore how sustainability is integrated, as well as learning from real-life experiences. As explained by the HE Professor, there are ways in which practice can include the university community within the classroom. A bottom-up approach, such as use of university departments, e.g. the School of Estates, Energy Officers and catering, can be incorporated within the classroom and assessments. It may also be the case where students can conduct interviews with these departments to analyse and understand what the university is doing to incorporate sustainability. This action for sustainability can further connect to offer students a voice (see below). It allows students to be at the centre of decisions and encouraging their own evaluation of sustainability strategies.

Giving Students a Voice

The investigation evidenced the consideration of encouraging debates in the classroom and allowing students to voice their opinions for the integration of ESD within HE. Further research has also suggested the creation of student Sustainability Ambassadors within a cohort or course, as demonstrated by other institutions. Similarly, this enables responsibility and ownership by the student, which may involve decisions for teaching and activities for ESD.

Community Involvement

The study further emphasised the need to involve the local community within the classroom and teaching practice of ESD. As adopted by another HE institution, the CityStudio concept is a framework that can connect the university, local government and the community. Students are provided with the opportunity to interact with the community and ask what projects could be of benefit to enhance sustainability, social, economic and environmental within the local area. It is the co-design between students and the community that make this concept unique. The CityStudio framework enables empowerment and ownership for the students, as well as involvement of the community. This sense of student desire of ownership within the classroom, learning and assessments resonates with previous studies.²⁴ Following discussions of the framework with academics, the consideration of enabling benefits to both the students and the community was highlighted as essential.

CONCLUSION

As it becomes essential to embed sustainability and ESD into the curricula, there was a need for research to provide insights into the adaptations to pedagogical practices and actions for the integration of a bottom-up approach. Through discussions with an institution, the local authority and students within Built Environment education, as well as a review of prevailing literature, the investigation highlighted diversity in ideas of sustainable development, from a dominant focus on environmental sustainability, to culture and being considerate. The research further gave insight into the desire from students to learn about and understand sustainability, from personal motivation, as well as employment opportunities. The investigation also provided insight into the prescribed innovative pedagogical practices, methods to encourage active learning by the student, along with actions to incorporate the bottom-up approach within teaching practices. Finally, the study advises the incorporation of visibility of sustainability in practice, allowing students to have a voice for ESD development and effective learning, as well as an involvement of the community within practice.

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CHANGING DESIGN PEDAGOGIES WITH EMERGING TRENDS OF PERI & POST-PANDEMIC WORLD

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INTRODUCTION

Design education needs to respond to the increasing complexity and systemic transformations of the professional realm with a progressive, innovative, dynamic outlook which morphs into new formats swiftly. Embracing new pedagogies in light of modern necessities, design movements and trends within technological, social, and cultural domains is crucial to the progressiveness of academia. Some of the recent adversities due to pandemic, economic downfalls, shortages and now AI's inception brought new perspectives to design education by implementing new or revised methodologies in design thinking, problem-solving, collaboration and interaction. Taking these into account, this paper focuses on the latest developments in design field while examining different methodologies and pedagogies to cope with numerous drawbacks, emerging trends and demands. Design and learning processes discussed in this paper propose new approaches for employing new methodologies and pedagogies in design education as well as attaining sustainable and enriched academic experiences.

LIT-REVIEW FOR DESIGN EDUCATION

Design education relies heavily on concepts such as design thinking, motivating curiosity, cultivating debate, and creating free-and-critical thinkers. Design is always defined to be a shared activity and so design education should follow suit. One of the design areas this paper analyse is Industrial Design. This area offers multiple relevant disciplines such as interaction design -UI/UX-, service design and strategic design that would require not only broader understanding of the concepts of this paper but also the necessity to research and build an understanding throughout the educational timeframe. Design students are trained to holistically approach the user, exploring users in the context of everyday life. They are trained to visualize the intangible, and to find integral solutions addressing all stakeholders that interact with the solutions over its lifetime.¹ In order to achieve these objectives, Baynes and Baynes discuss the aims of design education by emphasizing two main approaches. Design education has always found itself squeezed by subject rivalries and by two apparently conflicting goals. They question if priority should be given to nurturing future design professionals or to providing the mass of people with access to 'designerly' skills and knowledge about design. They claim that the response to this dilemma has generally been to go for a watered-down version of professional design education. This top-down approach has led to some excellent practice and particularly at the upper end of secondary schools allows gifted students the opportunity to do outstanding work.² According to Dewey, there are two sources of knowledge for an individual: one is

goal-directed and the other acquired from student interaction with the environment.³ Owen identifies that ‘design thinking is in many ways the obverse of scientific thinking. Where the scientist sifts facts to discover patterns and insights, the designer invents new patterns and concepts to address facts and possibilities. He also establishes two ways creative people work. He recognizes ‘finders’ and ‘makers’. Finders exercise their creativity through discovery and are driven to understand and find explanations. Professionally, they typically become scientists or scholars. Makers are creative in a different way and demonstrate this through invention, construction, composition and developing new concepts. They typically become designers, engineers, and artists.’⁴ There should be an overlap in the design education to get the best of both worlds.

Old and New Paradigms of Design Education

Since Walter Gropius’ ‘1922 Bauhaus Curriculum Wheel’, which is one of the oldest established methodologies and systematic pedagogies in Design Education, only a few things changed in terms of applying different pedagogies in design education. Most of these were technology-driven rather than cognitive, many of which improved academia’s credibility by staying current with technology and applications while still being compatible with the industry’s demands and expectations.

Wake approaches to paradigms by stating that the basic problem-solving methodology consists of five steps, namely, reduction, selection, application, integration and testing, with three additional steps of paradigm superimposition, paradigm shifts and category shifts.⁵ As a precedent, Industrial Design education requires that students become trained in both rationality and free creativity. Problem-finding has become equally important as problem solving and solution detailing.⁶ Building on Don Fabun assembled characteristics of the creative individual, Owen nominated crucial concepts in today’s design education which are: conditioned inventiveness, creative thinking for designers, human-centered focus, environment-centered concern, ability to visualize, tempered optimism, bias for adaptivity, predisposition toward multifunctionality, systemic vision, view of the generalist, ability to use language as a tool, affinity for teamwork, facility for avoiding the necessity of choice, self-governing practicality, ability to work systematically with qualitative information.⁷ Baynes and Baynes also argue that in the light of the problems facing humanity, our current approach to the curriculum is fatally flawed. He claims that we continue to emphasize the acquisition of knowledge rather than the exercise of the imagination; continue to emphasize the acquisition of knowledge rather than the creative application of knowledge; continue to emphasize knowledge of the past at the expense of learning how to shape - and control - the future.⁸ To this extent, design education needs to refocus to the old and the new paradigms of the design world with technology and advancements on one hand and human requirements and capacities on the other.

Durling et al observe that the designers prefer teaching that begins with the big picture and then explains details, focuses on future possibilities, and gives alternative viewpoints. It has a lightweight structure, allowing for guided exploration, and predominantly shows objective data, is logical and analytical, and is based on demonstration examples.⁹ Whereas the theoretical framework of William Perry, based on his studies of undergraduates, is a sequential continuum that describes how college students view the nature of knowledge and the process of learning. The scheme consists of four states of students’ experience, namely dualism, multiplicity, relativism, and commitment.¹⁰

Various models, for critical design thinking and design processes, were explored with linear, non-linear, and circular approaches. Collaborative design approach between academia and industry benefited immensely from a non-linear approach.

The Non-Linear Nature of Design Thinking Approach and New challenges are outlined by Pontis and van der Waarde with direct and linear design thinking processes in which one stage seemingly leads

to the next with a logical conclusion. However, in practice, the process is carried out in a more flexible and non-linear fashion.¹¹ Design process is claimed to be conducted more than one stage concurrently, or by collecting information and prototype during design processes, to enable students to bring their ideas to life and visualize the solutions. The majority of US design schools are developing new academic practices that respond to a new set of knowledge and skillsets demanded by the globalized design industries.¹² Faern voices another concern in US Design Education by stating that in order to provide students with skillsets, design schools are increasingly shifting their curricula emphases from technical and tactical skills to those that prioritize the development of students' conceptual and speculative thinking, understanding of research methodologies, design processes, and interdisciplinary practices. Despite this evolution occurring across US design higher education, the nation's pre-college art/design education has remained unchanged for decades; curricula remain focused on honing students' vocational and technical skills - such as drawing perspective, craftsmanship, and digital aptitudes - rather than introducing and developing the aforementioned skillsets prioritized in design schools and sought by design industries.¹³

There is a strong body of research that suggests design education relies heavily on cognitive and emotional parameters. Mental and physical health; academic development; identity development; social emotional and cognitive development become the objectives. According to Tyng, Amin, Saad and Malik, emotion has a substantial influence on the cognitive processes in humans, including perception, attention, learning, memory, reasoning, and problem solving. Emotion has a particularly strong influence on attention, especially modulating the selectivity of attention as well as motivating action and behavior. Some studies report that positive emotions facilitate learning and contribute to academic achievement, being mediated by the levels of self-motivation and satisfaction with learning materials.¹⁴ Evidently, without these emotions, learning would not be fulfilled and would not turn it to memory that is needed for design education.

These findings suggest that design educators should reconsider strategies for interacting with students and other faculty. In light of the lit-review and analyses of various approaches, some critical concepts for design education are suggested - as diagrammed in Figure 1.

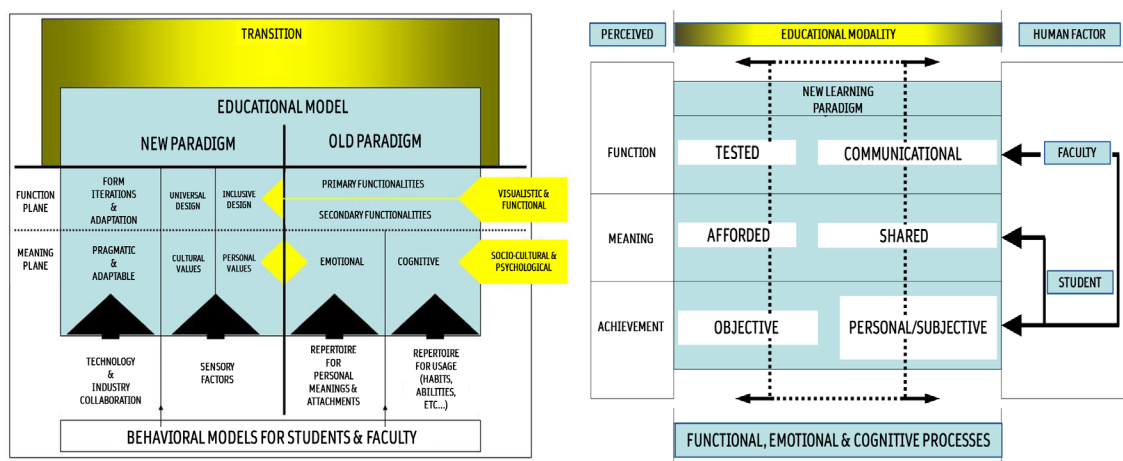


Figure 1. Analysis of old and new paradigms of educational models in design education.

Challenges with Remote and Hybrid Modalities - and now with AI

It is found out that during hybrid and remote working, remote workers decreased “time spent working” and instead increased their time spent on “leisure and sleeping”.¹⁵ Concurrently, digital environment opens up the question of design representation. New modes of design representation emerged from digital media, enabling visualization of different kinds of data.¹⁶

There are also important developments in terms of Artificial Intelligence applications that entered the design education, both from faculty and student standpoints. This new paradigm is creating various deliberations as to how AI to be implemented in academia. European academia got more in-tune with AI early on, by virtue of EU parliament’s proposals. The development, deployment, and use of AI in the fields of education, culture and audiovisual media must fully respect the enshrined in the EU treaties. Education, culture, and the audiovisual sector are areas where the use of AI and related technologies is sensitive, as they may affect fundamental rights and values. Therefore, the importance of respecting ethical principles in these areas is stressed when developing, deploying, and using AI and related technologies, including software and algorithms and the data they use and produce. EU Parliament also stresses the importance of ensuring EU-wide mastery of basic digital and AI skills by developing training opportunities for educators. The Commission is called upon to make digital skills, media literacy and AI skills priorities in its action plan, while paying particular attention to children and young people in precarious situations who need special support in the field of digital education.¹⁷ AI systems used in education or vocational training should be considered high-risk, since they may determine the educational and professional course of a person’s life and therefore affect their ability to secure their livelihood. When improperly designed and used, such systems may violate the right to education and training as well as the right not to be discriminated against and perpetuate historical patterns of discrimination.¹⁸

There are also efforts in the US with Department of Education and a few initiatives to regulate and implement AI appropriately. Department recognizes AI as a rapidly advancing set of technologies that can enable new forms of interaction between educators and students, help educators address variability in learning, increase feedback loops, and support educators. It also outlines risks associated with AI - including algorithmic bias - and the importance of trust, safety, and appropriate guardrails to protect educators and students.¹⁹

In light of all these advancements, it is hard to tell how AI’s inception to design education will be navigated in the short term.

Similar principles need to be applied to the design education’s modalities to enable more adaptable solutions when adversities occur.

TAKE-AWAYS FOR REDEFINING THE DESIGN EDUCATION

The approach needed for the new ‘around the corner’ design education would be a design challenge as a whole, not as disjointed pieces borrowed from different old methodologies. Wang notes ‘there is a feeling among many design educators, that today the discipline has reached a crisis in its development, and that change is needed immediately in the way that design educators articulate their epistemology and their methodology’.²⁰

In the learning action, as argued by Gottardo and Martino, not only the educators implement their research improving their knowledge, but also the learners make their own research: this is one of the learning methods where the learner can be more involved, actively, and emotionally.²¹

It is noteworthy according to Owen to interpret the problems and possibilities of impending changes, science thinking must be solicited and heard. To explore and conceptualize ways to proceed, design thinking must receive equal attention. Design-thinking, less well known than science-thinking, has

characteristics of great value to teams dealing with complex, ill-formed problems. Together, the characteristics of design and science thinking form a set of complementary thought processes able to add considerable strength to the advisory task. Providing design-thinking in an advisory capacity to governmental and institutional leaders will require an evolution in design education, design research and design professional activities. For design education, new programs must be designed that bring the best of design-thinking into the new context of policy planning. New content will be necessary; new processes must be developed and taught; and new ways of working will have to be learned.²²

Cognitive Model for Design Education

Balancing emotional, cognitive, and physical aspects of design education that would enable students and educators to apply methodologies is of key importance. Promoting design intellect by curiously pursuing knowledge in socio-cultural, technological, and economical norms should follow suit.

Meyer and Land identify that when it comes to courses in applied psychology or cognitive science, providing students with an understanding of human behavior and the theories underlying choice, decision-making, perception, attention, and interaction, most schools offer either no courses or simplified ones. The threshold concept is a relatively new theoretical framework for teaching based on overcoming student's learning barriers by understanding the following dimensions of learning: transformative, bounded, integrative, discursive, and troublesome. It involves integrating or synthesizing knowledge that was previously viewed as unrelated.²³

It is encouraging that Evans and Sommerville propose a model with a product semantic approach which basically introduces the basic ideas, concepts, principles, and language of product semantics and to practice them. This model claims to enable students to articulate design problems in a new way, engage in research about the meanings their designs might have for others, and to enhance their ability to defend their proposals in the face of competing discourses. It also increases the competence of translating these ideas, concepts, and principles into design practices.²⁴

From a cognitive standpoint, utilizing AI ethically and efficiently might help bring more up-to-date data-driven scenario-based training, both from procedural and executional standpoints.

As a model, cognitive and emotional aspects that were analyzed in previous sections such as creative thinking, human-centered focus, environment-centered concern, systemic vision, predisposition toward multifunctionality, and ability to work systematically with qualitative information could be established in a non-linear methodology - as depicted in Figure 2.

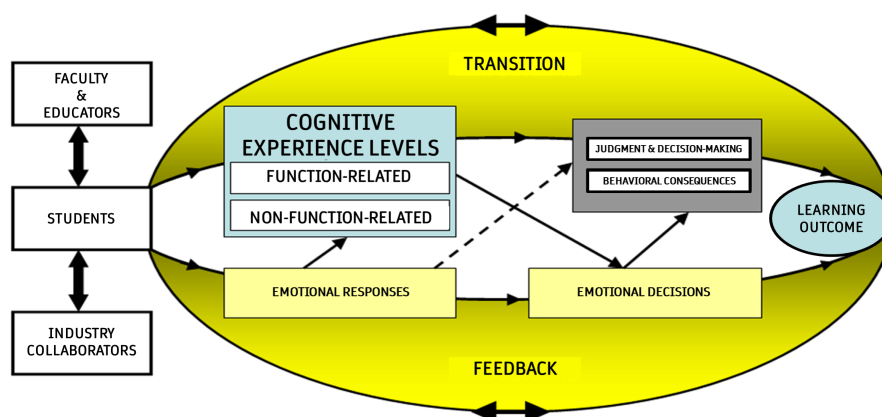


Figure 2. Cognitive and Emotional model flow for design education.

Inescapable developments, triggered by adverse and everchanging circumstances such as global crises and pandemic leading up to remote and hybrid work, brought to light that higher education as well as the design education need to be more flexible with adaptation to the new surfacing demands and norms. Nevertheless, these adversities prepared students and faculty to become more emphatic, environmentally-conscious and creative by recognizing global socio-cultural shifts require design-related responses. The integration of hybrid modalities with upgraded pedagogies for every section of higher education emerged not only from necessity but also from the nature of adaptation. Many of the recent shifts in pedagogies in academia happened retro-actively and without much given timeframes to be established and organized accurately. Design students need better and frequent access to real-time data in real-world scenarios, market analyses, and testing abilities. Teaching technology by utilizing digital classroom and virtual learning environments with the proper utilization and integration of AI will be critical. The lack of correspondence during studio and lecture sessions would easily cause the lack of emotions which should be avoided by letting students and faculty express themselves more frequently with digital interfaces and interact on virtual 2D and 3D levels - as depicted in Figure 3.

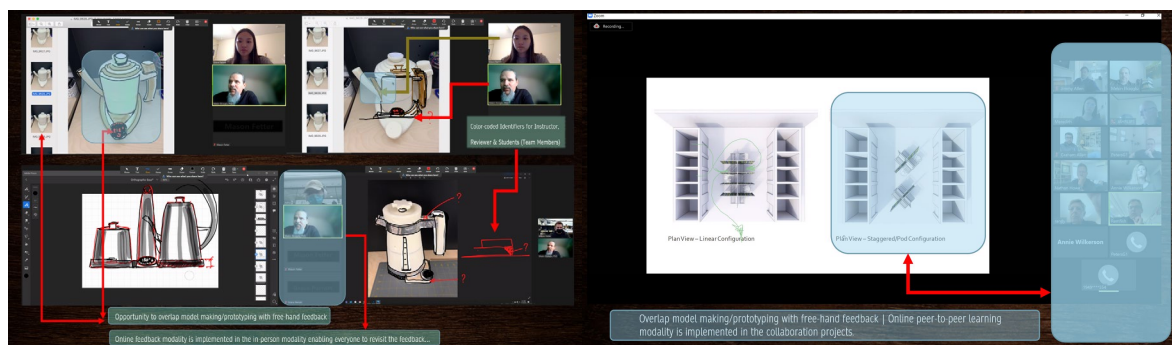


Figure 3. Application of the proposed utilization of 2D and 3D tools for design education.

For Academia

During the pandemic-triggered shift, a variety of setbacks and challenging impositions such as not being able to work hands-on with projects were surfaced due to remote modality. While observing, understanding, and practicing the dynamics of the paradigm shifts within the design culture, the succeeding design education methodologies will rely on the integration of virtual interaction tools which will take place mostly in non-school environment. Educators, students, and designers will be tasked with creating highly functional and adaptable environments within their limited spaces. Changing class and studio culture with shifting paradigms, changing methodologies in collaborations and pedagogies while understanding the primary needs and the ways of the industry versus the behavioural aspects of user nature are becoming more imperative in design education. There will be a need to re-organize personal workspaces, re-think and re-shape adaptable working environments while revisiting behavioral models and habits of students and faculty alike. University-industry collaborations could increase global competitiveness and provide access to various markets by using the university's expertise in design research.

For Collaborations and Collaborators

On the industry side, the 'new unknown' or the uncertainty for what the future holds appeared in terms of implementing remote-working scenarios and keeping the efficiency. Industry collaborators benefit from ideas that are generated by their prospective user base; participating in collaborative and

interdisciplinary research and development with design programs; and receiving incentives to incorporate design to their processes. Collaborations support students, faculty and programs while encouraging knowledge-sharing across different platforms.

According to Goatman and Moody, it is the responsibility of the sector, to give greater clarity to students on the nature of the subject they are to study. It is argued that there is a need to identify the key components of industrial design in order to inform improved matching of students to degree courses in a way that is accessible and useful. The necessary first step is, for the sector itself to identify the categories of curriculum being practiced and to make these more explicit.²⁵

New methodologies that integrate online education and virtual interaction opportunities with AI and 'real-world' scenarios will provide academia and the industry with more efficient and adaptable solutions. Studio culture should also be redefined with collaborative design environments, peer-to-peer learning, and data-gathering.

CONCLUSION

Identifying changing paradigms coherently and therefore reinforcing the mutual interest between faculty and students are crucial. The utilization of tools to make communication and methodologies stronger is also needed to create emotional and cognitive levels for design education which should grow exponentially with the adaptation of the new practices, and now the inclusion of AI. This will help educators and students keep themselves engaged with current advancements in a pro-active fashion.

Academia and its core components, altogether, need to update methodologies, pedagogies, and approaches to design by developing and practicing new models and solutions for socio-cultural, environmental, technological, and economical circumstances to adapt to shifting paradigms and real-world scenarios. These affect learning and practicing environments with everchanging human behavioral models. Diverse approaches are needed that embrace empathy and awareness.

However, while this study tries to shed light into how the current methodologies, pedagogies and curricula impact design faculty and students, more research is needed to envision if academic re-methodization would help with cognitive and emotional challenges and thus bolster holistic development in design education.

NOTES

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LEARNING COMPLEX SYSTEM STRATEGIES IN DESIGN TECHNOLOGY STUDIOS

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INTRODUCTION

This paper introduces strategies used in studio courses that make use of emerging technologies. The courses discussed were taught in one of the largest US research universities, to undergraduate design major students in a design department, and in a research center called ACCAD (the Advanced Computing Center for the Arts and Design) that focuses on the use of computer animation and emerging technologies in interdisciplinary research. The author is an assistant professor with a position split between those two areas as well as the university's Translational Data Analytics Institute (TDAI). Though the instructor's background is in computer science and philosophy, he has been working with technologies in interdisciplinary collaborations primarily in the arts and humanities for several decades. These courses were created to introduce important emerging computer technologies in a discipline-neutral manner to students from areas as diverse as art, design, dance, theatre, computer science, industrial systems engineering, and architecture. The primary learning goal has been to expose students to the *capabilities* of emerging technologies, so that students can apply such technologies to problems in their own fields and visualize them as interacting components in *complex systems*.

Complexity Contexts

When providing students with opportunities to engage with emerging technologies, complexity can be readily identified in many contexts. *Project management* and *collaboration* are two familiar examples. Companies employ *project managers* to track and manage *collaborative* efforts for very good reasons. This paper will focus however on three additional sources of complexity: *problem discovery*, *technology learning*, and *learning technology*. The last two complexity sources in this list are named a bit ambiguously, but what is meant is, “learning about new *technologies*” versus “*technologies* used for learning.” (These can feedback into one another as well.)

Problem discovery plays a significant role in the courses discussed here, where students are rarely provided narrow design problems to solve because of their diverse interests, backgrounds, and goals. Design students in particular are very used to being provided with well-defined situations, and almost always a specific set of deliverables in their previous classes. Yet one can argue that it is much more common to encounter *unconstrained* design situations outside of classroom assignments: “Given our resources and capabilities, what’s the best thing we could do next?” Problem discovery will be discussed further after a bit more context about students and classes.



Figure 1. Depart of Design building

DESIGN COURSES

Half of the author's courses are taught within the university's design department entirely to design students. In the *undergraduate* design studio course, the students are required to collaborate in groups that are a mixture of different types of design majors and years. In the *graduate* design studio, the students have just started one of two MFA program tracks. The *Digital Animation and Interactive Media* (DAIM) track is more explicitly focused on critical making. Most of the students are interested in computer animation, games, and interactive media. The students in the *Design Research and Development* (DRD) track are more focused on aspects of design research methodologies such as human centered design, co-design, and so on.

In addition to being in one of the largest universities in the US, our design department also happens to be housed in the oldest building (Figure 1) on the campus. Thus, another source of complexity is navigating and accessing different facilities and resources our students would like to use.

In the graduate-level studio, design students arrive for their first semester with diverse backgrounds and disparate professional goals. The studio is structured to get new students comfortable with approaching and learning about emerging technologies. Students are encouraged to consider and abstractly represent their design processes, and to use visualization as a tool for inquiry. A three-part structure has been developed in which students first visualize their research interests, then do some hands-on learning about learning, and finally end with research prototyping. They learn a bit about related topics such as generative design, systems thinking, complexity theory, technology ethics, possibility spaces, and are introduced to technologies that are useful for prototyping.

All our upper-level undergraduate design students are required to choose between six different collaborative studios sections, each having a different annual topic and roughly sixteen students. While the studio section discussed in this paper is primarily about emerging technologies, the other sections' topics include subjects such as sustainable retail, healthy cities, and social design. These third- and fourth-year undergraduates span our three different design sub-majors: visual communication design, industrial design, and interior design. In nearly all their other design courses these students are required to stick with their cohort within the same year and same major. This studio is one of the few opportunities they get to work with design students from other years and majors.

Topic Visualization Project

Problem discovery was mentioned earlier. In both design studios, a straightforward process has been cultivated which has emerged out of the author's more reductionist engineering tendencies but combined with the artistic use of generative systems. Whether the students are in collaborative groups, or individually navigating the spaces of their individual interests, they are asked to first *collect* a set of topics of interest (given a few constraints), then to *organize* the complex intersections of these chosen topics, and finally to investigate the intersections of these topics through mapping and *making*. They then discover where this leads them. Note that such emergent problem discovery strategies appear to be somewhat unusual for our design students who seem to be much more *initially* comfortable being assigned narrower problems to solve. Choosing problems is more common in other art disciplines, or graduate school. Being asked what they are *interested* in learning about is surprisingly stressful to many undergraduate design students, while others immediately embrace the unexpected freedom.

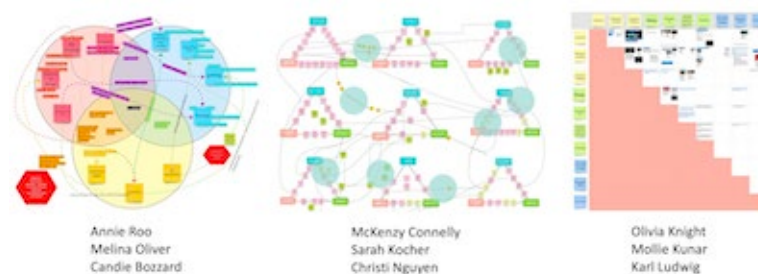


Figure 2. Diverse topic visualization strategies

Both design studios (undergraduate and graduate) begin by asking students to identify unfamiliar *technologies* they are *individually* interested in learning about. These are typically things like AI, virtual or augmented reality, 3D printing, and so on. Every student is then also asked to identify additional research topics that interest them. These might be subjects such as sustainability or childhood education, or perhaps entirely personal interests such as coffee or sneaker culture. Finally, graduate students are asked to choose a social issue, while undergrads choose subjects related to an annually changing studio topic which has ranged from data analytics research to digital humanities, to the future of design.

When one recent group of MFA design students chose to collaborate for their project, their combined interests encompassed mental health, biophilia, voice interfaces, and virtual reality. Students are given opportunities to use their design skills to visualize connections, projects, and relationships within the web of topics they or their group have selected. Students iteratively produce topic maps, grids, and graphs of varying forms in attempts to organize the complex information spaces they've generated.

Using these typically complex 2D information maps (Figure 2) students are asked to further represent this abstract space of concepts using their favorite design tools and methods. Students combine 3D modeling, motion graphics, physical making, animation, and recently, generative AI, to create representations of the complex overlapping interests they have assembled.

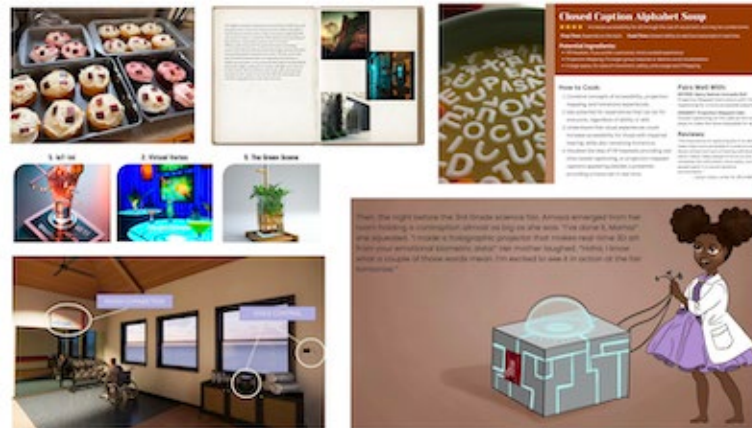


Figure 3. Topic collection representations

One unique problem encountered annually is that students naturally very much want to see examples of design solutions generated by previous students. But showing examples of prior exploratory visualizations always results in some students simply adopting similar solutions to those shown. When prior examples are not shared, the more stressed some students become, thinking there must be a “correct answer”, but then the more diverse and creative their results tend to be leading to much greater student satisfaction in the end. Figure 3 shows diverse solutions from the previous year including stories, menu cards, drink recipes, and exercise spaces. (Also, for the first time, *baked goods* was a new concept representation medium.)

Unfamiliar Technologies and System Prototyping

After the first assignment in the design studios, students are asked to select *unfamiliar* technologies and then design system prototypes and diagrams explaining how such systems might work. This provides them with new alternative approaches for considering complex system representations. This second assignment focuses on the processes by which they *learn* about new technologies, and introduces technologies they might use *for* their learning. Examples of technologies students wish to learn about recently include 3d scanning, 3d modeling, Internet of Things infrastructure, and responsive environments. The typical sort of technologies considered for *learning* include social media, search engines, online videos, and hardware kits.



Figure 4. Prototyping with unfamiliar technologies

Technologies such as augmented reality, AI and virtual reality also can help us learn about *other* technologies by allowing for prototyping of speculative systems. For example, students use

augmented reality when shooting videos to virtually place objects (or even environments that they've digitally designed) into a physical space. They can then make videos (Figure 4) showing students pretending to interact with the objects or spaces as if they were there.

Complexity Readings

These design studio classes involve managing *complexity*, but only briefly explicitly cover it as a specific topic. Students are pointed to a few readings on complexity that have been quite accessible. Sarah Firth's *Making Sense of Complexity*¹ is subtitled, "A case for embracing ambiguity and celebrating uncertainty." Sarah is a comic artist and graphic recorder who has made a wonderful visual explainer for understanding real world examples of complex systems. Examples of the wolf purge in Yellowstone and the evolution of coffee supply chains are particularly useful. Most design students have heard so much about "design thinking" that Steve Vessallo's short essay *Design Thinking Needs to Think Bigger* about "systems thinking" and complexity provides them with a provocative competing viewpoint.² Finally, Donella Meadows' *Dancing with Systems* provides a numbered list with a few concrete points about complex systems for each item.³ The essay contains examples that everyone manages to immediately connect to their own design experiences.

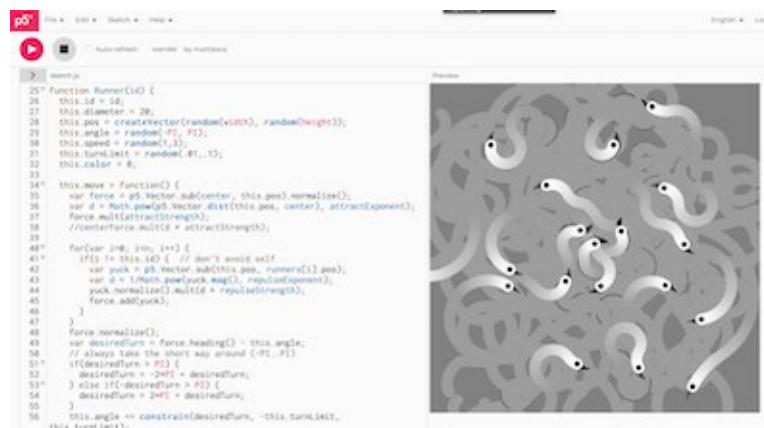


Figure 5. Creative coding behavioral animation systems

ACCAD COURSES

Complexity theory and systems thinking arise organically in the author's other interdisciplinary technology studio courses taught at ACCAD, our computer animation research center. The author teaches studio courses at ACCAD such as programming for artists and designers (Figure 5), procedural animation, and performance and installation technologies. Students in these classes have always been a diverse mix from art, theatre, and dance, but also architecture, computer science, and even systems engineering. It should be noted that a handful of students straddle these disciplinary boundaries: double majoring in art and computer science is a great combination, for example.

Teaching students from both arts and sciences in these courses has been extremely rewarding for all involved. While those in the arts are learning formal processes for reducing complexity (for example, through coding) engineers simultaneously get a chance to explore *making* in more ambiguous problem spaces than they might be used to. Graduate students who are on the verge of becoming painting professors relearn about sine and cosine so they can use code to generate color and shapes, while PhD students in engineering learn basic color and spatial design theory, and how to translate such systems

into familiar mathematical terms. These two groups seeing each other's work in the same class is invaluable.



Figure 6. Interdisciplinary technology course topics

Figure 6 shows examples of the range of topics students are introduced to in these interdisciplinary courses including material shaders, virtual environments, procedural animation, creative coding, performance installation, responsive environments, and virtual lighting. In groups or as individuals, students are asked to apply these techniques to their own research interests and disciplines. MFA artists integrate algorithms into their painting and projections, while engineers and set designers prototype interactive systems.

Tools And Resources

Many of these classes gravitate towards working with tools that attempt to reduce complexity through visual interfaces for building algorithms based on visualizing the flow of data. Virtual environments, 3d materials, video, sound, interaction, and movement, can all be constructed using software such as Houdini⁴ (Figure 7) or Max/MSP/Jitter.⁵ In other classes, students might choose to use Blender,⁶ Isadora,⁷ or Touch Designer.⁸

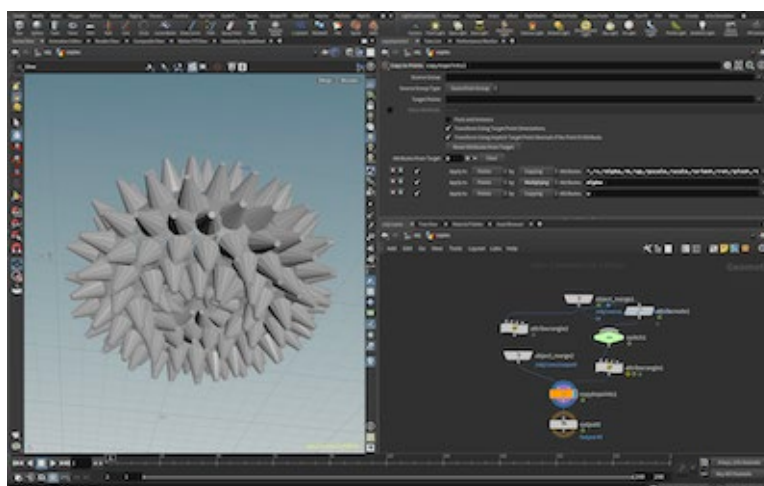


Figure 7. Node-based algorithm interface example

But regardless of visual or code-based authoring interfaces, these courses primarily practice a “bottom-up” strategy of building from basic skills, instead of starting with complex examples (i.e., “top-down”.) This has the *disadvantage* of resulting in simpler initial student outputs, but the *advantage* of students acquiring conceptual knowledge that they can then apply more generally.

Assignments are constructed as multi-stage open ended exercises. These are structured such that there are easier steps to try first, followed by more difficult challenges. Through these strategies, all students can have a few confident successes while also gaining a sense of the infinite possibilities they can choose to investigate if they wish.

TDAI AND RESEARCH

This paper first discussed design department courses, then those in the ACCAD animation research center. Our students have sometimes been able to access our translational data analytics institute (TDAI) as well. The undergrad collaborative design class has studied the data analytics research building and workspaces for collaborative design as a research topic.

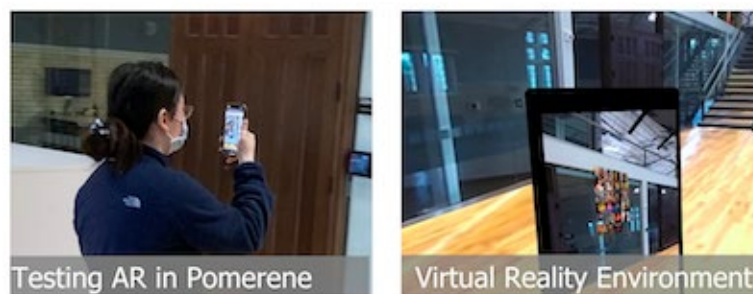


Figure 8. AR and VR prototyping in TDAI's Pomerene Hall both physically and virtually

Graduate design students have also been able to work on faculty research projects taking place in this environment. These have involved virtually situating data visualizations using AR and VR (Figure 8) within the institute. This work focused particularly on spatially located humanities data.

TECHLASH

None of this should be interpreted as purely promoting the uncritical adoption of technologies by students. For nearly every hyped emerging technology there is frequently a corresponding “techlash”. While society has very recently been focused on the existential risk and intellectual property implications of generative AI,⁹ the past decade has seen similar concerns about the potential excesses of the metaverse, cryptocurrency and NFTs, surveillance capitalism,¹⁰ autonomous vehicles, the internet of things, 3D printed weapons, and of course social media. While many students are enthusiastic about learning new tools and capabilities, other students have strongly expressed concerns about *technology* itself as a specific topic of focus. Technologies are often viewed as a *harmful* force in the world.

Throughout these courses, an attempt has been made to constantly reintroduce *complexity* into most discussions that involve simple ethical binaries. It is not uncommon to hear “the technology isn’t what’s important” or “this technology is just a tool” or simply “that technology is *bad* because...” Students are encouraged to notice such binary statements when they appear and consider a balance between enthusiasm and concern. Such discussions invariably turn to the subject of power and ethics. Almost nothing can be said to be simply *bad* or *good* without examining who might benefit or be harmed, to what degree, and with what probability.

AIGA DESIGNER 2025: COMPLEXITY

In 2017, the AIGA professional design organization’s educator’s community released a white paper with their analysis regarding future trends that should guide what should be taught to Design students as they looked forward towards 2025 (which of course is almost here.)¹¹ The first of seven “trends and

competencies” discussed was “complexity”. They wrote about “problems being situated within larger systems characterized by interdependent relationships among elements or activities” and conclude that college design students should:

1. Address design problems at various scales (at the level of components, products, systems, and communities)
2. Identify and visually map the interdependent relationships among people, places, things, and activities in a complex system
3. Locate areas of friction and leverage points where small changes or external forces could produce big differences in the state of the system
4. Frame design investigations for enhancing the overall effectiveness of the system, not just individual components
5. Evaluate design solutions for their short- and long-term physical, social, cultural, technological, and economic effects
6. Identify the nature of values and modes of inquiry in various disciplines that contribute to the successful solution of complex design problems

This list is reviewed in a couple of classes to discuss whether there is alignment with these recommendations. Of these suggestions, students in practice probably learn the most about *visually mapping relationships* and *considering impacts* (numbers 2 and 5). Individual design students vary widely in their focus on *multiple scales* (1) and the *nature of values* (6). *Leveraging opportunities* (3) and enhancing *overall effectiveness* (4) are probably the ones engaged with the least, given short class timelines and early-stage design course work.

CONCLUSION

After exposure to emergent problem discovery, students express increased comfort with unexpected complexity. The acceleration of change calls into question the utility of merely teaching individual technologies and their *known* effects. The extremely rich discussion around artificial intelligence is a great current example of this. Everything is changing so fast, including impacts and implications, that instead of being taught today’s technology, learning how to learn about tomorrow’s technology is probably one of the most valuable skills students can acquire. But students first require the knowledge and confidence they’ll need to face the increasingly inevitable unexpected.¹²

The intersection of design, complex systems, and rapid technological change is critical for both students and instructors to engage with as we are continuously required to relearn how to learn. These courses value meeting students where they are and helping students to achieve their diverse learning goals, despite the additional teaching complexity.

NOTES

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POSITIVE SUM DESIGN: DESIGN METHODS AND STRATEGIES

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INTRODUCTION

The act of design determines what relationships are possible between stakeholders in a given context, and the rules within which those relationships function. Frequently, these “rules of the game” are based upon the assumption of zero- (win/lose) or negative-sum (lose/lose) outcomes. Positive Sum Design (PSD) critiques this notion of scarcity, embracing an orientation of abundance through methods that allow individuals, institutions, and societies to recognize and create new forms of value through cooperative strategies and pluralistic values.¹

Achieving Positive Sum Design outcomes that reward collective benefit over maximizing individual self-interest relies on the ability to identify and transcend presumed constraints to develop novel and useful solutions, converting zero sum games into non-zero-sum ones through the use of critical frameworks.

Positive Sum Design: A Critique of Zero-sum Bias

Zero sum bias assumes fixed value under conditions that encourage competition, even when there are abundant resources and affordances for communication, coordination, and the possibility of shared value.² It inhibits collaborative creativity and limits potential avenues for problem-solving by rigidly constraining the boundaries of how problems are defined. Yet this mindset is also pervasive, deeply ingrained in the mores and culture of human society, and too often limits how we see the world.³ By contrast, Positive Sum Design (PSD) applies a Utilitarian or Consequentialist scaffolding to the design process as a form of Human Centered Design (HCD) with a humanity-centered approach that orients individuals’ experiences in relationship to one other with the goal of producing beneficial outcomes across stakeholders: a win/win.⁴

In nature, the symbiotic relationship between organisms engaging in a mutually beneficial relationship is a form of positive sum game. In designed environments, PSD’s goal is not necessarily harmony between stakeholders so much as a kind of collaborative participation that generates new forms of value and understanding despite conflicting perspectives, and ability to recognize opportunities to move beyond assumed constraints by employing a critical, yet creative, approach to ‘reframe the game’.

For example, checkout lines are often assumed to be an exercise in efficiency. When the Dutch *Jumbo* grocery chain observed that some customers held up the line by chatting with cashiers, a zero-sum solution might have suggested “correcting” this behavior. Instead, they recognized that not everyone had identical needs, resulting in a traditional checkout line for customers who valued speed, and a second as a *Kletska*—or “chat checkout”—option to support more leisurely social interactions.⁵ Win-win.

Below, we describe an emergent methodological approach to PSD that helps students use creative processes to frame problems in novel positive-sum ways. This paper offers a brief overview of PSD themes, followed by a description of a workshop activity designed to explore these themes by reframing a familiar activity: standing in line.

Positive sum design triad

Achieving positive sum solutions requires seeing challenges through a new set of lenses, represented by three interrelated components: the mutability of constraints, the multivalence of utility, and the mediation (multiplicity) of incentives in Figure 1.⁶

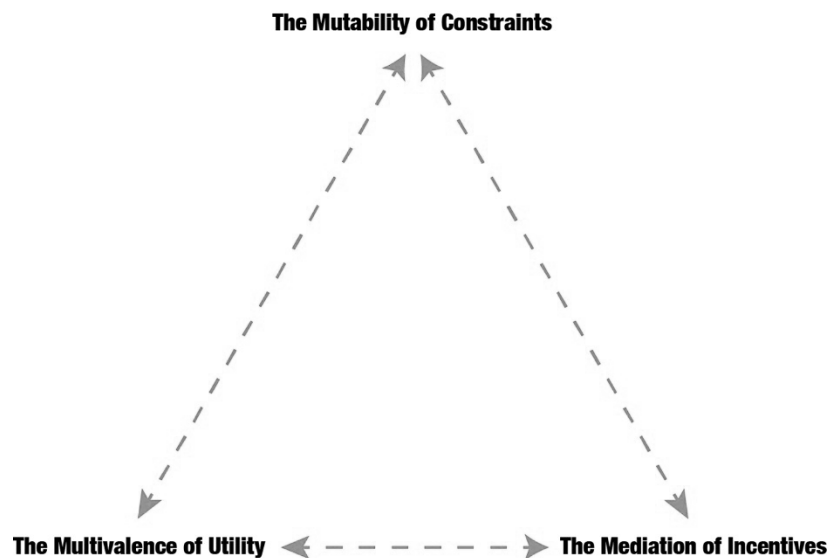


Figure 1. The Positive Sum Design Triad.

Mutability of constraints

Constraints are a necessary condition for the creative process, shaping what is possible by framing limitations and opportunities within a given situation.⁷ However, constraints are often more fluid than they appear. When designers critically evaluate conditions and available resources, they can recognize previously unconsidered opportunities to shift from a position of presumed scarcity to one of abundance. In other words, not only are situational constraints not immutable, but their flexibility can be increased when the desired outcome is also reframed (diversifying utility), and when new affordances for coordination are built into stakeholder interactions (repositioning incentives).

Positive Sum Design aims to either optimize value *within* given constraints or expand it *beyond* given constraints. The first strategy focuses on finding inefficiencies in resource distribution to overcome the apparent scarcity characteristic of zero-sum games, or making Pareto improvements to help stakeholders make gains that do not come at the expense of others until Pareto optimal is reached, after which all further improvements incur someone’s loss.⁸

The second option—expanding *beyond* the given constraints—aims not for optimization but for redefining value altogether by questioning conventional norms of distribution or reframing the nature of the decision entirely. For example, the obvious means of distributing a cake amongst stakeholders entails cutting it into equal slices. But if some stakeholders prefer frosting and some prefer cake, communicating these preferences allows each stakeholder to get more of what they want despite an ostensibly uneven distribution of goods. Reframing this question further still—asking “what’s a satisfying conclusion to dinner?” rather than “how do we distribute this cake?”—allows stakeholders to expand their perceptions of value beyond maximizing their share of cake to include a piece of fruit, an espresso, or a cheese plate.

When we think about standing in line, it may initially appear to be an efficient solution for coordinating access to available resources: a fixed constraint issue. A PSD approach suggests the value of critiquing these constraints and conditions by questioning what people actually want from the situation to reveal new preferences and resources.

Multivalence of utility

Economists define “utility” as a metric for preferences that determine the desirability of goods and services,⁹ a measure of how much we want what we want. Positive Sum Design goes further, asking not just “what do we want,” but also “*why* do we want what we want?” When stakeholders want the same thing, it can result in a zero-sum game: increased demand, greater competition, and greater cost for all. Reframing the game as positive sum allows us to explore diverse ways of satisfying diverse preferences to create more aggregate value.

Once again, a conventional read of standing in line renders it a zero-sum game, in which competition to get to the front of the line as quickly as possible creates a hierarchical stalemate. However, this neglects other ways to define and cultivate utility. Seeing the experience of waiting as valuable in itself—as a social experience or an opportunity to access entertaining or informative experiences—rather than as a means to an end exposes different conceptions of value that can address diverse preferences of diverse stakeholders without resorting to zero-sum assumptions.

Mediation of incentives

Incentives are the affordances for action that are designed into a system,¹⁰ that prompt us to choose one option over another. The prisoners’ dilemma, from game theory,¹¹ provides a classic example: two suspects are placed in separate cells and interrogated, each told that they will receive a reduced sentence by betraying their fellow alleged conspirator, but that if both refuse to confess, they will both go free. Because they cannot coordinate their efforts, participants tend to betray each other to get the best deal they can based on limited information. However, this interrogation technique only works due to the lack of communication and coordination between the suspects that incentivizes sub-optimal behaviors.

Designers can mediate incentives by deliberately introducing affordances for coordination into the infrastructure of a system, cultivating behaviors not through force but through alternative “choice infrastructure” that shapes what seems desirable or appropriate.¹² A line can be self-organized, structured by social conventions (“first come, first served”), or even allow for placeholders to do the waiting; in each case, however, the rules of the game dictate what behaviors seem valid or sensible. When structure is missing or ill-defined, coordination becomes difficult, and conflicts can emerge.

TEACHING POSITIVE SUM DESIGN

Below, we explore the potential use of PSD as a method for problem framing and solution exploration¹³ to identify and respond to instances of zero-sum bias in design. Crafting a PSD approach for “reframing the game” requires developing methods that allow designers to systematically explore the three legs of the PSD triad—the mutability of constraints, the multivalence of utility, and the mediation of incentives—to reimagine perceived system constraints as opportunities, document and identify new forms of utility and value, and establish revised choice infrastructures that support new incentives.

This complex, interwoven and iterative process benefits from being broken down into steps in order to design a repeatable teaching method. First, we can enable designers to recognize and understand the existing zero-sum biases of both system stakeholders and designers themselves. Next, designers must identify the constraints in the system for each of the stakeholders to inform strategies for reframing the problem and solution space, allowing them to turn constraints into opportunities. Collectively, resulting ideas can then be reimaged as potential solutions through creative storytelling, sketching and imagination to “expand the pie” by creating opportunities where limitations previously existed.

Because PSD ideas tend to be abstract, we chose to use the example of standing in line in the workshop to bring positive sum theory and problem-solving into practice. As practitioners and educators, we sought to develop a method that could be adapted to different environments and contexts, with a goal of supporting student development of critical thinking and reasoning skills. In order to support further iterative design, we are sharing the workshop materials using Creative Commons licensing to facilitate sharing and collaborative adaptation.¹⁴

A PSD Case Study: Reframing Standing in Line

Waiting in line is often characterized as a zero-sum game, in which one is forced to spend time—a fixed, scarce resource—at the expense of other potential uses. A designer could take multiple strategies to create an improved experience when asking people to wait: You can speed up the wait by looking for efficiencies, or enhance the experience and make the wait an end in itself. But what if time were to be reframed *as not a constraint, but as an opportunity*?

To better understand how designers might reframe the game and cultivate value in a scenario that at first glance seems strictly constrained, we developed an exercise to ask the question “how might we redesign the experience of waiting in a line?”, in the form of a workshop conducted at Carnegie Mellon in the Design for Social Innovation seminar, led by L. Arthi Krishnaswami.¹⁵ The workshop's purpose was to help students explore potential design strategies for reframing the game of waiting in line from a zero-sum game to a positive-sum one, using an iterative design process to design the method. We chose the scenario of standing in line to facilitate broad adoption and ease of understanding; lines have seemingly simple goals, yet are adaptable to a variety of interactive environments and serve many purposes and formats, with an interesting degree of sociological and cultural diversity (e.g., British queuing known as a “national pastime”,¹⁶ Asian competitive line jumping¹⁷, and the increasing presence of bots in digital lines for concert tickets). Standing in line also has an established theoretical basis in the design and behavioral economics disciplines.¹⁸

Workshop overview

Prior to the workshop, students read overviews of positive sum design and the theory of lines to provide framing and design principles for the experience. On the day of the workshop, students participated in an overview lecture and discussion, followed by small group breakouts to reimagine the experience of standing in line and opportunities for redesign that might benefit stakeholders in

new ways (Figure 2). This was conducted through a series of activities that aligned with the utility, constraints and incentives components of the PSD triangle, which included considering how the experience of being in line might be different on various channels and devices or in serving new purposes. Upon completion of the exercise, students participated in a full class discussion and completed an online survey to reflect upon the activity, summarize findings, and capture feedback about the design method.



Figure 2. Image of students exploring constraints and opportunities during the workshop

Students were engaged and enthusiastic about participating in the activity and responded positively to the readings. They indicated that the workshop represented a real-world way of working with the theory and principles from coursework in design for social innovation, observing that while the ideas made sense in readings and discussions, applying the theory to a seemingly simple real-world activity gave the theory a new context and meaning. *This suggested the value of asking participants to identify three real-world examples of lines to provide context for the exercise as a part of the pre-reading.*

Students identified a variety of physical lines (e.g. TSA, Disney rides, events) as well as lines that were procedural or systematic (e.g. promotions at work and seniority of experience) each of which provided different incentives, constraints, opportunities and rewards. Considering the stakeholders in the different line types was a useful way to challenge their perspectives and exposed underlying biases. *Rapidly brainstorming line types, followed by a cluster analysis to identify patterns of lines, can supply a useful baseline for structured ideation.*

Students benefited from diagrams and structured visual prompts to reinforce the content (e.g., using a table format to list constraints and brainstorm aligned opportunities). *Visual prompts and tools help support each step of the process.*

While the full-class overview discussion and line type brainstorming was beneficial for hearing diverse viewpoints, the size of the class (22 students) made it difficult to easily identify patterns from the live brainstorm that informed breakouts for redesign activities. *This suggests the downsides of a large group may outweigh benefits of large-group brainstorming, and also that providing deeper background reading may limit the need for introductory discussion.*

Student feedback

After the activity, students submitted feedback about the workshop via an online survey¹⁹ to share outputs from the activity (e.g., types of lines and specific constraints and opportunities identified for stakeholders), zero-sum bias, and changes to the system that would reframe the constraints into opportunities. Students also shared information about the value of thinking in a new way: what was

hard, what they learned, and how they might apply it in the future. In the spirit of iterative design, we also asked for feedback about the activity and how we could improve it in future iterations.

Students indicated that they benefited greatly from the collaborative sharing of perspectives, imagining problems from other people's point of view, and bringing concepts to life through an exercise, which "helped bring the theory we are reading to life and provided practical skills training in this way of thinking".²⁰ This positive energy was palpable during the exercise from constraint to opportunity as students moved from thinking of stakeholder utility as a constraint to an opportunity for creative exploration: "By allowing all stakeholders to gain values from the game, it would elicit more positive possibilities about the solutions, and will also gives [sic] room to creativity."

Students also found this way of working to be challenging, and wanted more time to explore this type of thinking through observational research or some type of proxy, suggesting that "thinking this way could be difficult when the designer does not personally have any experience in a certain domain. For example, if I had never traveled via air before and have never been to an airport, I would not have been able to come up with any solution for this need." These options will be explored in subsequent iterations of the workshop, alongside activities to promote creative problem solving.

Students appreciated examining their own biases, considering options, and reframing the problem into a positive sum game, observing that the PSD method promoted approaching problems from multiple perspectives and helped them "...approach problem framing from a more holistic perspective, to challenge myself to view an issue from multiple angles, and to build upon existing opportunities when proposing a solution." It also helped them to "think creatively and think from both sides of the stakeholder... it is important to think about the pros and cons, and find a great balance between the opportunities" despite the challenges inherent in a "perspective shift to go from passive observer to proactive problem-solver". As instructors, this shift in perspective and expansion of thinking represents a key learning outcome.

Although the theoretical part of the activity worked, students indicated that they would have benefited from more time in the redesign of the line process. This might be addressed by adding a final full class group activity that incorporates visual storytelling, storyboards, diagrams, and the physical acting out of different line scenarios.

Finally, experienced practitioners and faculty may forget the extent to which shared technical language and shorthand stand in for complex concepts and practices. This was reflected in student comments stating that aligning definitions and concepts—such as constraints (duality), resources, scarcity, opportunity, stakeholder, and time—with the steps in the PSD process would have provided valuable context for activities. This was noted by one student's feedback underscoring the importance of "clarity on what you mean by value and constraint, putting into simple terms 'physically visit an airport and observe travelers'."

CONCLUSION

Structured approaches for PSD may be especially useful for exploring complex problem spaces characterized by multiple stakeholders and a plurality of values. This positions PSD as a potentially useful strategy to help today's design students cultivate critical thinking skills that can help them respond to the multitude of wicked problems²¹ facing this generation, specifically related to understanding personal biases and adapting or limiting their unintended negative impacts.

Nobel laureate Paul Romer has described design as "nonrival," stating "that once the design is created, it can be used as often as desired, in as many productive activities as desired". The notion of promoting nonrival relationships—finding opportunities to reframe success such that we all win—is core to both PSD practice and the design process itself. Testing nascent PSD methodology

collaboratively with students and gathering feedback to share more broadly to promote rapid iteration and sharing with the field is therefore also a pedagogical choice, less oriented toward efficiency than with embedding a PSD mindset into the problem-solving process itself.

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A CROSS-DISCIPLINARY OVERVIEW OF HEALTH CONCEPTUALISATIONS TO AID URBAN HEALTH RESEARCHERS AND PRACTITIONERS

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INTRODUCTION

The way researchers understand and conceptualise health within urban environments has seen a significant transformation over the years. This is attributed to how researchers have approached the increasingly complex, diverse and interconnected factors, challenges and trends affecting health and wellbeing. Numerous social, environmental, biological, economic, political, and cultural aspects can affect the health and wellbeing of populations within a worldwide web of complex and interconnected urban settings on multiple levels and contexts. As a result, various conceptual and theoretical framings of health exist today influencing the way urban health researchers understand and approach health and wellbeing. This could be a confusing endeavour, especially for urban health research students, early career researchers and practitioners who need to understand how best to approach urban health with better conceptual grounding. With an ever growing number of cross-disciplinary research material in this area, the literature can easily become confusing and lacking conceptual and theoretical rigour. Here we provide a useful mapping of the different lenses researchers have utilised to conceptualise and theorise about their understandings of health, especially as these relate to urban environment. By organising the literature into five distinct conceptual lenses of health (as illustrated in Figure 1), the perspective piece provides a clear reference point that will assist the urban health research community.

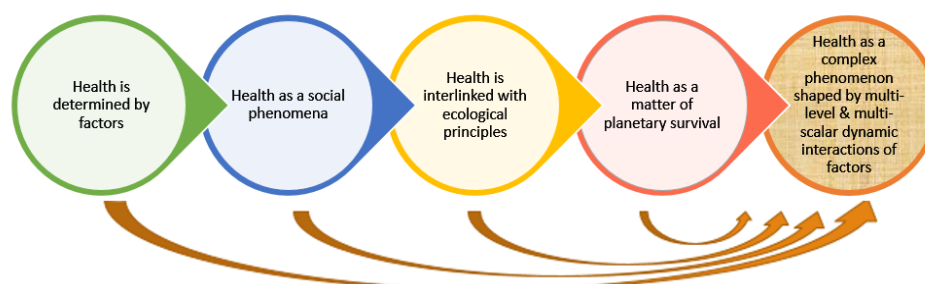


Figure 1. Five overarching conceptual lenses of health

THE INFLUENCE OF HEALTH PROMOTION (HEALTH IS DETERMINED BY FACTORS)

Health promotion movements and actions have played a role in moving conceptualisations of health beyond biomedical views. According to the biomedical perspective, health is about the body's biological existence where it is either diseased or not, hence healthy or not.¹ In other words, disease was not considered within the context of the lives of people who have it. This is when early health promotion movements became key in contextualising health.

The World Health Organisation's (WHO) landmark definition in 1948 of health as *"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"*² promoted health beyond the absence of disease perspective. The definition moved health away from a separation between the mind and body.³ It also broadened the scope of health beyond disease prevention. Hence, an appreciation of health determinants started to develop.

Through the Canadian health promotion focused Lalonde report in 1974, the sole role of healthcare as the central resource for producing health was challenged. Instead, the role diverse interdependent determinants play in producing health was acknowledged. In addition to the health care system, the concept of health included the interdependency of three other broad aspects namely: biology, lifestyle, and the environment (both physical and social).⁴

This complexity of societies and the environment in their impacts on health was also acknowledged by the Ottawa Charter for Health Promotion (1986) adopted at the first conference on health promotion in Canada in 1986.⁵ The Charter advocated for a 'socioecological approach' to health based on their views of inseparable links between people and their environment. Reciprocal maintenance by taking care of each other, our communities, the natural environment, and the conservation of natural resources was seen as imperative to the health promotion agenda. Hence, fundamental conditions and resources, including peace, shelter, education, food, income, stable ecosystem, sustainable resources, social justice and equity were established as pre-requests to health along with a systematic assessment of health impacts from urbanisation.

Through views of health as promoting, the role of different determinants in producing health, wellbeing and disease have become apparent. Thinking shifted to an understanding of health as being created out of interdependent factors.

THE INFLUENCE OF SOCIAL JUSTICE AND SOCIAL CONDITIONS (HEALTH AS A SOCIAL PHENOMENON)

Addressing the social conditions (determinants) of health and disease advocated by the health promotion movement was brought into sharp focus, especially following the landmark commission by the WHO on the Social Determinants of health (SDOHs) in 2010. Social epidemiology theories explained how differences in social position account for health inequities.⁶ Health became an outcome of a social patterning of health and disease⁷ stratified in the population through structural and intermediate determinants examined from a health equity lens.⁸

Social epidemiology theories brought the focus on the social and biological conditions that shape population health⁹ despite notable differences in their respective weight on these conditions in shaping health and how they integrate social and biological explanations.¹⁰ Nonetheless, they all represent what Nancy Krieger termed *"theories of disease distribution"* where mechanism-oriented theories of disease causation are presumed but equally not reduced to them alone.¹¹

In particular, Krieger's ecosocial theory along with two related multi-level frameworks: the eco-epidemiology framework/theory by Mervyn Susser dated 1996 and the social-ecologic systems perspective/framework introduced by Anthony McMichael dated 1999; integrate social and biological

reasoning. They also integrate a dynamic, historical and ecological view to explain patterns of health, wellbeing and disease among populations and social inequalities in health.¹²

Rather than simply reinterpreting factors identified by one approach (e.g. biological) in terms of another (e.g. social), the frameworks envision a more systematic integrated approach.¹³ Krieger's constructs of embodiment, pathways of embodiment, cumulative interplay between exposure, susceptibility and resistance, and accountability and agency explain structural barriers to health beyond biomedical and unhealthy lifestyle choices approaches.¹⁴ Their goal is to answer the question of who and what drives existing and altering patterns of social inequalities in health.¹⁵ Hence, it fully embraces a social production of disease perspective. McMichael's social perspective relates to population properties, including history, culture, and socioeconomic relations as key aspects in determining the level and internal distribution of disease risk.¹⁶

The two frameworks bring analysis that extends understanding beyond 'proximate', individual-level factors alone and into the large context where the complexity of life is recognised. Causal processes might not necessarily be linear and sequential and may involve interactions and feedbacks.¹⁷ With the use of ecological notions, literally not just metaphorically, the two frameworks also part company with other theories. They situate humans as one type of species among others that cohabit, evolve and alter our dynamic planet.¹⁸ Clearly demonstrating a shift in research thinking that took advantage of ecology, systems and complexity thinking and science in order to understand health, wellbeing and disease causation and impacts on individuals and populations.

ECOLOGICAL FOUNDATIONS OF HEALTH (HEALTH INTERLINKED WITH ECOLOGICAL PRINCIPLES)

The terms 'eco' and 'ecologic' in both Krieger and McMichael's frameworks revealed an influence of Ecology which examines interrelations between living things in connection with their environment.¹⁹ By ecological terms, attention is drawn to contexts where interdependencies exist between individuals and groups of humans and their environment.²⁰ Principles of scale, levels of organisation, dynamic states, complexity modelling, and understanding uniqueness of population similarities and differences also became key to understanding health and disease.²¹

The influence of Ecology on health is not merely viewed in respect to its principles, hence in what ecological thinking and analysis can bring. Health is not only contingent upon connections with multiple factors, but also upon other life forms.²² In this context, ecological public health also brings attention to dependencies between human health with the natural world and coexistence with this world.²³ Instead of thinking about the environment as a source of exposure to hazards, ecological thinking forces thinking of the environment as living human habitats.²⁴

Ecological thinking sees each 'living' level as a function of complex systems where the whole is greater than the sum of its parts.²⁵ Ultimately, human health and wellbeing would depend on us being part of ecosystems and the natural environment.

By bringing these ecological principles, understanding health within urban environments becomes attuned to interdependencies, population processes and multi-level causality-typical of systems thinking.²⁶ Coexistence with the natural world demands a non-separation between social systems and natural systems, as natural systems do not exist without people and human systems cannot be isolated from nature.²⁷ Hence, ecological foundations of health put an emphasis on the interwoven nature between the social and ecological interactions—in other words the 'social-ecological intertwinedness'.²⁸

Systems and complexity science thinking brought important implications to the social-ecological systems perspective. In relation to health, systems thinking brings a way of looking at interactions

through a web of interrelated and interacting components.²⁹ Owing to the complexity of social and environmental settings, systems are considered as being in constant change, can reach equilibrium but equally may change in random ways, occur in repeating chains or circuits of cause and effect, and can be adaptive or reach a tipping point when balance is compromised.³⁰ Hence, systems have dynamic, unpredictable and adaptive properties, and are underlined by feedback loops. Complexity brings nonlinearity and bidirectionality between parts where temporal and spatial boundaries become merely social constructions. Within these complex interactions between humans and their environment, a large number of heterogeneous elements of the systems continuously interact leading to positive and negative feedbacks. This leads to emergent behaviours where different parts influence each other resulting in consequences viewed as small changes that lead to surprises of large and unpredictable effects.³¹

By gaining new insights into the complex social and environmental systems that are context for health and disease, causal ways of thinking and knowing were broadened.³² Thereby, “*the important ecologic dimensions of social-environmental influences on health and disease*” were recognised.³³ These systems are viewed as interconnected and coevolve across spatial and temporal scales, whereas the trajectory of the system and its degree of resilience is influenced by the social and ecological dynamics and properties.³⁴ Ultimately, health becomes dependent on resilience—the capabilities of the systems to absorb disturbances and undergo change.

THE INFLUENCE OF SUSTAINABILITY (HEALTH AS A MATTER OF PLANETARY SURVIVAL)

Considering health and wellbeing in light of sustainability—a concept that is focused on preserving health in future terms and, in turn, the viability of the human civilisation³⁵—have seen a surge, especially within the last decade demanding urgent actions. Researchers argue that humans are altering fundamental earth processes, including the climate, river flows, the cycling of materials, and other aspects related to Earth’s natural systems and resources.³⁶ This shift has been highlighted by many reports and global assessments³⁷ warning that global human health is being increasingly and severely threatened due to the accelerating change to the structure and function of the Earth’s natural systems if steps are not taken to rectify the situation.³⁸

This reiterates warnings previously echoed by the WHO in 2003 and 2005 following their Millennium Ecosystem Assessment (MEA).³⁹ The assessment showed that 60% of ecosystem services examined (the essential services that ecosystems provide for people) are being degraded or used unsustainably.⁴⁰ Urbanisation, and its impacts through urban development was considered one of the major pressures causing direct and indirect health impacts.⁴¹ Other events and key actions have also brought attention to the links between human health and sustainability both implicitly and explicitly. Prominent events and actions included, the Brundtland Report, the UN’s Millennium Sustainable Development Goals (SDGs) and summit on sustainable development in 2002, the 1992 UN Conference on Environment and Development, and the Rio Declaration and Agenda 21.⁴² Through these events, what sustainability stands for started to take shape within the research community.

Sustainability is concerned with “*the ability of a system to continue functioning without depleting or damaging the things it needs to function*”.⁴³ Primacy is given to environmental concerns where Earth systems and ecosystems are preserved to maintain human health and wellbeing in sustainable ways.⁴⁴ Health gains cannot be achieved at the expense of ecosystem services on which humanity’s coexistence depends. Being part of this social-ecological coupling requires the consideration of long-term system resilience. Therefore, health became “*the health of human civilisation and the state of the natural systems on which it depends*”.⁴⁵ This planetary health conceptualisation aims to address the

political, social and economic systems that interfere with health, equity and wellbeing to a level that civilisation collapse is becoming inevitable.⁴⁶ In this context, researchers argue that human and nature sustainability should be unified.⁴⁷ Ultimately, human biology and the collective human ecology, hence health, depends on the stability, productivity, and resilience of the natural environment.⁴⁸

THE INFLUENCE OF COMPLEXITY (HEALTH IS COMPLEX)

The complexity of the social and environmental systems as context for health and disease with humans being part of an organic web of species brought fundamental changes on how health is conceptualised. The discourse on health and determinants of public health is changing. Different research fields, including medicine, public health, social epidemiology, and population health are taking advantage of complexity science and systems theory. McMichael⁴⁹ linked this shift in mindset to the way one ought to understand health and disease causation. Thinking about health in social-ecologic systems terms extends our space-time frame of reference from modular to a life-course view.⁵⁰ It also means an understanding of the determinants of health beyond proximate, individual-level influences alone to broad, population-level focal lengths.⁵¹

Whether individual or population health focussed, researchers are increasingly viewing patterns of health outcomes as ‘emergent property’ from multi-level and multi-scale interactions among heterogeneous components of Complex Adaptive Systems (CAS).⁵² Instead of isolating causality from separate factors alone, attention shifted to relationships between parts and determinants whereby how the system is comprehended as a whole.⁵³

Health becomes a manifestation of a system where, *“biology interacts with environments and individuals interact with each other and with environments over time”*⁵⁴ giving rise to states and patterns of health. This makes health a dynamic continual outcome of many processes as supposed to a static state of existence.⁵⁵ As a response, a high degree of adaptive capacity can develop that leads to resilience and the capability to cope with ongoing and future challenges resulting in states of health.⁵⁶ Otherwise, states of disease and negative health impacts would ensue where systems’ parts and determinants become insufficient to respond to life’s demands.

It is important to note that conceptualising individual and population health as complex have shifted recent narrative within the healthy urban environments literature. In response, research in this area is witnessing a worldview revolution from purely reductionist cause and effect-based discourse to a complexity-based one. This is attributed to emergent behaviours from complex systems and challenges currently being manifested within urbanised areas.⁵⁷ The numerous urban and nonurban-related challenges, determinants, factors, and systems’ parts are inspiring urban researchers to think beyond reductionist, linear, and hierarchic frameworks of health conceptualisation alone.⁵⁸ In addition, the deteriorating natural environment with all its fragile interlinked systems along with the loss in biodiversity are prompting the need to consider the issue of the sustainability of population health in ecological terms.⁵⁹ Consequently, managing population health becomes about being adaptive and continually evolving in order to ride these challenges in the sense of an evolutionary process.⁶⁰

This implies that both urban environments and human health are multi-faceted, diverse, complex and evolving.⁶¹ Urban health researchers are now conceptualising urban environments (e.g. cities) as CAS in order to understand the complexities involved in urban environments-human health interactions. Sarkar and Webster⁶² explained how health and disease self-evolve in ‘space-time’ as a result of complex dynamic non-linear interactions between biological and environmental factors. These factors function at multiple levels (at the cellular, molecular, individual, population and societal levels of the organisation) as well as different contextual scales (e.g. cities and neighbourhoods).⁶³

CONCLUSION AND FUTURE TRENDS

Conceptualising health within urban environments as complex has revolutionised the research on healthy urban environments. Researchers involved on healthy urban environments now advocate for cross-disciplinary research (e.g. transdisciplinary and interdisciplinary research), systems approaches (e.g. coupled social-ecological systems approaches), multi-level and multi-scale analytic techniques, data and future-scenario modelling, and long-term monitoring and database development. In addition, various approaches in the form of frameworks, models and mappings have been developed to help advance knowledge in practice, whether concerning policy, intervention, assessment or understanding of health conceptualisation within the urban environment. This area of research is fast-moving, and recent publications suggest that researchers are beginning to adopt a complexity of health conceptualisation in relation to the urban environment to aid understanding and practice.

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MAKE IT HAPPEN: DEVELOPING CULTURAL ENGAGEMENT THROUGH UNIVERSITY AND CHARITY COLLABORATION, DIFFERENT TEMPORALITIES AND RHYTHMS

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INTRODUCTION

This article reflects on a project, *Make it Happen*, that was a collaboration between a University and an Arts Council National Portfolio Organisation (NPO). NPOs are organisations that are funded as part of a *People and Places Consortium* in the UK that increases access to the arts in areas of low participation. Additional resources came from Knowledge Exchange funding awarded by Research England via the University.

The aim of the project was to create a curriculum that would be suitable for preparing local artists so they could have the skills to work in community arts or, as it is now known, socially-engaged practice. It was hoped that this would address a problem where there was a lack of artists from the local area who felt confident in applying for commissions for socially-engaged work. As a consequence, funding would go to arts practitioners from outside the area, and these people would not necessarily have the connections and insights to understand the needs and cultures of local communities.

The *Make it Happen* team included a coordinator and a researcher from the University and the NPO Chief Executive Officer (CEO) and a Creative Producer. A draft curriculum was then designed based on the knowledge and experience of the team's members. This was then trialed with a group of local artists (participants) who were recruited to undertake a three-week short course.

The feedback and reflections from the participants and the project researcher were then examined through a theoretical lens developed from Bernstein's work on classification and framing¹ in conjunction with Alhadeff-Jones' work on the rhythms of educational time.² This enabled the researcher to explore the tensions that arose in the project around the competing temporalities of organisations and individuals.

It was found that different stakeholders (University, NPO, Artist-Teachers, and participants) operated within different rhythms and temporalities. The course was positively received by the participants, the majority commenting that it did prepare them for undertaking socially-engaged practice. However, the feedback made references to time, pacing and sequencing, therefore it was suggested that an understanding of diverse temporalities should be explicitly included in any future curriculum for training artists to be socially-engaged practitioners.

Context

The project took place in an area of low participation in the arts. This was indicated by the previous research in 2011 that showed 52 percent of people in the area did not attend a single arts event during the previous year.³

In England the Lower layer Super Output Area (LSOA), is a measure of deprivation and includes the domains of income, employment, health, education and skills, housing and access to services, crime, and living environment.⁴ *Make it Happen* was undertaken in a place where 12.2 percent of its population lived in LSOAs which ranked within the worst 10 percent in England. This is higher than the average for England where 9.9 percent of the population are within the worst 10 percent of LSOAs. The local people identify with a range of ethnicities; 76.6 percent of the population identify as white British; the next largest groups are 9.9 percent identifying as Asian/Asian British (Pakistani) and 4.9 percent identifying as Asian/Asian British (Indian).⁵

There are few artists from the local area who have been trained to be socially-engaged practitioners and who are being commissioned to run projects with the local communities. Coinciding with this issue is a perceived lack in higher education of degree courses that focus particularly on socially-engaged practice. The *Creative People and Places* CEO argued that, “[In my view] there’s nowhere in the UK that teaches socially-engaged [arts] practice... which is bizarre because socially-engaged practice is the fastest growing and most significant element of how art practice is changing globally, yet the UK education system is not responding to that.”⁶

Community-based arts degree programmes ultimately can lead to just and sustainable societies where people and communities feel they belong and can contribute towards a greater good. However there have been many arts courses in the UK that have suffered from significant cuts.⁷ At the same time higher education’s engagement with community arts projects could be declining.⁸ Therefore, there is a need for additional opportunities to train in socially-engaged arts practice so that artists feel confident in working with people and communities. By developing the practitioners based in the locale this would ensure they had an empathy with and understanding of those with whom they were working as well as of the place in which the work was situated.

Theoretical Context

The theoretical context considers two approaches. Firstly, by drawing upon Bernstein’s classification and framing, questions can be asked about who has control over the content of the curriculum and how it is delivered. Secondly, Alhadeff-Jones’ work on developing rhythmic intelligence, enables a further analysis on who has control over the sequence, pace and rhythm of curricular delivery. This will aid an evaluation of how well the *Make it Happen* project enabled artists to be trained in socially-engaged practice.

Classification refers to **what**, framing is concerned with **how** [my emphasis] meanings are to be put together, the forms by which they are made public and the nature of the social relationships that go with it.⁹

Classification, the degree to which categories or subjects are insulated from each other, constructs the nature of social space, stratifications, distributions and locations. How is a curriculum organised; are the topics clearly delineated from each other or are they integrated as in an approach based on project work? Bernstein clarified that, “where we have strong classification, the rule is things must be kept apart. Where we have weak classification, the rule is these must be brought together.”¹⁰

Within a community arts organisation such as the NPO the numbers of workers tend to be small. This leads to the boundaries between job roles becoming fluid, as people often need to operate in more

than one area therefore the classification between roles/tasks/ expertise is weak. For example, an artist could be also managing the social media accounts and the administration.

In a University where job roles are more clearly delineated and regulated, the boundaries are likely to be more impermeable and therefore, classification would be strong.

The difference in how the two organisations are classified might lead to tensions that could impact on the curriculum and how it was delivered. There may be a difference between educators from the two organisations about their beliefs on how the participants should be taught or trained.

Framing is the control of pedagogic communication, for example who controls the pace and sequencing of a curriculum? To what extent do students/learners/trainees have control over how they learn, when they learn and how quickly they learn? Where the role of teachers and learners is clearly delineated and teachers control how the content is to be learned, this would be seen as strong framing. However, if the learners can decide the pacing and sequencing of topics to suit themselves then this would be weak framing.

As Bernstein suggests, the “stronger the classification and the framing, the more the educational relationship tends to be hierarchical and ritualised...”¹¹ And this suggests a very teacher-centred approach.

Conversely, weak classification and framing could lead to educational relationships that appear more non-hierarchical and fluid, more student-centred rather than teacher-centred. However, control and power still operate in weakly classified and framed curricula through complex modes of interpersonal communication and implicit or explicit modes of evaluation.

One criticism of Bernstein’s approach is that it can appear that power relationships between social groups as well as teachers and learners are static and fixed. So, a development of these ideas could be to consider theories that try to evoke the complexities of time when looking at pacing and sequencing of content.

Alhadeff-Jones’ work around rhythmic intelligence introduces the notion that control over the timing, pacing and sequencing of curricula are in flux. From this perspective, educational processes, as well as the environments in which they evolve, are to be conceived as being in on-going motion.¹² Daily cycles and seasons punctuate the course programmes and these may or may not be in synergy with the biological and psychological rhythms of learners and teachers. Learning phases can be paced by schedules, timetables, calendar and social interactions, but who controls these mechanisms for regulating time - the learners, educators or managers?

Method

The aims of *Make it Happen* were to:

- Educate and inform participants on designing and delivering an interactive and community focused activity.
- Educate participants and provide them with experience of developing and presenting a project proposal in response to a site-specific brief.
- Seed and grow a creative network within the locale interested in and capable of delivering high quality engagement projects in the area.

Ten participants were recruited from the locality. They were artists, performers, writers and textile makers who were interested in developing their skills as socially-engaged practitioners. They were invited to take part in a short course (*Make it Happen Creatives Summer School*) and given a small bursary to pay for their travel and expenses.

The *Make it Happen* curriculum was devised by the project researcher and the Chief Executive Officer and Creative Producer of the NPO and included sessions on:

Preparing a budget, risk assessment, preparing a proposal, promoting socially-engaged practice, researching sites and communities, developing ideas for socially-engaged practice, reporting, evaluation, representation, documentation, co-construction, doing no harm, respect for the site, collaboration, diversity and inclusion, working and connecting with communities in an ethical way, cultural literacy, empathy, listening, care for self, participants, stakeholders, communities, sponsors and colleagues, and understanding the various contexts of socially-engaged practice.

The *Make it Happen* course took place during three days per week over three weeks in July 2022, resulting in participants presenting proposals for an outdoor and interactive art activity or an event for a local heritage open day. Artist-teachers – people who had extensive professional experience working in socially-engaged practice/community arts ran the course. University lecturers taught two discrete sessions on participatory art and on poetry. The start and finish times 10.00-14.00 (British Summer Time) were carefully considered so that participants with caring responsibilities could drop off and pick up their children from school.

The pedagogical approach was based on working with a real site, where participants guided by the artist-teachers researched and tested ideas for socially-engaged practice. This activity culminated in a series of proposals for future projects that were pitched to the CEO, who evaluated them and gave feedback to the participants.

During the sessions the researcher observed the course and made field notes. The participants were then asked to give feedback on the course, reflecting on the impact the experience had had on them.

DISCUSSION

Feedback from the participants

The comments from the participants very often alluded to time. The *Make it Happen* project was seen to provide time where they could learn important skills that could have a benefit on their careers.

This has been an absolute game-changer for my career! Having the time, space and input from others to consider proposals has made such a difference in motivation, positivity and confidence, thank you!

Although the course was based on learning through doing, it also seems to have provided thinking time where people could reflect and contemplate. It also seems that the participants were surprised at how much they could learn in a relatively short amount of time.

I have learnt so much in a short space of time about an area I am new to.

The topics were sometimes seen to be covered in depth rather than superficially and it is positive that this could be done in nine days contact time.

I didn't realise the course would be this in depth, we covered an absolutely huge amount in such a short time.

A couple of the participants mentioned that the pace of the course was relaxed. This could mean the course felt informal or that the pace was comfortable; they did not feel pressured to meet a deadline.

I thought the course allowed us to touch upon all of the areas above in a relaxed fashion (with some topics having more dedication than others) meaning we had more of a scope of the thinking and necessities of socially engaging art practice, rather than concentrating a few topics and missing others.

Other participants noted a change in the pace of the course; that it may have become more pressured towards the end.

Overall a good course, I felt the start was relaxing and perhaps rushed towards the end to get the proposals ready.

Another participant commented both on the pace and the sequencing of *Make it Happen*.

Wonderful course – although seemed to slow down a little during the second week. I feel it would have been good to have had the brief earlier in the project.

The comments from the participants suggested that the rhythms, pacing and sequencing of the course were important issues for consideration. Of particular interest was the perception of time being at some points slow and relaxed and at other points rushed as pressure increased to meet the deadline.

Reflections on the temporalities of the stakeholders

The researcher reflected on how the University, the NPO, the artist-teachers and participants seemed to operate with different rhythms and conceptions of time. Table 1 represents the researcher's thoughts based upon working on the project with all these stakeholders.

Group/body	Pace	Sequence	Rhythm/episode	Control
University	Slow	Consistent Inflexible	Annual	Time-bound Controlled and controlling
NPO	Rapid	Inconsistent Flexible Open	Sporadic (opportunistic)	Controlling
Artist-teachers	Slow-fast	Inconsistent Flexible	Daily and weekly	Controlling and controlled
Participants	Fast and Slow	Habituated Interrupted	Daily, sporadic	Controlled

Table 1. Stakeholders' Rhythms and Temporalities

The rhythms, pacing and sequencing of the different stakeholders were entangled and vying for control over the concept and use of time in the project.

The University as the gatekeeper of the funding did have some control over the timings of the activities. However, its control was not absolute as it needed to have completed the project within one academic year to comply with the conditions of the external funder. Also, its policies and regulations needed to be complied with, resulting in processes being slow, consistent and inflexible. This has some congruence with the assessment of the University being a strongly classified and framed organisation.

Conversely, the NPO worked at a rapid pace and was quick to change the sequence of activities and topics as opportunities and challenges arose. This approach from the point of view of the University led to difficulties in sticking to agreed plans and a breakdown in communication when activities

changed. This more fluid and adaptive understanding of time was in keeping with the notion that the NPO was weakly classified and framed. Ultimately the NPO had a large amount of control of the project, because it was subject to its own policies and regulations that allowed for a more sporadic way of working.

The artist-teachers who delivered the course had most control of the sequencing and pacing of the curriculum. They were able to set the pace which changed depending on what outcomes they wanted to gain from the learning activities. But they also needed to comply with the deadline so that the participants could present their work to the CEO in good time. Their planning was in relation to the days and weeks of the project. The schedules for individual days were changed and adapted depending on how the learning activities were received by the participants or based on environmental factors due to working outside at the site. This way of working was well described by the participants when they commented about the course being slow at some points and rushed at others.

The participants had least overall control; they were working within the time constraints that had been set by the artist-teachers, the NPO and the University. They also needed to align the rhythms, pacing and sequencing of the course with their lives outside the programme. So, for example, the rhythms of picking up children from school, or visiting an aging parent or going to a part-time job, or catching a train to arrive home on time could be disrupted or interrupted by the rhythms of *Make it Happen*. It could be argued that the course appeared to be weakly classified and framed. There was a degree of informality where the participants had a level of control over the sequence and pacing of the course, however, they were still subject to the relatively powerful position of the artist-teachers.

CONCLUSION

The course, from the point of view of the participants appears to have been very positive. They felt they learned more than they expected in a relatively short amount of time. It is possible that the learning was superficial rather than in depth, but this did not come through in the feedback. The point that the stakeholders operated with different rhythms and temporalities does not seem to have impacted on the outcomes for the participants.

There were some nuances reported in the pacing and sequencing of the curriculum where participants reported the course feeling relaxed and at times rushed. This suggested that control oscillated between participants and the artist-teachers. It must be remembered that the participants were subject to the temporalities of many different organisations and agents, and it is a testament to them that they were able to manage their time successfully.

There was some sensitivity to the temporal needs of the participants in the planning where the whole week was not taken up with the course (only three days). Also, the contact time was carefully planned so that the participants could meet their life responsibilities outside the course.

Those who control the rhythms and temporalities of others ultimately have power over them and this is a social justice issue.¹³ As the *Make it Happen* course was about training artists and creative practitioners to work with marginalised communities then perhaps the curriculum should have contained some explicit discussion about respecting the temporalities of others when planning socially-engaged practice.

The project suggests that there are some theoretical synergies that can be made between Bernstein's theories on classification and framing and Alhadeff-Jones work on developing rhythmic intelligence. This approach suggests that when planning inclusive socially-engaged projects artists and educators should not assume that everyone has the same experiences and concepts of time.

NOTES

- ¹ Basil Bernstein, *Pedagogy, Symbolic Control, and Identity: Theory, Research, Critique (Vol. 5)* (Oxford: Rowan and Littlefield, 2020).
- ² Michel Alhadeff-Jones, *Time and the Rhythms of Emancipatory Education: Rethinking the Temporal Complexity of Self and Society* (Milton Park: Taylor & Francis, 2017); Michel Alhadeff-Jones, "Developing Rhythmic Intelligence," *Time and Temporalities in (Adult) Education and Learning* 11 (2023).
- ³ "Impactful Insights: A Data-Driven Approach to Audience Development," Creative Scene, accessed June 08, 2023, https://www.artscouncil.org.uk/sites/default/files/download-file/ECorysCaseStudyCPP_SlowSuperSlow.pdf
- ⁴ Gemma Catney, Christopher D. Lloyd, Mark Ellis, Richard Wright, Nissa Finney, Stephen Jivraj, and David Manley, "Ethnic diversification and Neighbourhood Mixing: A Rapid Response Analysis of the 2021 Census of England and Wales," *The Geographical Journal* 189 (2023).
- ⁵ "Kirklees Factsheets 2020: Intelligence and Performance," Kirklees Council, accessed June 08, 2023, <https://www.kirklees.gov.uk/beta/information-and-data/pdf/kirklees-factsheets.pdf>
- ⁶ "Talent Development for Socially Engaged Practice," Creative people and places [CPP], accessed June 08, 2023, https://www.artscouncil.org.uk/sites/default/files/download-file/ECorysCaseStudyCPP_SlowSuperSlow.pdf
- ⁷ Jonathan Lilliedahl, "Is there a Transnational Trend of "Nudging" Away from the Arts? How the Selection Device Works in The European–Swedish Context," *Arts Education Policy Review* 124 (2021); Sally Weale, "Funding cuts to go ahead for university arts courses in England despite opposition," *The Guardian*, July 20, 2021, <https://www.theguardian.com/education/2021/jul/20/funding-cuts-to-go-ahead-for-university-arts-courses-in-england-despite-opposition>.
- ⁸ Dany Louise, "Why are universities scrapping their community arts projects?" *The Guardian*, May 02, 2013, <https://www.theguardian.com/education/2013/may/02/why-are-universities-scrapping-their-community-arts-projects>
- ⁹ Bernstein, *Pedagogy, Symbolic Control, and Identity*, 12.
- ¹⁰ Bernstein, 11.
- ¹¹ Basil Bernstein, *Class, Codes and Control: Vol. 1. Theoretical Studies Towards a Sociology of Language* (Boston, Massachusetts: Routledge & Kegan Paul Books), 376.
- ¹² Alhadeff-Jones, *Time and the Rhythms of Emancipatory Education*.
- ¹³ Elizabeth F. Cohen, *The Political Value of Time: Citizenship, Duration, and Democratic justice* (Cambridge: Cambridge University Press, 2018).

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INTERDISCIPLINARY PEER-TO-PEER LEARNING IN DESIGN AND POLICY: RHIZOME AT VIRGINIA TECH

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INTRODUCTION

The Rhizome Living-Learning Community (LLC) is one of twenty-one such communities at Virginia Tech. Founded in 2021, it is part of an ongoing effort by the university to expand the number of on-campus students enrolled in programs in which students live and work together around a shared theme.¹ It is part of an effort to remake the east side of Virginia Tech's campus to focus on the interdisciplinary intersections of the arts, design, and technology. It is located in the new CID LLP dormitory, which offers a unique blend of spaces and amenities, including traditional dorm rooms, suites for first-year student athletes, studio and performing arts classrooms, and apartments for live-in faculty and student affairs staff, as well as for visiting scholars. The crown jewel of the facility is a state-of-the-art maker studio that includes a wood shop, metal shop, laser cutters, and 3D printers.²

Living-Learning Programs at Virginia Tech are organized based on the pyramid model formulated by Karen Kurotsuchi Inkelas, et. al. in *Living-Learning Communities That Work: A Research-Based Model for Design, Delivery, and Assessment*.³ In this model, the foundations are both conceptual—a need for clear goals and objectives—and infrastructural—facilities, faculty, staff, and other resources. Built upon those foundations are an academic environment encompassing courses for credit, faculty advising, and intentionality around supporting student learning. The next layer is a co-curricular environment that supports the academic goals of the program. The pinnacle is a concept known as “intentional integration,” meaning that all aspects are working in harmony towards the program's goals.⁴

As with many—though not all—LLCs at Tech, Rhizome is a partnership between academic affairs, specifically the College of Architecture, Arts, and Design (AAD), and Student Affairs. Its physical infrastructure and resources are centered in the CID dorm, with the majority of funding coming from student program fees. Additional funding is provided by AAD, with additional facilities available in the college's academic buildings elsewhere on campus. Rhizome's Program Director, appointed as a faculty member on Virginia Tech's Collegiate track, is responsible for both the curricular programming—Rhizome's classes—as well as co-curricular aspects. Though the model insists on the inseparability of curricular and co-curricular aspects, this paper will focus on the curricular portion of Rhizome's programming.

Featuring an interdisciplinary, multigenerational mix of curricular and co-curricular experiences, Rhizome aims to help undergraduate students gain the skills and perspectives to tackle complex global challenges through a combination of design thinking, systems thinking, sustainable

development, and project-based learning. Yearly learning is centered on one of the seventeen United Nations Sustainable Development Goals, and approaches a complex global challenge from both global and local perspectives. The culmination of the year is a sustained and iterative project in collaboration with a community partner, offering design-based solutions to problems faced by that partner. In Rhizome's first year, the theme was food insecurity and sustainable agriculture, with the focus shifting to sustainable cities and communities in the second. This paper reflects on these first two years of Rhizome, in particular on the challenges and possibilities represented by Rhizome's unique blended emphasis on policy and design interventions. How do design and engineering students understand their relationships to policy? How do students in the humanities and sciences contribute to design projects? How does peer-to-peer learning—specifically, organization into interdisciplinary design teams—impact students' understanding of their roles in addressing complex global challenges? Thus, this paper offers guidance and possibilities for the creation and sustenance of similar living-learning communities.

Rhizome's Conception and Launch

Though it now resides with a college called Architecture, Arts, and Design (encompassing the Schools of Architecture, Design, Visual Arts, and Performing Arts), Rhizome was planned as part of the College of Architecture and Urban Studies (CAUS). Consisting of the Schools of Architecture + Design, Policy and International Affairs (SPIA), Building Construction, and Visual Arts (SOVA), the old CAUS was conceived as studying and designing the built environment from the interior out through the individual building to the street, neighborhood, and, ultimately, the urban agglomeration. Subsequently, the College was reorganized, with SPIA and Building Construction joining other colleges, the School of Architecture + Design splitting into two units, and the School of Performing Arts (SOPA) joining. The result was a more traditional college of arts and design, one without the inclusion of the policy and construction areas that originally animated Rhizome. Upon this shift in the college's constitution, the Program Director—in consultation with a variety of stakeholders—decided to retain Rhizome's original focus while also aiming to further integrate concepts and perspectives from the performing arts.

YEAR ONE

Rhizome was launched with a mix of curricular and co-curricular activities designed to support student learning around the inaugural theme, which was United Nations Sustainable Development Goal 2: Zero Hunger. The initial Rhizome cohort consisted of fifty first-year students, about half of whom came from architecture, design, and policy majors, with the rest represented by engineering and a grab bag of science disciplines. Due to a compressed timeline of onboarding and program launch, the Rhizome class was not offered until the Spring Semester. Instead, students were greeted with an ambitious co-curricular program that included service learning trips, guest faculty lectures, and workshops on community work and social justice. According to the pyramid model, co-curricular elements rest atop academic ones, reinforcing classroom work by giving students the opportunity to apply it outside of the classroom.⁵ By launching its co-curricular programming first, Rhizome offered these sorts of experiences without the benefit of formalized classroom study, leaving students adrift as they navigated complex challenges. Further, many of the co-curricular experiences were strikingly academic, better suited to the classroom setting. One of the key takeaways from this early experience is thus to focus early semester rhythms on cohort-building, leaving weightier subjects for later in the semester, when students are both more comfortable with each other and have begun to grasp concepts through classroom study.

Rhizome's Course: First Version

When Rhizome's course started up in the Spring 2022 Semester, another problem with the delayed start manifested itself: many students in the LLC did not know one another. A bigger issue, however, is that Rhizome's complex mix of disciplinary inputs made for an overstuffed class experience. In one sixteen-week semester, students were asked to learn about systems thinking; sustainable development (primarily the UN SDGs); and design thinking and human centered design. They were then asked to complete original design-based projects in service of a community partner, in this case Plenty!, a farm and community food organization in Floyd County, a rural area about 45 minutes from Virginia Tech's campus. The first half of the semester moved discretely through the more academic topics, asking students to read, discuss, and apply concepts from books and scholarly articles about systems thinking, sustainable development, and design history and theory.⁶

The switch to practical design work in interdisciplinary project teams in week 9 of the semester was, after this rigorous academic study, jarring. It also exposed a key flaw in the one-semester model. Design thinking, as it originated at Stanford University's d.school, is an intensely iterative process, involving initial client/community input, initial prototyping, feedback, redesigns, further feedback, and so on until a satisfactory conclusion is reached.⁷ Simply put, even a basic version of this process was impossible to execute in the second half of a semester. This was exacerbated by the fact that students were not prepared for this type of work. Even architecture and design students at Tech are engaged in foundations work in their first year, while non-design students were even less likely to have experience with this sort of iterative, project-based work. It quickly became clear that, in order to maximize success a longer timeline for student work would be necessary.

Even in this constrained environment, however, the students' work revealed the strong potential for service learning inherent in the Rhizome model. Plenty!, Rhizome's partner for the year, distributes both donated food and produce grown on site to anyone living in Floyd County who identifies as food insecure.⁸ Running its operation out of a small former farmhouse and outbuildings, Plenty!'s leadership were concerned about the county's relatively low rates of vaccination for COVID-19, and the impact of indoor food distribution on its clients, many of whom are elderly or otherwise at heightened risk for the vaccine.⁹ Thus, students were asked to submit ideas for a variety of efforts to move more of Plenty!'s operations outdoors, including waiting areas, new food distribution areas, demonstration gardens for locally-grown produce, wayfinding and signage, and a new facility for washing plastic produce crates.

An examination of student work shows a serious approach to the topic. For example, a group called P.L.E.N.T.Y. (for Please Let Everyone Nourish Their Youth) decided to focus on the crate-washing station – as illustrated in Figure 1. They conceived of an enclosed or semi-enclosed space with large sinks, ample drying racks, and a floor drain to ensure that standing water would not be a concern. In particular, they included an accessible sink to accommodate volunteers or employees who might use wheelchairs. Their design stemmed directly from their goals, which included accessibility, aesthetics, manageability, practicality, and usability. These last three, overlapping though they may be, show the group's cognizance that this is not the appropriate time for the architect or designer's flights of fancy. Rather, they have absorbed one of the key goals of the program, which is for students to grasp that, in seeking to improve peoples' lives, they should trust those people to know what they need and to help them achieve it, rather than to impose top-down, hierarchical solutions.

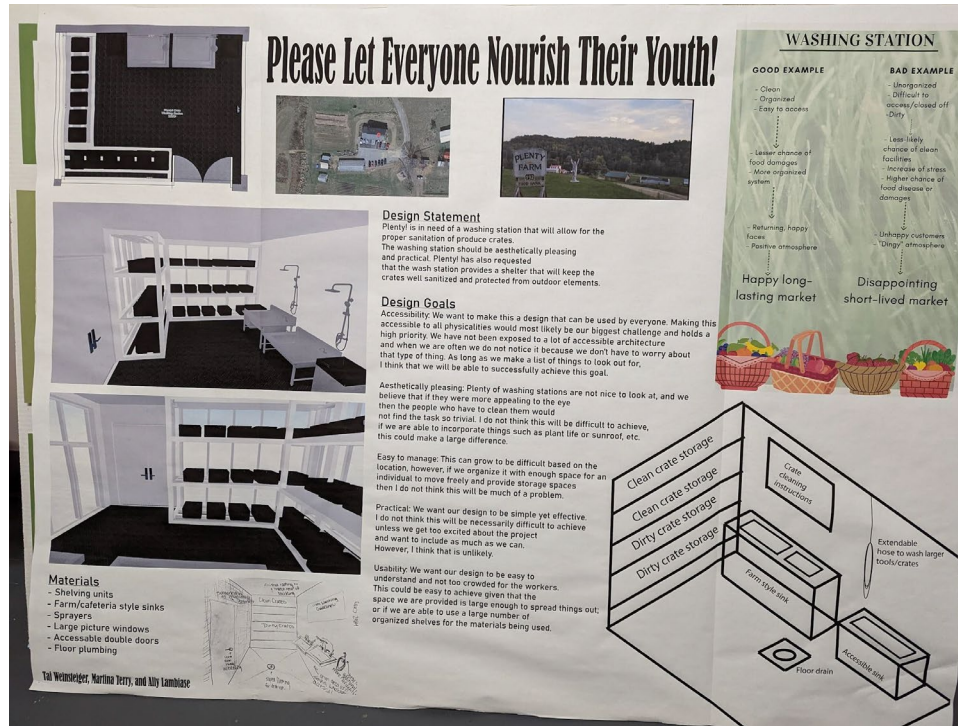


Figure 1. Work by P.L.E.N.T.Y. Project Group

The Virginia Tech Trekkers, the only group to have a member actually visit Plenty! before beginning work, focused on an outdoor waiting area for those visiting the food pantry – as illustrated in Figure 2. Their design reflects that visit, exhibiting a site specificity lacking in the groups that relied on photographs and other indirect observations. Designed as an addition to an extant outbuilding, their waiting area is designed to cover a low-lying swale, currently an under-utilized dead zone in the middle of the Plenty! campus. Featuring low walls that can double as seating, the design also includes an armature to support a retractable fabric shade to provide shelter from both rain and sun. As with P.L.E.N.T.Y., these students made accessibility a cornerstone of their design, at first considering ramps at the entrances before deciding to take advantage of the fact that they were filling a ditch, suggesting that the whole structure simply be constructed at grade.

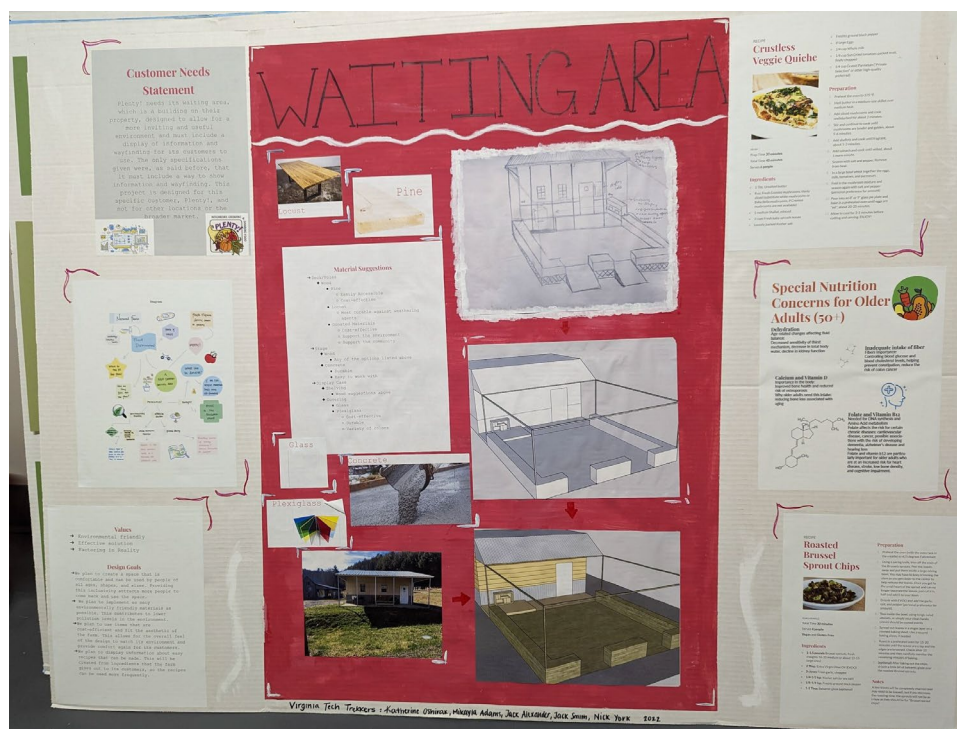


Figure 2. Work by Virginia Tech Trekkers Project Group

An examination of the other groups reveals a similar set of strengths: students thought seriously about the problems as conveyed to them by Plenty! staff, and they were careful to create realistic designs. Each of the designs—with the possible exception of a planter design repurposing old shipping pallets—would need additional attention from professional architects to be realized – as illustrated in Figure 3.¹⁰ Still, that is likely to be true of most designs created by first-year students, so overall the effort was a successful one.

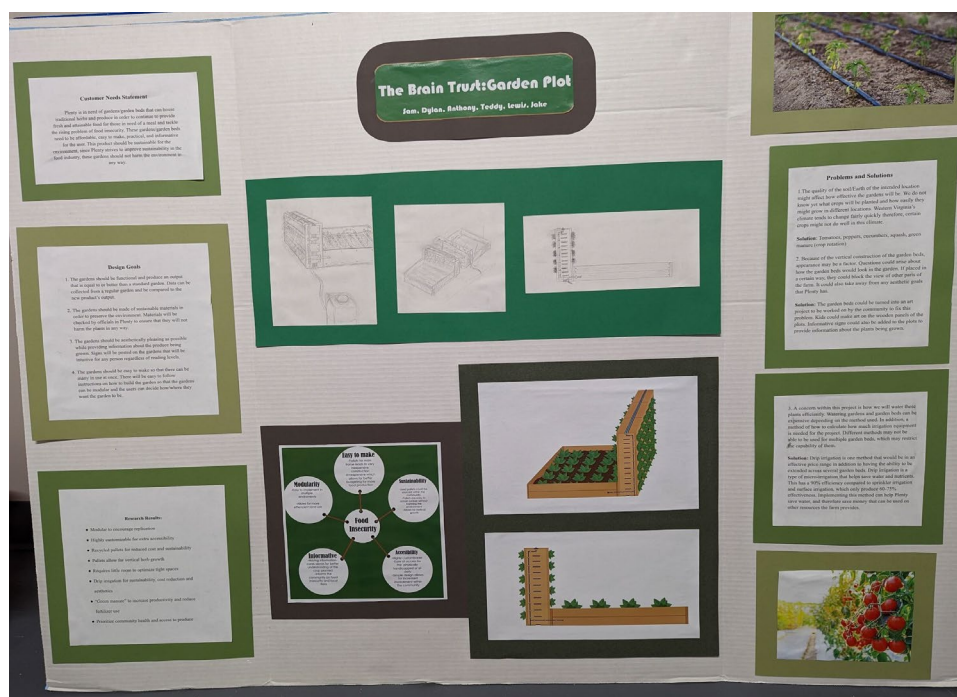


Figure 3. Work by The Brain Trust Project Group

Student feedback was mixed, though on balance positive. Some students resented having to devote so much time to a course required to live in their preferred dorm. This is always a hazard in LLCs, but was likely exacerbated in this case by the lack of a fall course. Meeting in the fall would have established the course as a normal part of the dorm, rather than a new and more onerous requirement. For those students who overcame this obstacle, they lamented the compressed timeline and the difficulty in switching subjects from sustainability to design at midyear.

The other major piece of feedback speaks directly to Rhizome's interdisciplinary character. Though it is sponsored by the College of Architecture, Arts, and Design, Rhizome's students come from every college in the university, and many students professed discomfort and uncertainty when it came to design. Each team was asked to produce deliverables—including annotated bibliographies of scholarly sources on their topics—that would enable non-design students to shine, but many still felt that the weight was too far towards design. From the instructor's standpoint, these non-design assignments felt insufficiently integrated into the students' workflow.

YEAR TWO

Going into year two, the biggest areas for improvement seemed clear: better integrate the course into the rhythms of life in the LLC; separate the academic and hands-on sections of the course; and give more time for iteration in design work. Fortunately, a single solution presented itself for all three problems: split the course in two. During the Fall, students in Rhizome now take AAD1204: Thinking Globally. Encompassing systems thinking and sustainable development, the course also lays the groundwork for the spring design projects by introducing Rhizome's yearly theme and heavily emphasizing group work, in which students begin to develop the collaborative research skills to help them succeed in their design teams. Behind the scenes, this arrangement also allowed the instructor time to lay the groundwork for the design projects, including recruiting clients, faculty mentors from a variety of disciplines, and working to break project into manageable chunks for the students.

In January, at the start of AAD1214: Acting Locally, students have become accustomed to a weekly LLC class, they are familiar with each other's group work styles, and have already achieved a basic level of familiarity with the projects on which they will work. That familiarity was reinforced at the beginning of the semester with presentations from the clients, which in this case included Habitat for Humanity, a local housing nonprofit called Community Housing Partners, and the Town of Blacksburg. Representatives of these groups walked the students through the projects, which revolved around two housing developments, one of which is a townhouse development in an existing neighborhood and the other is new construction on the outskirts of town. Working in 13 different teams, students engaged in a diverse array of projects, including both digital and physical 3D modeling, site planning, recommendations on architectural language, house orientation recommendations for solar and passive heating, and more. The students were asked to perform preliminary research on their chosen projects, building knowledge that would ideally help them as they began their design work. They also performed group work exercises in order to help ensure that they worked well together.

After these initial weeks of research and group formation, students embarked on a modified version of a charette. While most commonly used to mean an intensive collaboration between a community and design professionals, the charette format was modified in this case to enable first-year students, working with faculty guidance, to quickly complete initial prototypes of their designs.¹¹ These formed the basis of further iteration over the remaining twelve weeks of the semester.

In the interest of space, I will highlight the progress of one of the groups, an interdisciplinary team made up of students majoring in architecture, engineering, water science, data analytics, and urban

planning, Nate's Team benefitted from the mentorship of a senior member of the Architecture faculty. They were among the most successful teams, showing the possibilities of this sort of interdisciplinary collaborative work for first-year students. After the charette, this group came up with preliminary plans for fitting eleven townhouses townhouses—plus parking and communal space—on a 0.8 acre parcel of land – as illustrated in Figure 4.

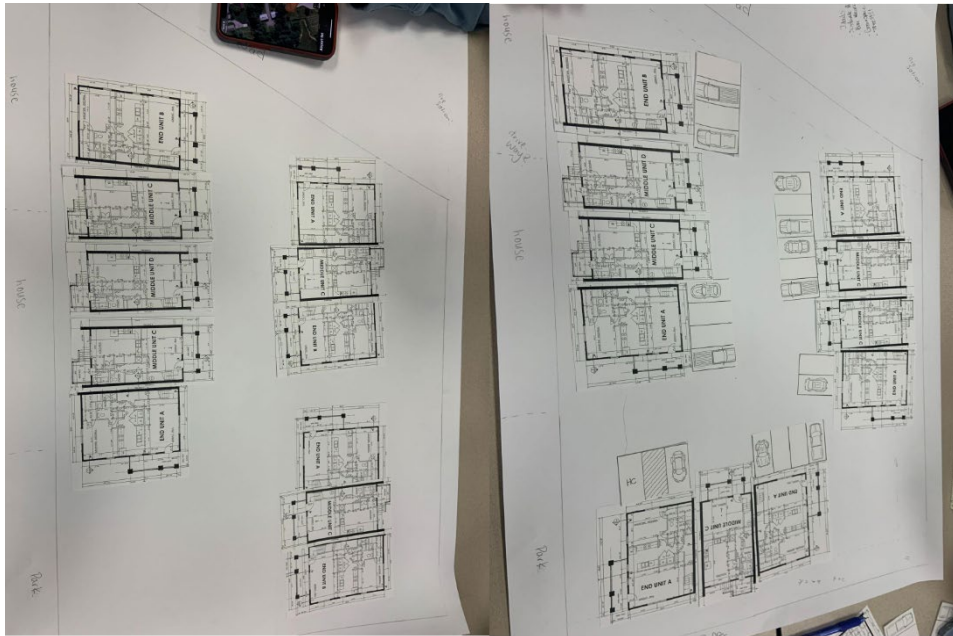


Figure 4. Initial Design by Nate's Team

Their faculty mentor and I offered feedback on these preliminary plans, after which they chose to focus on an orientation in which houses are clustered in three sections – as illustrated in Figure 5. They chose it in order to maximize the amount of communal space, hoping to avoid making lower-income inhabitants feel as if they are simply being warehoused. They also chose this orientation to increase the appeal to the rest of the neighborhood, a tightly-knit enclave of midcentury ranch houses, primarily by minimizing the profile from Airport Road, the area's main thoroughfare.



Figure 5. Revised Design by Nate's Team

The team presented this version of the project to the clients, including the executive director of the local Habitat for Humanity and representatives of the Town of Blacksburg, as well as the faculty mentors. The clients were complimentary, raising two major objections. The first was related to cost, specifically of the amount of asphalt required for the ring road orientation. The other was more technical, relating to stormwater management on the site.

Following this feedback, Nate's Team produced their final design – as illustrated by Figure 6. This site plan minimizes the impact of the stormwater issue (the natural path for the drainage sits at the rear of the site), while also providing greater access via footpath to an adjacent micro park, another design goal. Importantly, the students have stuck to their guns on the ring road, viewing it essential to the success of their design. Nate's Team shows the power of this sort of project for first-year students. They have experienced something of the iterative design project, prototyping, revising, responding to feedback, and otherwise gaining perspective on what their future lives as experts might hold. Though they might or might see this experience as directly relevant to their intended majors, they have gained a variety of broadly transferrable skills, including teamwork, interdisciplinary collaboration, working with faculty experts outside of their usual academic orbits, and absorbing and responding to feedback related to real-world requirements and conditions. The other teams also engaged in similar practices, and I believe have gained similarly in perspectives and skills. This type of teaching is immensely time-intensive due to the need to recruit and manage community partners as well as faculty mentors. It is worth it, however, to see students gain so much in such a short amount of time.



Figure 6. Final Design by Nate's Team

NOTES

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- ³ Karen Kurotsuchi Inkelas et al., *Living-Learning Communities That Work : A Research-Based Model for Design, Delivery, and Assessment* (Sterling, Virginia : Stylus Publishing, LLC, 2018).
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- ⁵ Inkelas et al., 65.
- ⁶ Draper L. Kauffman and Morgan D. Kauffman, *Systems 1: An Introduction to Systems Thinking* (Independently Published, 2021); Jeffrey Sachs, *The Age of Sustainable Development* (New York: Columbia University Press, 2015); Richard Buchanan, “Wicked Problems in Design Thinking,” *Design Issues* 8, no. 2 (1992): 5–21, <https://doi.org/10.2307/1511637>.
- ⁷ Jeanne Liedtka, Andrew King, and Kevin Bennett, *Solving Problems with Design Thinking: Ten Stories of What Works* (New York, UNITED STATES: Columbia University Press, 2013), 16, <http://ebookcentral.proquest.com/lib/vt/detail.action?docID=1192015>. Hasso Plattner, Christoph Meinel, and Larry Leifer, eds., *Design Thinking: Understand - Improve - Apply*, Understanding Innovation (Berlin Heidelberg: Springer, 2011), v, <https://doi.org/10.1007/978-3-642-13757-0>.
- ⁸ “About Us,” Plenty Local, accessed April 14, 2023, <https://plentylocal.org/about-us/>.
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- ¹⁰ It seems likely that the shipping pallet design was not entirely original, as this is an idea floating around the DYI Internet, but the students in this group made enough suggestions unique to Plenty! that the idea still had merit.
- ¹¹ Rob Roggema, ed., *The Design Charrette: Ways to Envision Sustainable Futures* (Dordrecht: Springer Netherlands, 2014), 16–21, <https://doi.org/10.1007/978-94-007-7031-7>.

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AIRPLACE: INTERDISCIPLINARY APPROACHES TO REGENERATION & SOCIAL SUSTAINABILITY

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INTRODUCTION

This paper presents *Airplace*; a collaboration between academics across various fields – Photography, Fine Arts and Architecture – and the Portland Inn Project - a national portfolio organisation that works with community of young residents in Hanley (Stoke-on-Trent) - to design and build a learning pop-up space as part of their summer programme, the Portland Thinkbelt led by the artistic directors Anna Francis and Rebecca Davies¹. Stoke-on-Trent has been identified as a region of severe deprivation, ranking 13th in the 2019 Indices of Deprivation study released by the Ministry of Housing, Community and Local Government. This project is part of a wider strategy of regeneration of the area through arts practices and experiential learning strategies that proposes reimagining the architect Cedric Price's project The Potteries Thinkbelt. (1964, S.o.T). The Potteries Thinkbelt proposed an innovative university model for the regeneration of the local Pottery industries and infrastructure, then significantly in decline. In this proposition the railway line would support a mobile educational provision based on temporary structures, with the carriages becoming classrooms. *Airplace* is a contemporary iteration of some of these key concepts. In this paper we contextualise the workshop in relation to Price's visionary thinking and consider the impact of the project on local regeneration strategies and policies supporting place-making and social sustainability.

Airplace incorporates innovative placemaking strategies and co-created modes of self-representation; integrating experiences of cultures and collective memories into urban public spaces.² As part of the methodology developed in the project, codesign emerged as one of the key strategies of work; co design being defined as 'the creativity of designers and people not trained in design working together in the design development process'.³

One of the main objectives of this project is to contribute to a sustainable regeneration of the neighbourhood. Sustainable urban regeneration requires the involvement of local communities in the decision making and design processes in order to empower communities and develop a sense of placemaking and ownership.⁴ The innovation of this practice-based research project lies within the development of interdisciplinary architecture and cultural production methodologies that address complex questions of regeneration and social sustainability by applying experimental techniques of interdisciplinary arts practices.

Portland Inn Project context and connections

In 2022 we were invited to engage participants of the Portland Thinkbelt Summer program in a place-making and identity workshop. The focus was on placemaking to foster a sense of community “ownership” of their street through the co-creative design and building of a pneumatic structure in collaboration with the Portland Inn Project. As cited on their website, “the Portland Inn Project CIC is a creative arts project for a community in Stoke On Trent with an aim to achieve community cohesion, economic, social and cultural development by involving the community in development of a pioneering community space, cultural hub and social enterprise.”

In the first (Doing/Making) stage, the participants engaged with the physical challenge of creating the large surface area of the inflatable through joining together pieces of opaque plastic donated from local industry. This process involved teamwork and an element of feeling into the unknown. Once created, the structure was inflated using a simple pedestal fan. The transformation of the inert materials into a physical structure that could house them really caught the imagination of the participants, who “took ownership” of its interior immediately. The interior of the inflatable structure then became our photo-studio, and each participant considered poses that they felt represented themselves in front of the camera. They then selected the image they felt best captured their identity, and used it as the basis for a further layer of customisation. This section of the project enabled participants to employ movement, stylisation and drawn and text-based elements to perform aspects of their identities, leading to a co-created ownership of their image.

Finally, we re-deployed the inflatable structure as an impromptu site of exhibition, displaying the participants’ images on the sides and “ceiling” of the pop-up. The Portland Inn Project facilitators hosted them in experiencing the space as a gallery, enacting a “private view” in the personas of The Curators; introducing another layer of performative identity. We worked with the community on this project through the lens of experiential learning; where knowledge is created through the transformation of experience. ‘Knowledge results from the combination of grasping and transforming experience’⁵. Kolb developed a cycle of experiential learning that has four stages: *Concrete experience*, *Reflecting Observation*, *Abstract Conceptualisation* and *Active Experimentation*. These stages were an important aspect of scaffolding learning for the youth workshop participants in the project.



Figure 1. Airplace workshop image generation and pop-up space construction by Becky Nunes

The role of HE in regeneration & social sustainability

One of the key elements of this project is its contextualization within the Higher Education Framework. It is essential that HE institutions engage with the regions where they are located. Students and academics can offer insightful perspectives, models and strategies for regeneration and can catalyze communities to become more involved in these areas. The civic movement and the Civic University network, led by Sheffield Hallam University supports that universities across the UK need to develop and embed civic aspirations at an institutional level, particularly through developing and publishing civic university agreements.

In terms of the work that we developed during this project it is essential from our perspective that the development of novel strategies are the product of co-creation with communities. The emerging

consensus among scholars, professionals and policymakers is that there is a need to find ways to give voice to local communities. Higher education institutions can contribute to the development of these models and strategies, testing and establishing innovative frameworks that have the potential to involve more diverse participants.

Our departure point for *Airplace* was the following question; how do we make regeneration and social sustainability strategies inclusive for more people? When communities take the initiative to lead the design of certain areas through self-directed processes generating interventions in public spaces that have a ‘lasting effect on people – they are public goods whose impact reaches more than simply those who live or work there and therefore support social sustainability.’⁶

The Thinkbelt; an educational model for regeneration

In a daring and brave moment Cedric Price established models for civic engagement that still represent an exciting approach that could be adopted in architectural pedagogy. For example, at Staffordshire University, the annual Cedric Price Day, which was first established at the closing proceedings of the EURAU conference, continues to explore ideas such as the Fun Palace and Potteries Thinkbelt, as models for a radical and activist approach to civic architecture. Price published his proposal The Potteries Thinkbelt on issue 2 of June 1966 of *New Society*. Essentially, the Potteries Thinkbelt proposes an innovative civic university model linked to local industries. The railway line would support a mobile educational provision based on temporary structures, with the coaches becoming classrooms. The students will be integrated within the urban areas contributing to the existing communities.

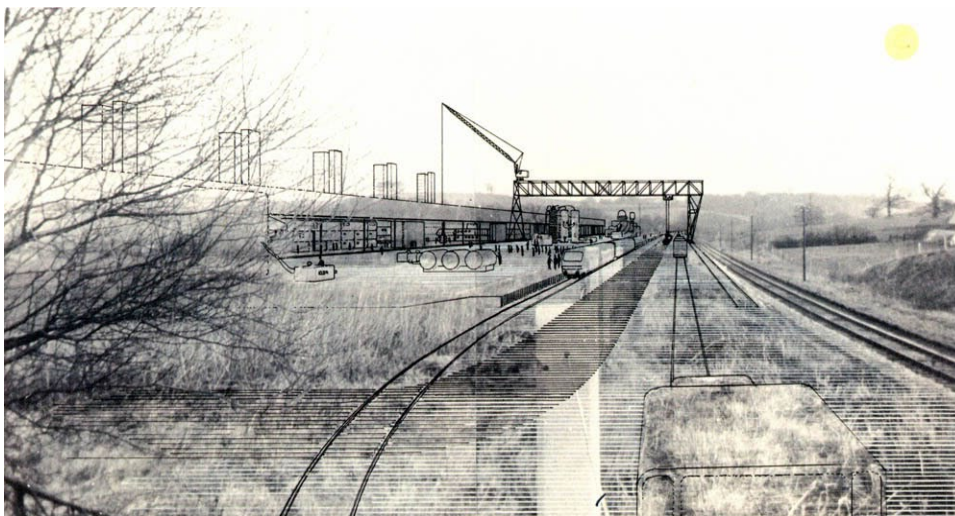


Figure 2. The Potteries Thinkbelt. Cedric Price. Canadian Centre for Architecture.

The Potteries Thinkbelt and the Portland Thinkbelt

One of the key references for the project, in terms of the type of intervention that we wanted the Community to develop in their area, was the project Potteries Thinkbelt by the architect Cedric Price. Cedric Price established models for civic engagement that still represent an exciting approach.

Price proposed to create an educational network in North Staffordshire which would replace the pottery industry. It would integrate that infrastructure and industry in decay and transform it into a university. That was a mobile university across the whole region that would create networks of students and citizens. The students would be integrated within the city. What was also innovative

about his proposal was not only the way in which it was going to be formalised, but also the creation of an educational model for the region.

His proposal presented train coaches that would become classrooms, and a network of pop-up learning spaces that would just appear and disappear when they were needed. He published this proposal on the 2nd of June of 1966 in the Journal News Society. It was essentially an innovative civic university model linked to the local industries. ‘When the next round of university building starts, perhaps we should treat education less as a polite cathedral-town amenity. We print here an architectural project for a 20,000 student campus in north Staffordshire which is built around a road and rail network, emphasises temporary housing and ties students with the community.’⁷

In the Potteries Thinkbelt, Price also brings into the table questions such as regeneration and sustainability. Already in the 1960s he was discussing and proposing a circular economy model where the structures could be disassembled and reused. Price was able to link sustainability, the higher education sector and local communities, having as an outcome a plan for the regeneration of a post-industrial area that 62 years later in 2023 is still addressing regional and global issues.

This is the reason why for us the Thinkbelt was a clear reference for this project; not only because we were creating one of those pop-up learning spaces that will serve the community in Hanley (Stoke-on-Trent), but also because it celebrates those sustainable ideas; the ways in which this temporary space that can be assembled & disassembled by the community can bring an empowering educational dimension to the regeneration of the area.

Rhizomatic networks

The Portland Inn project has pioneered the implementation of what their artistic directors have defined as ‘street level learning’. Previously to the project of the Potteries Thinkbelt, Cedric Price collaborated with the theatre director Joan Littlewood and the cybernetician Gordon Pask in the project of the Fun Palace. The Fun Palace was defined by Joan Littlewood as the ‘university of the streets’.⁸ The Fun Palace was instrumental in Price’s approach to architecture, and the Potteries Thinkbelt also contains elements of this University of the streets. When Price designs the Potteries Thinkbelt he proposes to break the hierarchical university structure and replace it by a rhizomatic network. Gilles Deleuze and Felix Guattari define the concept of Rhizome in opposition to the tree hierarchical structure ‘any point of a rhizome can be connected to anything other, and must be. This structure is very different from the tree or root, which plots a point, fixes and orders’.⁹

In the Potteries Thinkbelt, the exchange of knowledge is shared with the city, having a wider impact. In many ways the rail network is the materialisation of the rhizomatic structure. This is replicated in the Portland Inn Project (PiP) where there is a framework where everyone learns from each other, as highlighted by the young people that participate every year in the programme. The educational programme of the PiP is based on experiential learning and codesing, which by nature are non-hierarchical - rhizomatic - methods for learning. This idea of sharing knowledge horizontally, at the same level is one of the common characteristics of Price’s project and the Portland Thinkbelt.

Visual citizenship

The second key element of the Airspace project was a project of photographic representation for the workshop participants. Any photographic representation of communities as an aspect of socially-engaged or participatory projects carries with it a heavy load of ethical considerations. For some context we can look at Steve McQueens’ year-long project of representation, *Year 3*, (2020) which has in some quarters been hailed as “unassailable in its emotional immediacy and grandeur”¹⁰. McQueen spent a year coordinating photographers from Tate Britain to photograph more than 75,000

children from London's primary schools: a process that involved McQueen and his team visiting approximately 80 schools per week for an entire year. Every day for 20 weeks, 600 schoolchildren were brought to Tate Britain to view the project, while the institution estimates that, in total, around 17 million people would have encountered the billboards before they were eventually pasted over. This is undeniably a massive "reach" for the project, which aimed to capture and reflect the diversity of our contemporary classrooms. However, Harry Thorne, writer for Frieze Magazine, described the outcome as "large-scale participatory spectacle",¹¹ which, while undeniably celebrating diversity and universality, also packages the sitters and the audience into a static binary without offering any real possibilities for participation, problematization or politicisation of either group via the process of making or viewing of the work. Thorne points out in his critique of the project that "The risk is that we will end up with projects that do not help communities, but use communities for acclaim, only to discard them once more. Involvement does not equate to engagement. Participation is not praxis."¹²

If we look for alternatives to this author-subject model of photographic representation, a powerful example of participation as praxis can be seen operating in the ongoing Photo-Futures/Collingwood Project, led by RMIT lecturer Kelly Hussey-Smith. Hussey-Smith, in collaboration with colleagues from RMIT, has conceived of a "co-creation" between community groups, students, alumni and faculty, existing outside the boundaries of the institution. A key aspect of the project has been a physical space in which to house the Research Lab in the suburb of Collingwood, Melbourne. This space houses a vertically integrated group of BA Photography students, along with an alumni residency and community partnerships and projects. Community partners are viewed as co-teachers, and much time and care is taken to develop these working relationships, supported by faculty through readings, discussions and lectures which focus on collaboration, ethics and representation. In this way the curriculum can be viewed as the incorporation of photography and pedagogy in relation to community-led social change. Co-created outputs to date include modules developed for delivery into the local school, the use of lens-based imaging to highlight the misrepresentation of the African-Australian community, local social histories and the visual support of work created by the new migrant and refugee communities. These are rich and complex social relationships being co-created in the laboratory of the citizenry of photography.

Erica Balsom states that "to be invisible is also to be cast out of the body politic, into the precariousness of ungrievable life."¹³ So the claiming of global citizenry depends to some extent on visibility; and it is this notion that Azoulay addresses in her *Visual Contract of Photography*.¹⁴ In this work, Azoulay addresses some of the historical concerns raised by Sontag and others in their critique of photography as a tool of representation. These critiques have focused on the propensity of the fixed image to perpetuate or reinscribe stereotypes and traumas on the subjects within the frame. Azoulay calls on the viewer of the traumatic image to act in response to their witnessing, and points out that the image content can move far beyond the original intentions of either author or subject.

In thinking through the photographic element of this collaboration, it was therefore really important to create an ethical framework that would provide a platform for visibility, while avoiding the re-inscription of tropes and stereotypes that might override the agency of each subject. The framework for the photographic component of an urban place-making project such as *Airplace* has three distinct stages:

Stage One: Reading Pictures

In this stage a visual politics workshop is facilitated with the participants before the pop-up structure is built. During this workshop, participants tease out the problematic aspects inherent in photographic representation through reflecting on their own lived experiences, as well as by looking at other practitioners and projects.

Stage Two: Constructing Selfies

There follows an identity-design session, where participants imagine their own constructed visual reality. These sessions inform the portrait photography in relation to poses, wardrobe and any other visual clues to this constructed self.

Stage Three: Seeing Ourselves

This stage involves the practical making, selecting and editing of the participant portraits, with their full involvement in every stage of the process.

Airplace as part of the Portland Inn Project Summer Workshops was the pilot iteration of this process, and we did not have the opportunity to deliver the full three-stage representation framework, or to incorporate the final portraits fully into the actual material used for the pop-up space. However, this is something we are developing in terms of technical and conceptual integration towards the next iteration.

CONCLUSION

The key imperatives that unite our practices as researchers are those of place-making and social sustainability. As we attempt to navigate the many challenges inherent in our contemporary milieu, a globally-informed approach to pedagogies practice and problem-solving is essential. *Airplace* has constituted a model of participatory codesign led by a Higher Education institution that can continue to be developed, and can have an impact on the regeneration of the region of Stoke-on-Trent. This project has also allowed us to define the role of educators within codesign strategies, as transmission of knowledge is at the essence of the process. Another key element of the success of the model that we have tested is the collaboration between different stakeholders; academics, professionals and the community. Interdisciplinarity has become an essential part of the project, as it has allowed us to find a common ground and it has made the project more accessible to all the community participants; departing from specialist knowledge, to incorporate different areas of expertise. As academics and practitioners, we wish to share these practical and conceptual tools to engender positive relational exchanges, and to have productive dialogue with others engaged in relational practices.

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PEDAGOGY THROUGH WALKING PRACTICE: OBSERVATIONS ON POWER RELATIONS

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INTRODUCTION

Since 2018, at the Degree in Visual Arts, we have been promoting the practice of walking as a pedagogical methodology. In this article we would like to share the experiences and practices developed and critically question these approaches, observing power relations. In a teaching-learning process we believe that we learn with each other surrounded by the world¹ and so, as teachers and researchers we believe that we learn with the students, in practice and in a dialogue between theory and practice.

By promoting moments of sharing, namely of individual experiences or group activations, positions and links are built between the self and the group, and new practices emerge and develop. Because walking requires the participation of the group, the collective and the other, it promotes the construction of collaborative and participative actions and practices.

These qualities (walking, participation, "I", group) are of particular interest to us because they allow us to apply pedagogical methodologies which question ideas of power, knowledge and hierarchies. Walking makes it possible to reorganise the power relations between the subjects of the actions by questioning their roles in learning. Applying Jean Houssaye's pedagogical triangle² as a tool for analysis, we can recognise how walking questions the relationship between teacher/student/knowledge: the three vertices are in constant rotation, in an action between practice/theory, experience/knowing, individual subject/collective subject. It is from the walk as an aesthetic experience and artistic methodology that we are individually moving in unity.

I FIND MYSELF IN THIS PLACE

Our school is in Guimarães, located in the District of Braga, northern region of Portugal and sub-region of Ave in Minho (one of the most industrialised sub-regions of the country). It is a small city with a population of 50,000 inhabitants, but historically important, having played a crucial role in the foundation of Portugal as a country. Its historic centre has been on the UNESCO World Heritage list since 2001, and on the other hand, the strong impact of the textile industry that went bankrupt in the 1980s, still echoes in the region deeply affecting the landscape and the people. These characteristics make Guimarães a landscape rich in meanings and representations, historically and socially rooted, potentially available for attention and critique. Despite the diversity of backgrounds, the vast majority of our students are still from this area, with a strong cultural attachment to the place.

As teachers we believe that we learn from each other and the surrounding world.³ When the Brazilian pedagogue Paulo Freire proposes an attentive learning (surrounded by the world) it means feeling and looking towards the place where we stand.

According to Paulo Freire, learning is not a passive act of simply obtaining information but an active process of critical consciousness. Learning requires a critical examination of the world, questioning the existing structures and systems that shape our reality and our perception of this reality. By attentively observing and reflecting on our experiences, we can gain insights into the complexities and nuances of the world. This learning is also not limited to an individual experience, but it is interconnected to the collective (group). Listening and sharing with the other, we enable dialogue, collaboration and mutual understanding. In addition, attentive learning is not about accumulating knowledge but also about acting, this means that we need to be present, and actively participating in the world, the society, the group, committed to the transformation of ourselves and our surroundings. As such, learning may be understood as a reverberation between the world and our attention on the world, implicating ourselves in the learning process. By sharing collectively, we acquire wisdom.

The qualities of walking, participation, individuality ("I"), and group dynamics are significant because they enable the application of pedagogical methodologies that challenge traditional notions of power, knowledge, and hierarchies.

In 2018 the new visual art bachelor started although there were still lacking several pedagogical spaces and equipment. This was embraced as a possibility to expand our perception of what a school should be. We realised that these opportunities could help us expand to new territories and landscapes material but also social and symbolically, awakening the body, questioning the way a subject need to be summoned to action to build the world. As teachers we had to assess the outcome of these strategies pedagogically, and what this meant to the structure and systems already implied.

Jean Houssaye's pedagogical triangle is commonly used in pedagogical research. This model helps to represent and discuss the complex network of relationships and connections of the main agents and the processes of teaching-learning. In the pedagogical triangle, the vertices represent, by turn, are the teacher, the student and knowledge. The sides represent the relationships between these actors. Houssaye identify as:

- The didactic relationship the one maintained between the teacher and the knowledge and which allows him/her to teach;
- The pedagogical relationship concerns the teacher process of educating the student;
- The learning relationship is the process of the student's engagement with knowledge in order to learn.

We are aware that, like all models, it will always have suitable or unsuitable aspects and can always be questioned. And that, because it is a model, it will always be an abstraction of complex and interconnected actions with exogenous and endogenous factors to which we are subjected.

We will apply this pedagogical triangle, because as a model it synthesises the actors and relations implied in the pedagogical process, representing its dynamics, thus making clearer and more visual the active pedagogical shift that we propose through the practice of walking. Thus, we will seek to evaluate the possibility of unbalancing the power relations that are built in a classroom, assessing its effectiveness by applying this triangle.

STAY STILL, SIT DOWN

What can we learn while we are seated? Working sessions within a classroom (or a conference room) are conditioned by space. The pedagogical relationship, as we know, adapts to the spatial conditions offered. By considering the physical environment as an integral part of the learning experience one

can assess the opportunities and the limitations of a room organisation. In a traditional classroom setting, the organisation is structured around a teacher-centred approach, with desks arranged in rows facing the front, the students are fixed to a chair, the body is absent and disconnected – as illustrated in Figure 1.



Figure 1. Class room organization at first meeting in Studio practice

In such a classroom the teacher controls knowledge, transmitting it in a familiar lecture style, keeping, according to the pedagogical triangle, the student in the place of the “dummy”,⁴ inactive and powerless. It is the teacher who dominates, controlling the content delivery process, the knowledge, and the way in which knowledge is presented, little is left to the student, his/her action is inaction. The student is attentive but a static, still, immobile body. This practice, as we know, is very widely implanted in compulsory schooling, and is therefore accepted without discussion.⁵



Figure 2. Classroom organisation for exercise with clay and plaster

Engaging in a physical action, such as using our hands, awakens the body and alerts the senses, we learn by doing and not just by listening. We have to summon up other scientific and technological contents, other knowledge, often not verbalised, no longer under the teacher's total control. There are qualities and properties of materials and technical processes that are consolidated as something that is learned by doing.

In an experiential and hands-on learning process, the teacher's didactic task is replaced by support, so the didactic interactions change and the student is called into action. To experiment is to be in contact,

to get involved, not knowing what result can be expected. Little by little, you acquire knowledge and above all, the awareness that you can learn from experimenting. Working in a workshop, in a group, means that we can rely on our peers, the companion in the construction of the teaching-learning process and in the sharing of knowledge. Inter-peer learning happens. No longer the learning process is controlled by the teacher, but by the apprentice, and this implies, in a reciprocal way,⁶ that also, as an apprentice, one can teach. Activating the body in learning, shifts the power relations among the involved individuals.

WALKING AND FOLLOWING

We have addressed walking in classes, seeking to expose students to exploratory and disruptive methods of thinking about art, our time, our geography and our culture. This search starts from a simple setting, of putting one foot in front of the other.

The studio practice tasks happen on the streets through a set of simple exercises, which we adapt from other artistic practices of walking. We want the group to explore walking, and as doing so experience, discover and be nourished with and within the world. Walking is no longer interpreted merely as moving around, but as an opportunity to broaden our way of observing and relating to others, our environment, our surroundings, as well as underlined political, social and cultural possibilities. We hope that by doing such, it enhances our relationship with the world, in an engaged way, because through our body, and in a participatory way, because the student is invited to act.

We rely on the students' group initiative to create or think of walks workshops. In the one we are sharing in Figure 3, the group built a set of coloured eyeglasses and invited us to walk through the city with this colour filter. Now, the teacher is stuck in the “dummy” seat, no action is required. The student is called upon to lead the learning process.

If we apply the pedagogical triangle, we can observe how a direct relationship is established between the student and subject matter. The student acquires an active voice and commands the process, the subject matter, and the results.



Figure 3. Workshop outside the school

There is no hierarchy of the senses. As visual artists, we often allow vision to dominate, emphasising representation as a creative solution. Culturally we value what we see and tend to limit ourselves to vision as a tool and output. What we want is to lessen the importance of seeing and to underline the

importance of touching (with the epidermis), of feeling (cold, shivering, hot, sweat), of hearing (timbre, noise, melody), of taste (the bitter, the sweet, the acid), and to experiment with all the senses. The challenge is to stay attuned to all the senses, recognising the body (mind and body) as a unity, and to explore these sensations and feelings in artistic thought and creation. In Walking-sensing, we bring to consciousness all our complex perceptual systems and raise our attention to what is happening inside us. The world goes through us. Life goes through us, and even though we are outside the studio, art can happen inside us.⁷

From a pedagogical point of view, control (the decision making) moves from the teacher to the student. In truth we (as teachers) have no other option, since we want each person, each body, to be able to digest life. The student's activity ceases to be an obligation and becomes voluntary and committed. Has Injeong Yoon-Ramirez explains: "The notion of walking-sensing is used to describe not only our physical movement and the sensibilities of our bodies, but also as recollective and communal engagements, such as connecting memories with others, (re)collecting personal and local stories, and imagining the ways of living and being otherwise".⁸

To feel how the other lives, feels, grows, dies, inhabits, moves, is also underlined by walking. To understand what we are, we also do it through the difference, recognising this diversity as an enrichment of us and of the collective.



Figure 4. Presentation of the collective art work "andas"

In the project of the "andas", as see in Figure 4, a group of students brought to the discussion the differences in walking, and playfulness as an artistic action. As bipeds we move using both our legs, but there are as many ways of moving as people in the world. How we live in the world is idiosyncratic. But as a complement, this project emphasised an important aspect that tends to be undermined in our hyper-efficient and consumerist society: playfulness. Pleasure as a form of creation.

The impossibility and the unforeseen are summoned into the creative process. Through play and make-believe, learning and thinking are explored, but without an observable end result. Playing is pure pleasure. The student becomes the teacher. The subject matter is unstable and surprising. Walking allows a greater permeability of subjects, opening the way to surprising and unexpected themes and interests.



Figure 5. In the park for the presentation of a collective walk

Another group of students organised a collective walk for the class. The route allowed us to go through the city, crossing some of the main places dedicated to culture. The culmination of the workshop took place in the gardens of the Vila Flor Cultural Centre, as in Figure 5, where we wove a web of relationships to connect individual notes of experiences, sensations and observations, building a collective narrative.

The relationships among involved individuals became looser and uncomplicated. Things passed from hand to hand, different opinions were heard, we learned to listen and to speak. Each of us contributes with personal thoughts, and in this variety, we discover a very rich panoply of inputs and ways of acting and thinking. In weaving a web of relationships, we think collectively about a theme (in this case, walking as a tool). The individual thought is reflected in the collective, and this collective is built in active sharing, attentive in listening.

From a pedagogical point of view, the student assumed leadership. Learning takes place in a diffuse and complex terrain of themes. Teaching takes place in sharing between peers.

UNRAVELLING

At the end of each semester, a collective show is proposed. The studio space is stripped of superfluous elements, leaving only the so-called "final" work, where each one is encouraged to materialise what they have learned. After acquiring some grasp on the act of walking, deriving a set of experiences, individual and collective, it is up to the students to digest the knowledge and unlearn the work.

Because wandering or walking are sensory experiences they allow a connection with nature and landscape, as well as a new experience of the self. Simultaneously, they are linked to social issues of global and local scale. This allows empowerment of the student, enabling each one to recognize personal skills, interests, tools, what they carry and feel. This awakening shows how our personal experience is valid, unique, and essential to our connection with the world and artistic production.

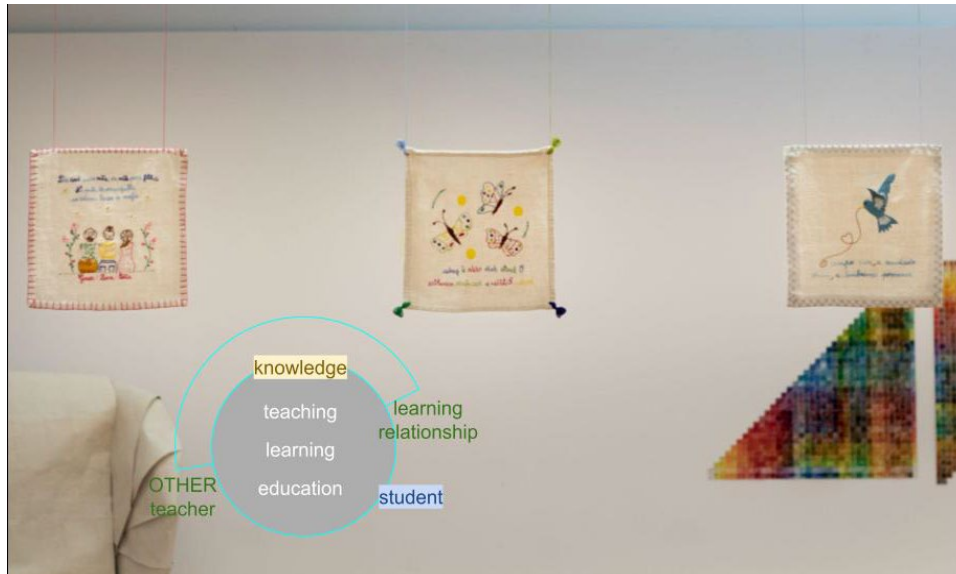


Figure 6. Lara Teixeira, “Lenço dos Namorados”, at the final exhibition

This small embroidery work was made by Lara Teixeira, as in Figure 6. Lara's mother and grandmother are seamstresses and embroiderers in Guimarães. During our walks through the city, Lara discovered that she could attribute aesthetic and artistic value to a craft practice of embroidering handkerchiefs with memories - "Lenços dos namorados" are confessions of love in textiles with a long tradition in the region. Her work brought together her interests for this object and its symbolism, a strong connection with the surrounding cultural frame, and the opportunity to include her mother and grandmother in the project. Now, knowledge is not controlled. Learning occurs independently, shared with new actors, being grounded in genuine and authentic interests.

However, as we are enrolled in an academy, it is up to the teacher to assign a grade, and to evaluate the work. We still can't get away from this. The teacher, once again, takes command, but now amplified by the hegemonic power of the school institution, so that we (the teachers) become the “dummy” controlled and limited by political and social power, as shown in the political triangle, whose vertices are teacher-state-communities⁹. This trauma activates the school-related reflexes in the students, who see themselves as re-schooling. This transference of mind sets awakens preconceptions such as the representation of the major and minor arts, or of what an artistic work has to be. Taking on the process, the playfulness, the sharing and the unexpected becomes an act of courage. This is the moment where we either lose the student or we take a leap to a new pedagogical approach.

So, to finish, from this perspective we try to unbalance the pedagogical triangle. So, shifting power we can share our knowledge, learn with students, systematise experiences and acquire wisdom. An experience that we hope for as an ongoing eco. So, walking moves power relations between the actors, questioning their roles and character.

Applying Jean Houssaye's pedagogical triangle as a tool for analysis, we can recognize how walking questions the relationship between teacher/student/subject matter putting all three vertices in a constant rotation, in an action between practice/theory, experience/knowledge and individual/collective. It is from the walk that we are individually moving as one.

NOTES

- ¹ Paulo Freire, *Pedagogia do oprimido*, 17a. ed. (Rio de Janeiro: Paz e Terra, 1987).
- ² Jean Houssaye, *Le triangle pédagogique, théorie et pratiques de l'action éducative*. (Berne: Peter Lan, 1988).
- ³ Paulo Freire, *Pedagogia do oprimido*, 17a. ed. (Rio de Janeiro: Paz e Terra, 1987), 435-456.
- ⁴ António Nóvoa uses a metaphor between the bridge card game and the pedagogical triangle, attributing the "dummy" to the stakeholder (student, teacher, knowledge) who is excluded from the pedagogical action: "Let us now imagine a triangle in which two vertices create a privileged relationship, the third vertex representing the "dummy": it is present, it has to be taken into consideration, but its voice is not essential to fix the outcome of the events." (1995), 7.
- ⁵ António Nóvoa (org.), *Profissão Professor*, 2a ed. (Porto: Porto Editora, 1995).
- ⁶ Paulo Freire "Carta de Paulo Freire aos professores", *Estud. av.* [online]. vol.15, n.42 (2001): 259-268, doi.org/10.1590/S0103-40142001000200013.
- ⁷ Art21. "Traveling & Making, Leonardo Drew", accessed march 23, 2023, <https://art21.org/watch/extended-play/leonardo-drew-traveling-making-short/>
- ⁸ Yoon-Ramirez, Injeong. Walking-sensing as a decolonial art and pedagogical practice. *International Journal of Education Through Art* (vol 17), (2021) 115-133.
- ⁹ António Nóvoa (org.), *Profissão Professor*, 2a ed. (Porto: Porto Editora, 1995).

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RESPONDING TO UNCERTAINTY: CASE STUDIES OF SUPERINTENDENT ACTION TO CONTINUE STUDENT LEARNING DURING COVID-19

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INTRODUCTION

The world reached an all-time peak of uncertainty in the first quarter of 2020 representing an increase of 46.73% from the previous high ¹. The pressure on school districts from the COVID-19 pandemic exceeded concerns from more ordinary times and contributed to increasing uncertainty for leaders and their organizations. Some have concluded that the belief in the certainty of the past is gone, and the world is forever changed. A Colorado superintendent is quoted saying, “I do not think that this is a tunnel we’re going to come through and say, ‘Oh, we’re back to daylight.’ We’re just going to continue to navigate this” ². How much did educational leaders change their leadership practice to navigate new ways forward to get back to the light?

Problem and Purpose

Uncertainty is the result of our incomplete knowledge of the world, or about the connection between our present actions and their future outcomes ³

The COVID-19 pandemic was a societal crisis and a crisis of leadership ⁴. The pandemic “upended normal processes and ushered in a persistent cloud of uncertainty” ⁵ into educational leadership. Leaders have been tested to respond to uncertainty from the pandemic, which challenged the previously existing more certain and more confident world. Scholars have a unique opportunity to thoroughly examine how leaders have addressed such radical uncertainty from this situation ⁶. Radical uncertainty is described by Romeijn and Roy ⁷ as the “state of utter cluelessness” felt subjectively by leaders when confronting uncertainty.

The District Superintendent is a significant agent in the management of uncertainty in school districts. For these leaders, managing uncertainty to meet this imperative required new approaches to leadership in response to global and local conditions during the pandemic.⁸ A significant component of the superintendent's role is working with others to respond to dilemmas arising from unpredictable and unforeseen events.⁹ These dilemmas arising from COVID-19 challenged existing policies and practices and forced all school systems to decide how to continue student learning and apply existing policies.¹⁰

Research Questions & Study Aims

This study's guiding objective is to better understand how superintendents managed uncertainty during the pandemic. What was the experience of superintendents as they worked with others such as provincial authorities, boards of education, teachers and support staff, parents, community groups, the Indigenous community, and other agencies to manage issues of uncertainty? How has this experience changed their leadership practice when developing local solutions under such environmental uncertainty? Based on the guiding objective this study will explore the connection between local environmental conditions of uncertainty and emergent management responses by senior leaders. Research questions will explore the subjective experiences of superintendents as they worked with others to manage uncertainty, and changes to the leadership practices of superintendents as they developed local solutions in response uncertain environmental conditions. In seeking answers to these questions, the study aims to describe the issues which created uncertainty during the pandemic, explain the managerial responses to these issues, and explore actions taken by Superintendents to enable these responses to emerge.

Educational Significance

Educational leaders were required by policy imperatives, community expectation, and their own moral compass to respond to conditions of uncertainty during the pandemic. Progressive and adaptive models for educational leadership are needed to address the short-term repairs required for student learning at the pandemic's end and to prepare for the post-pandemic world.¹¹ For scholars seeking to develop these models, the significance of these case studies will be a greater conceptual understanding of uncertainty in education, enable better responses to future uncertainty, and further exploration of the role of the superintendent in influencing these responses.

Complexity Leadership Theory (CLT) describes that novel adaptations emerge through the entanglement of three functions of administrative, adaptive, and enabling leadership.¹² This framework (see Figure 1) will be applied to explore the notion that a “newly emergent order”¹³ has developed in education. This will include an examination of the district superintendent's actions and influence as they worked with others to enable emergent outcomes in conditions of uncertainty. Complexity Leadership Theory conceives of leadership as a social function which bridges the gap between the administrative and the adaptive functions of leadership.¹⁴ How this conception of leadership was applied during the uncertainty of the pandemic will provide scholars with clues about its suitability to explain leadership practices during such extreme conditions.

The Three Functions of Leadership (Uhl-Bien & Marion, 2007 & 2009)

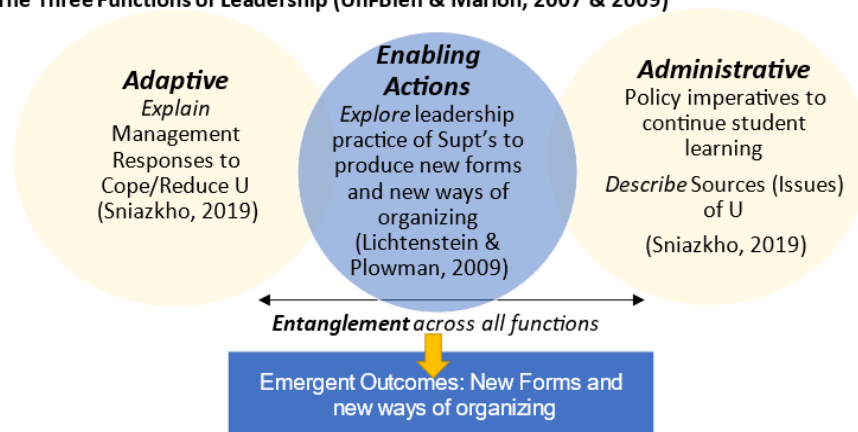


Figure 1. The Three Functions of Leadership

WHAT JUST HAPPENED HERE? COVID-19 AND EDUCATIONAL LEADERSHIP

*We live in an uncertain, not ideal, world*¹⁵

The global pandemic brought new components of uncertainty into educational systems not previously experienced. The indefinite length of the pandemic “changed the education system with incredible speed and scope”¹⁶ and meeting the pressures and dilemmas presented by the pandemic was a significant challenge.¹⁷ Leaders in a crisis are expected to give appropriate information, reduce fear levels, provide safety assurance, build confidence during ambiguity, and provide direction concerning action to take in these circumstances.¹⁸ Leaders further expected to learn from the past, understand the present, and consider future options with speed while carefully weighing outcomes and consequences.¹⁹ School superintendents are accustomed to responding to uncertainty in various dilemmas,²⁰ including leading their school systems through unprecedented levels of environmental uncertainty.²¹

What is Going on Here? Understanding Radical Uncertainty

Senior leaders have long viewed uncertainty as the core problem for managers.²² Romeijn and Roy²³ suggest that radical uncertainty is present when previous assumptions are in doubt but there is no means present to identify alternate assumptions to reach new conclusions. To resolve uncertainty, managers must address the question of ‘what is going on here?’²⁴ by first seeking to understand and identify the sources and causes of uncertainty. The radical uncertainty in the education system beginning in March 2020 created a gap between pre-existing practice and required approaches to determine what to do beyond previous practice. According to Milliken’s²⁵ conception, most definitions of uncertainty centre on the impact of the external environment on the organizational system. Organizational theorists describe environmental uncertainty as arising from insufficient information about causal connections in the past, incapability of predicting decision outcomes in the present, or the inability to have certainty about the probability of future events.²⁶

Uncertainty is present in varying dimensions in all policy and decision-making processes. However, there is “a lack of understanding about their different characteristics, relative magnitudes, and available means of dealing with them”.²⁷ Many authors have adopted a probabilistic approach from the economist Frank Knight²⁸ which distinguishes between risk and uncertainty according to measurability.²⁹ The first form, risk, is objective, measurable, and calculated using frequentist probability approaches. The second form, commonly called uncertainty, is subjective, not measurable, and cannot be calculated using probabilistic thinking. These two forms of uncertainty have been defined as either aleatory or epistemic uncertainty.³⁰ The defining feature of epistemic uncertainty is the lack of information, knowledge, or predictability about the outcomes of decisions.³¹

The challenge for the theory and practice of leadership is for more preparation for leaders to cope with events of epistemic, radical uncertainty where “the margin of error is high and consequences of failure potentially catastrophic”.³² While the literature on crisis management is well developed, it is argued that specific preparation for educational leaders has not kept up with the situation, and more frameworks are needed to provide direction for leaders in developing action and response to increasingly complex situations of uncertainty.³³ Scholars need to have a more complete understanding of theoretical and practical components of how to better prepare educational leaders to address uncertainty in the future which similarly threatens school operations³⁴?

What to Do? Responding to Radical Uncertainty

For leaders, the most basic form of responding to uncertainty is determining “what to do”.³⁵ A significant component of the superintendent’s role is to respond to and resolve dilemmas.³⁶ While the nature of many of these dilemmas has remained relatively consistent over time,³⁷ the pandemic was the “largest disruption of education systems in human history”³⁸ and presented new challenges. Challenges arising from the pandemic caused considerable changes in school leadership and educational administration, adding to the already complex nature of educational leadership.³⁹ For leaders, issues experienced when determining responses to uncertainty included a low level of preparedness, a lack of verifiable approaches to leadership, and the inability of foundational leadership theories to provide direction in such radical uncertainty.⁴⁰ These challenges often caused individual leaders to question how they could lead through the pandemic’s uncertainty and the crisis atmosphere it created. While the crisis affected the globe, local circumstances and conditions uniquely drove many sources of uncertainty.⁴¹ Stakeholders expected leaders to act immediately to return the situation to normal with “decisiveness, creativity, and flexibility”.⁴² Educational leaders can make confident choices when ample empirical evidence is available but need more certainty when such evidence is lacking.⁴³

Educational leaders have always needed to work with others when making decisions. Any one person cannot analyze all possible outcomes of a situation due to the boundaries of human rationality.⁴⁴ Liesch et al.⁴⁵ identify that individual factors such as a lack of experience or incorrect or incomplete information contribute to increasing uncertainty. For these reasons, equipping individuals to act on their own does not acknowledge that most decisions are made by teams not individuals.⁴⁶ Meaning to uncertain situations is best developed through practices involving collective inquiry as leaders and their followers socially construct meaning from events as they wrestle together *in situ*.⁴⁷ Social processes to determine responses often initiate when there is a disruption to the flow of regular or ongoing events in the life of an organization.⁴⁸ These responses begin with “accepting uncertainty as complex and non-linear [which] promotes innovative ways of thinking and opens up new approaches for addressing uncertainty situations”.⁴⁹ To better understand how these perceptions of uncertainty impact response, Sword-Daniels et al.⁵⁰ argue that case studies are required which analyze how uncertainty is addressed prior to, during and after such disruptive events.

Leading in Uncertainty: A Framework for Practice

Complexity Leadership Theory offers a leadership model to explain how individuals act within a social system to comprehend uncertainty.⁵¹ Alonzo-Yanez et al.⁵² state that leadership practice seen through a complexity lens is a means to “describe and understand the dynamic, multifaceted character that precedes emergence in ways that traditional linear approaches can often overlook” (p. 66). Complexity-based theories are about how organizations survive and adapt in the face of uncertainty.⁵³ Scholars identify a complex system by the building blocks of non-linear dynamics, chaos theory, and adaptation. These three building blocks combine to produce a unique description of an organization on *the edge of chaos*.⁵⁴ Complex systems can adapt the most when near the state of the edge of chaos.⁵⁵

Leadership at the edge of chaos presents specific challenges and requires the emergence of new solutions to resolve complex situations. Emergence of novel forms of organizing at the edge of chaos occurs through the process of entanglement.⁵⁶ Entanglement describes how the enabling function coordinates across the administrative and adaptive functions to produce “innovation, learning, adaptability, and new organizational forms”.⁵⁷ Well-integrated organizations have appropriate levels of entanglement, and in non-integrated organizations, low entanglement levels result in leadership

functions being stifled or not connected.⁵⁸ The enabling function of leadership is required to entangle the adaptive with the administrative functions effectively. When appropriately applied, enabling mediates the former from the sometimes oppressive tendencies of the latter and connects these two functions to allow emergent innovations to develop.⁵⁹

Leaders work to enable emergence in two ways. First, leaders work through the complexity dynamic of squeezing or easing adaptive pressures to enable the most effective use of this chaotic state⁶⁰. Leaders use pressure in this way to make a change when they acknowledge to “never waste a good crisis”.⁶¹ A second way for leaders to enable emergence is through building capital through social interactions.⁶² The complexity framework “suggests that the networks of interacting, competing problem-solvers and innovators are superior to centralized decision makers”.⁶³ These social practices are community-based, problem-solving approaches that bring together divergent groups across the organization or community to focus on solutions.⁶⁴ Examples of these can be sponsoring competing teams which either collaborate or compete with each other to develop models for solutions or large-group gatherings to initiate a grassroots response to a designing work.⁶⁵ Education leaders should seek to take advantage of these organizational and environmental complexities to generate change.⁶⁶

Some notions of CLT describe that emergent actions are the result only of bottom-up forces and seemingly require little action by the leader.⁶⁷ The concept of self-organization proposes that emergence occurs outside of the confines of rigid hierarchy and leadership is not a critical component.⁶⁸ These questions require further clarity about how complexity models describe leadership under extreme, radical uncertainty versus traditional bureaucratic leadership models.⁶⁹ This study will seek a deeper understanding of how superintendents acted and work with others in the enabling gap between the administrative and adaptive functions of leadership to influence the emergence of new practices.⁷⁰

RESEARCH DESIGN

*The real value of a case study is that it offers the opportunity to explain why specific outcomes might happen – more than just finding out what those outcomes are.*⁷¹

Case studies provide an “in-depth description and analysis of a case or multiple cases”.⁷² Schoh⁷³ asserts that a clear connection between a real-life situation and the studied phenomenon is essential for a case study to work best. Czarniawska⁷⁴ suggests that organizational narratives are best described in case studies. Stake’s⁷⁵ conception of an instrumental case study allows a focus on the unique issues of a case arising from local context, and describe the individual subjective experiences of participants during the pandemic. Arising from the pandemic experience, a case study can explain in detail how the circumstances in local settings were responded to by educational leaders and can provide a comprehensive description of superintendents’ actions and interactions with groups to develop local responses to uncertainty.

The primary unit of analysis in the study will be the work practice of the district superintendent. Interviews with four school district superintendents will provide the study’s data source with additional data coming from a review of documents associated with the responses being analyzed. The interviews will provide an account of the vicarious experiences of the superintendent to provide authenticity and a sense of immediacy for the reader.⁷⁶ Data from interviews will be used to gain an understanding of the processes used to work with others and make local decisions to manage uncertainty during the pandemic. Providing meaning from data includes describing the interrogative details of events being described, and then finding and comparing the themes and patterns which emerge.⁷⁷ The primary analytic purpose will be descriptive and exploratory to respond to the research questions and the study aims.⁷⁸

CONCLUSION

The phenomenon of uncertainty during COVID-19 and the spotlight placed on education provide a unique opportunity for researchers. The notion arising from Complexity Leadership Theory that novel outcomes emerge from the interaction of actors rather than from the direction of the leader alone will be analyzed as it applies to a complex system during a period of radical uncertainty. The study will also create a narrative about the subjective experiences of superintendents and how they acted in response to local conditions of uncertainty. Tversky and Kahneman⁷⁹ state that in the absence of precise models for determining the probability of uncertain events, belief and judgment based on intuition “is often the only practical method for assessing uncertainty”. As education systems have been making decisions during the uncertain events of this past period, understanding how these decisions were made and what lessons can be drawn for the future is a worthy topic for study by educational researchers.

NOTES

- ¹ “World Uncertainty Index,” World Uncertainty Index, accessed April 29, 2022, <https://worlduncertaintyindex.com/>.
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LEARNING THROUGH DESIGN PROBLEMS.

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INTRODUCTION

Training in architecture doesn't lay in the prescription of formal and mechanical tasks. In fact, its aim relies in the ministration of research methodologies engaging both abstract thinking and graphic speculation. This way, students are fostered to respond autonomously to the broad field of architectural action.

Departing from such assumptions, this article reflects upon teaching strategies, considering the complementary upon the teaching experience in both Geometry and Design Studio at the Integrated Master's Degree in Architecture of the School of Architecture, Art and Design of the University of Minho. Envisioning future pedagogical developments, such reflection is consequent to the ongoing re-equation of the syllabus, referencing framework, teaching-learning strategies, evaluation model, elected thematic guidelines and summon up instrumental resources of the Geometry Course.

ORGANIZING THOUGHT: MODELS AND STRUCTURES

Concerning the role of geometry within architectural training, we cannot fail to summon the words of Gaspard Monge, in the opening of his *Géométrie descriptive. Leçons données aux écoles normales (1799)*, about the discipline's objectives: "...the first, to provide methods for representing on a drawing sheet that has only two dimensions, namely, length and breadth, all bodies in nature that have three of them, length, breadth, and depth, since that these bodies can be rigorously defined. The second objective is to give ways to recognize, after an exact description, the shapes of bodies and to deduce from them all the truths that result both from their shape and from their respective positions".¹

Monge's words envisioned a clear complementarity between representing and recognizing, summing up multiple resources since descriptive and analytic thought, as well as intuitive, inductive and deductive reasoning. However, they operate under a Cartesian space (structured by length, width and depth), to which, and updating the conceptual framework, it must be added a fourth dimension, Time, considering the dynamic phenomena that characterize the contemporary spatial framework. Such inclusion arises new dimensions intrinsic to geometric formulations (contrasting absolute properties with its relativity by the perceptive subject), as well as the potentialities provided by contemporary digital tools (namely section sequencing and 'traveling' inside digital models).

As such, a strong cognitive structure is essential, condensing a wide range of contents and procedures.

Project-based learning

Learning is often defined under the dichotomy of practical and theoretical knowledge. Escaping from such opposition, the application of a project-based learning methodology avoids the misperception between learning and responding to tasks that, in the particular case of geometry, tends to reduce it to mechanical procedures, graphical conventions and technical drawing.

Searching for an effective cross-referencing among theory and practice, project-based learning methodology fosters experimentation and research, demanding an active engagement from the students with the process.

The application of such methodology can be illustrated by the work proposal *“Tessellations. Surface modeling applying Origami and Kirigami principles”*, which invited students to simultaneously explore theoretical and practical knowledge. Aiming to transform a flat surface into a complex structure, essayed solutions require, besides the development of models (fig. 1), the mathematical and geometric interpretation of its shape, cross-referencing theoretical and practical contents, poured into graphic projections. Through this exercise, each student develops an individual solution fostering critical discourse and design research (fig. 2).



Figure 1. ‘Tessellations. Surface modeling applying Origami and Kirigami principles’, model development.

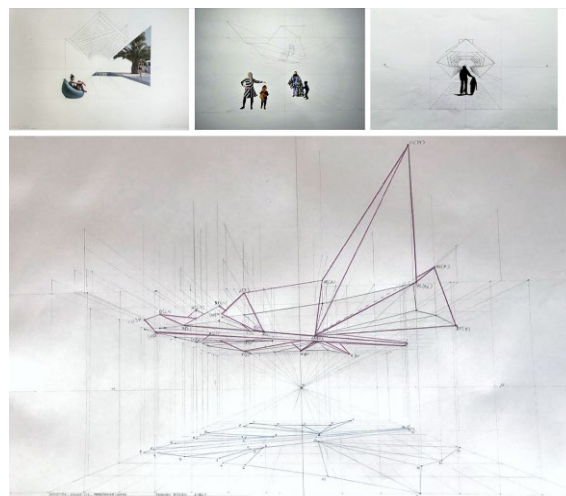


Figure 2. ‘Tessellations. Surface modeling applying Origami and Kirigami principles’, communication of the achieved solution.

Geometry e Architectural Design

As a fundamental science to the thinking and praxis of architecture, Geometry manifests itself through drawing, incorporating, a cosmo-poetic dimension. According to Frascari, “*Architects execute their common or differentiated ways of making drawings through a sequence of operations based on composition and decomposition, weighting, ordering, exclusion and supplementation and deformation. By tracing, architects perform an act of creation of the world: a cosmographic expression that is also the root of future cosmopoesis*”.² A vision that summons the connection between geometry and the creation of the world, expressed on *The Ancient of Days* (1794), by William Blake, through a geometer God delineating the cosmos with the help of a compass.

Under such creative and envisioning power, the geometrical cognitive and instrumental resources release themselves from being reduced to a prosaic device, suggesting, as stated by Pérez-Gomes “*...temporality and limits. Defining the space between light and dark, between the Principle and the Beyond, it illuminates the space of culture, of our individual and collective existence*”.³

Unleashing the creative power of Geometry, namely in architectural training, the syllabus under consideration is based upon two fundamental domains: Relational Geometries, which, due to their synthetic nature, support the understanding and conception of form and space; along with Representative Geometries, whose analytical purpose provide accurate resources for the representation and questioning of the material world. A duplicity materialized throughout a set of 4 functionalities individualized by Migliari.⁴ Free hand drawing (observation, inquiry and envisioning); Geometrical drawing (materialization, verification and technical communication); Modelling (verification and speculation); Reverse Modelling (survey and critical research).

Taking the words of Frascari, the graphic reasoning in architecture “*Teaches the look to go beyond the visible image to an infinity where something new from the invisible is found*”.⁵ In the same order Christenson expresses that “*To say that architecture becomes thinkable through representation is another way of saying that representation provides a framework for thinking, upon which – or through which – concepts and architectural ideas are perceived, questioned and organized*”.⁶

REVIEWING GEOMETRY TEACHING

Looking retrospectively, the previously applied teaching-learning methodology evidenced an excessive domain from projective mechanics, leaving little space for relational reasoning. A situation that prevents greater opportunities of trial and error in the exploration of geometric/architectural thinking. In this sense it is necessary to reinforce the prevalence of both physical and graphic models (applying, simultaneously, all of Migliari’s functionalities), foster problems of interpretation, characterization, conception and modelling. A set of premises that will reorient the course’s contents and its thematic organization (fig. 3).

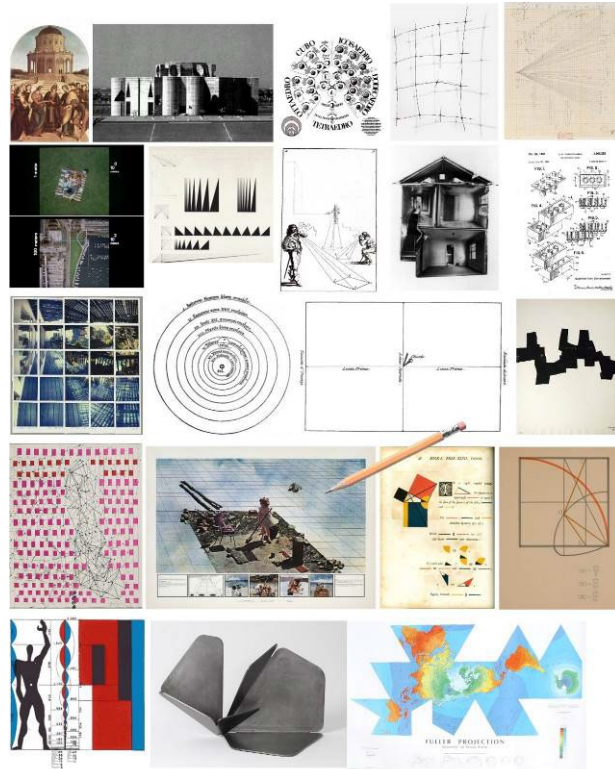


Figure 3. Reference Atlas for the Geometry Course.

Redefining Contents and organization grid

Systematized in two semesters, the 1st semester deals with geometrical rudiments, debating the characterization of two-dimensional and three-dimensional entities, as well as operative procedures concerning double orthogonal projection, axonometry and linear perspective. As for the 2nd semester, it should deepen the characterization of surfaces and complex structures, namely through its definition and classification, along with rudiments of cartography and solar geometry.

Such differentiation can be named after *Polyhedral characterization and transformation*, as for the 1st semester, and *Characterization and operationalization of surfaces*, for the 2nd semester.

It is important to highlight that the reorganization of contents interconnects three different sources, being the third the aggregating element among the other two:

- characterization of the geometric lexicon, namely figures, curves, polyhedrons and surfaces, along with their generative operations;
- exploration of graphical models, namely in its projective background, cross-referencing different systems and their spatial mechanics and reasoning;
- thematic election guiding work proposals, such as space/form modelling and representation, scale of the inhabited and represented space and the experience of space.

Semester I - Polyhedral characterization and transformation

Under this premises, the first semester begins with geometrical drawing rudiments grounded in the management of drawing tools, measure and scale principles, graphical configuration of geometrical elements and constructions as well as the application of double orthogonal projections, namely concerning procedures in the delineation of sections. Exercises that range from the representation of small-scale objects to architectural devices.

Subsequently, lessons should move forward into the analysis of the two-dimensional compositions, interpreting its structure and evidencing, graphically, regulatory traces, polygonal configurations, measurement ratios, regular and irregular tiling/meshes, composition axes, etc. A path that summons up strategies indorsed by D'Arcy Thompson, *On Growth and Form* (1917), opening field to the recognition of diagrammatic, proportional, structural or aesthetic nexus of the structures under assessment. In this pursuit, the definition of a geometrical matrix serves to acknowledge, control, replicate and implement such structures and its properties (both conceptual and material), as well as to advance into three-dimensional reasoning, through extrusion principles and volumetric subtractions defining internal voids.

Under these premises, the proposal *Departing from Eduardo Chillida*, considered a set of engravings by the Basque artist from which a corollary of interpretative and propositional actions was developed (fig. 4).

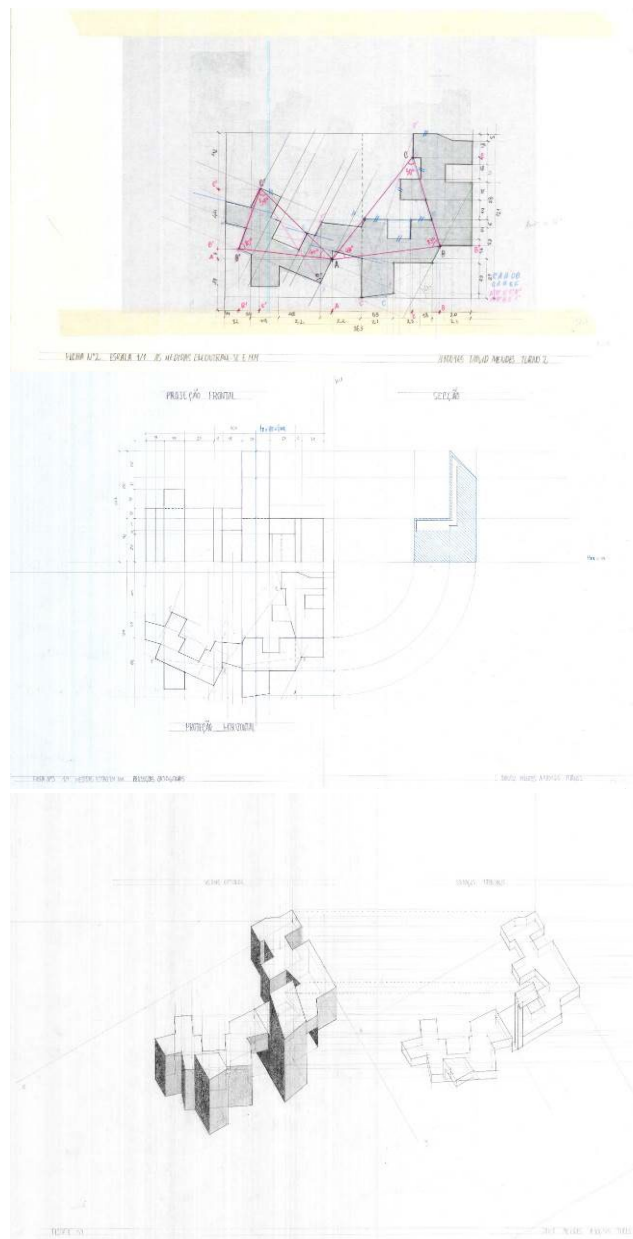


Figure 4. 'Departing from Eduardo Chillida', full sequence since the bidimensional structure interpretation to its spatial conversion.

In a first moment, and chasing the image's geometrical code, the aim was to analyze its structure, applying different methodological approaches for data management. From the achieved flat matrix and the possibility of its replicability, it was requested the development of a three-dimensional composition exploring two simultaneous features: its volumetric characterization and its internal spatiality according to preestablished parameters.

Still in a first stage, the composition was represented in double orthogonal projection (including section as a third projection), but in a second stage it was materialized by axonometry allowing to envisioning the conceived volumes and internal voids. Thus, the idea of representing the internal space in section is cross-referenced with its axonometry according to the assumption of transparency of the overall volume, giving rise to the inversion of positive/negative, an essential reasoning for architects.

The sequence allows to advance in the mastery of rigorous drawing instruments, and refinement of graphic expression criteria, along with the transposition from a two-dimensional domain into a three-dimensional one, in a progressive complexification of formal and spatial recognition. A path that consents the expansion of the recognized formal lexicon as well as contingencies from each representation system.

Posteriorly, students are called to explore the constraints and potentialities of modular structures. At first, under the precepts of axonometric projection and, later, through linear perspective (learning the rudiments of such projective system). Under this sequence the student progresses from the abstract simulacrum of an element, to its optical simulacrum, since the placement of the gaze in a direct confrontation with the model.

Aiming for such transference, from a distant envisioning into a visual confrontation, it was essayed a sequence whose model was based upon the *House of Cards*, designed Ray & Charles Eames (1952). Such modular structure serves the execution of both physical and graphical models allowing the verification of metric properties, spatial qualities, modular combinatorial constraints and tectonic expression (fig. 5). However, in a second stage of the assignment, students propose variations to the pre-established module, from which, coincident logics provide new formal and spatial qualities. At this moment, the propositional audacity of each student is at stake, being challenged to explore complexity, both in terms of form and application of theoretical and practical contents, namely its graphical and projective resolution.

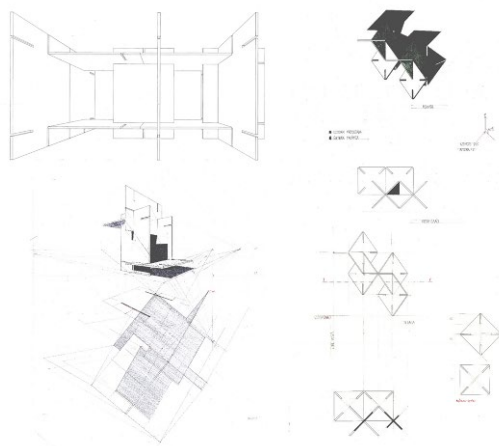


Figure 5. 'House of Cards', from model to drawing and module variations.

Linear perspective is a central subject in architecture training, as it enhances the visualization of the inhabited space as well as the qualification of the design space. A moment of encounter with the perspective discourse and its consequences into architectural theoretical and practical conceptions.

Along with the acknowledgment of projective mechanics, scales, tessellations and meshes in the ordering of space (both real/seen or mental/abstract) are widely explored, namely in the definition of spatiality and its respective articulations and qualities (always bearing in mind the scale of the seeing body). Still relevant is the materialization of three-dimensional models, giving way to Migliari's functionalities.

Such holistic examination leads to the mastery of preview techniques (perspective image), or analysis of the built environment (perspective restitution). The last aspect synthesizes explored mechanisms, calling for the inversion of acquired procedures, as well as the reverse modeling functionality in deconstructing operations.

In summary, the proposed grid trespasses geometrical rudiments, having in mind the context of architectural training, emphasizing the simultaneity between cognitive contents, speculation abilities and graphic materialization, always targeting methodologies to think and practice architectural design (fig. 6).

A1	Rudimentos do desenho geométrico Geometria no Pensamento e Prática da Arquitetura. Dicas para a representação da realidade. Medidas e escala. Construções geométricas do espaço.	
A2	Rudimentos do desenho geométrico Visualização de espaço interno e externo. Construção de volumes e superfícies.	
A3	Trabalhos reguladores Identificação e caracterização de estruturas. Construção de estruturas. Formas, Materiais, Escala, Propriedades.	
A4	Projeções ortogonais e Extensão e elevação Aplicação das projeções ortogonais. Representação e interpretação do espaço tridimensional.	
A5	Projeção axonométrica + Exatidão axonométrica Representação do espaço através da projeção axonométrica.	
A6	Projeção axonométrica + Projeção ortogonal múltipla Assimilação de projeções ortogonais (vistas). Processos de transformação planimétrica.	
A7	Planificação + Construção de modelos Elaboração de modelos físicos e digitais. Construção de modelos físicos e digitais.	
A8	Projeção Axonométrica + Construção de modelos Assimilação de projeções ortogonais (vistas). Construção de modelos físicos e digitais.	
A9	Perspectiva Linear Técnicas de construção da perspectiva linear.	
A10	Perspectiva Linear Técnicas de construção da perspectiva linear.	
A11	Perspectiva Linear + Transformação planimétrica Definição de volumes e sua transformação.	
A12	Perspectiva Linear + Construção de modelos Construção de modelos físicos e digitais.	
A13	Perspectiva Linear + Método dos arquitetos Processos de construção da perspectiva linear.	
A14	Perspectiva Linear Construção de volumes e processos de transformação planimétrica.	
A15	Avaliação	

Figure 6. Programmatic grid for semester I

Semester II - Characterization and operationalization of surfaces

In the second semester, and concerning the recognition of surfaces and complex structures, didactic activities begin with the characterization of conic curves (graphically and analytically), paying special attention to the repercussion between parameters' variation and obtained result. A crucial relation for the architect in investigation and definition of space and form.

The characterization of ruled surfaces (through double orthogonal projections and linear perspective), allows to advance on the surface's acknowledgement in a refined characterization of their constraints, potentialities, transformations and architectural applications. Since the conformation of ruled surfaces is based particularly on the definition of directrix, generatrix and their subsequent relations, the study of flat surfaces is performed through modeling lines, according to the nomenclatures of orthogonal projections and quotation. Going forward, such premises allows to advance in the study of topographic surfaces in the view of mastering procedures for the topographical modeling and transformation. This aspect is particularly relevant in the scope of architectural action, whether concerning operations with the ground (either natural or constructed), as for the resolution of complex surfaces (namely Mesh and Nurbs).

For instance, proposed exercises explore the transformation of a plane grid into a spatial mesh (fig. 7), according to the application of altimetric values to node points subordinated to mathematical progressions. The new surface is thus consequent to the distortion of distances among points that, when latter combined with ruled and topographic surfaces, allows to acknowledge different methodological approaches to the interpretation and conformation of surfaces.



Figure 7. From a plain grid to a complex surface.

After the wide variety of analyzed surfaces, contents are redirected to the study of the sphere, focusing upon problems of cartographic projection, namely the ‘developing’ of the sphere, as well as the planification of inscribed meshes.

The last step goes through the fundamentals of insolation geometry, characterizing in this context issues such as the apparent movement of the sun in the celestial sphere, applying it both to the

measurement of time (medians and solar calendars) and the study of shadows in architecture (incidence and sun protection).

Nevertheless, by the end of the academic year, and fostering the logic of project-based learning, a Research and Development work synthesizes the taught contents and summons up the relation between relational and representative geometries. Under a general theme, elected annually,⁷ the research work is an opportunity to amplify operative domains of geometry in architecture, in addition to advance into higher levels of complexity. According to this it can be explored themes such as perspective deconstruction, architectural analysis, stereotomy, linear structures, origami, tessellations, drawing instruments, architectural survey, etc.

An example of such research were the assignments on Reverse modelling, through which perspectival restitution regards the application of specific projective knowledge in the management and conformation of the image of space. One of the assignments departed from the painting of *Saint Jerome in his studio* (1624), by Hendrik van Steenwijck, aiming for the deconstruction of the perspective structure of the image and the full analyses of the portrayed space (fig. 8). Another case, *Image and representation of space. Survey, design and representation* departed from three pictures of three different spaces of the Architecture school building in order to, through the application of linear perspective procedures, analyze the architectural space in the view of installing a selected sculpture and propose a new staircase in one of the spaces. A work that recalls to its elaboration procedures from architectural survey, architectural design, manipulation of form, measure and space, as well as the graphical background of architecture practice and thinking.

It would be, in this last moment, that it would be allowed, in order to support the complexity of the explored forms, to introduce students to digital tools, pouring into them the cognitive collection accumulated throughout the academic year and amplifying methodologies of representation and production.

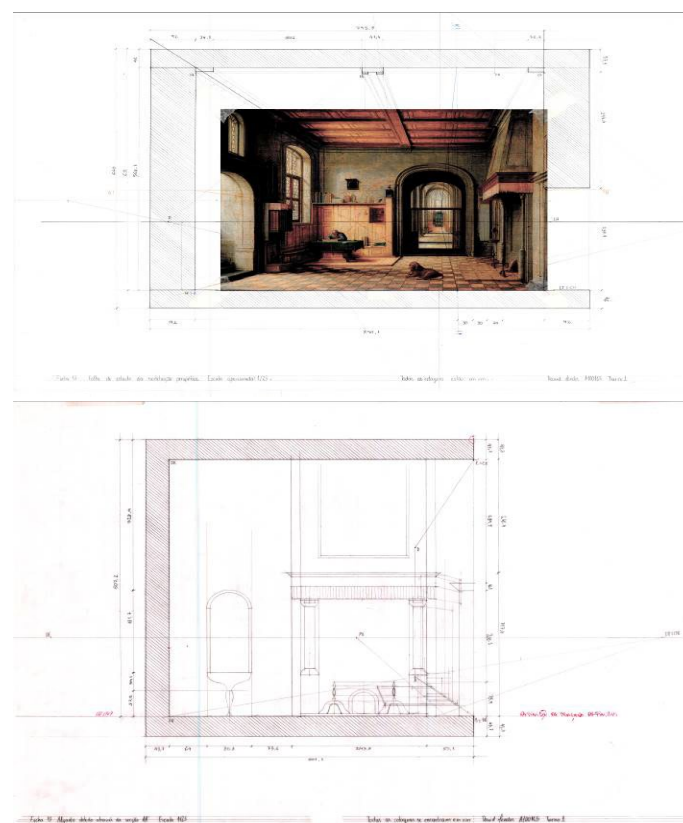


Figure 8. Perspective restitution

In the incessant search and inquire that characterizes architectural thinking and practice, the second semester programmatic grid (fig. 9) amplifies cultural, conceptual and instrumental resources, as well as methodological competences, that converge to the wide range of problems that arise within the scope of disciplinary action.





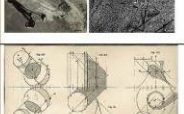





<p>A16. Ônices + Êngia projeção ortogonal Gênica e a projeção de superfícies a partir de linhas de moldação.</p> <p>Ficha 16 Bach, Johann Sebastian. <i>Matemática e geometria</i>. Londres: Continuum University Press, 2007. «Bach, Johann Sebastian. <i>Matemática e geometria</i>. Londres: Continuum University Press, 2007. «Bach, Johann Sebastian. <i>Matemática e geometria</i>. Londres: Continuum University Press, 2007.</p>		<p>A23. Projeções cartográficas Projeção e planificação de superfícies esféricas.</p> <p>Ficha 23 Projeção de mapas.</p> <p>Bibliografia «Projeção de mapas». <i>Projeção de mapas</i>. Londres: Continuum University Press, 2007.</p>	
<p>A17. Superfícies regulares + perspectiva linear Definição e caracterização de superfícies regulares.</p> <p>Ficha 17 Caracterização de superfícies regulares.</p> <p>Bibliografia «Caracterização de superfícies regulares». <i>Caracterização de superfícies regulares</i>. Londres: Continuum University Press, 2007.</p>		<p>A24. Curvatura de superfícies + Reforço de linhas Módulo e pólignos em superfícies curvas.</p> <p>Ficha 24 Reforço de linhas e pólignos em superfícies curvas.</p> <p>Bibliografia «Reforço de linhas e pólignos em superfícies curvas». <i>Reforço de linhas e pólignos em superfícies curvas</i>. Londres: Continuum University Press, 2007.</p>	
<p>A18. Superfícies regulares + perspectiva linear Definição e caracterização de superfícies regulares.</p> <p>Ficha 18 Caracterização de superfícies regulares.</p> <p>Bibliografia «Caracterização de superfícies regulares». <i>Caracterização de superfícies regulares</i>. Londres: Continuum University Press, 2007.</p>		<p>A25. Geometria de construção + Sombras Formas geométricas e sombras produzidas.</p> <p>Ficha 25 Formas geométricas e sombras produzidas.</p> <p>Bibliografia «Formas geométricas e sombras produzidas». <i>Formas geométricas e sombras produzidas</i>. Londres: Continuum University Press, 2007.</p>	
<p>A19. Configurações planas + Projeções cotadas Caracterização e representação de superfícies planas.</p> <p>Ficha 19 Caracterização e representação de superfícies planas.</p> <p>Bibliografia «Caracterização e representação de superfícies planas». <i>Caracterização e representação de superfícies planas</i>. Londres: Continuum University Press, 2007.</p>		<p>A26. Sombras Visualização de formas.</p> <p>Ficha 26 Visualização de formas.</p> <p>Bibliografia «Visualização de formas». <i>Visualização de formas</i>. Londres: Continuum University Press, 2007.</p>	
<p>A20. Configurações poligonais + Projeções cotadas Tesselação poligonal.</p> <p>Ficha 20 Tesselação poligonal.</p> <p>Bibliografia «Tesselação poligonal». <i>Tesselação poligonal</i>. Londres: Continuum University Press, 2007.</p>		<p>A27. Investigação & desenvolvimento Técnicas de investigação e desenvolvimento.</p> <p>Ficha 27 Técnicas de investigação e desenvolvimento.</p> <p>Bibliografia «Técnicas de investigação e desenvolvimento». <i>Técnicas de investigação e desenvolvimento</i>. Londres: Continuum University Press, 2007.</p>	
<p>A21. Superfícies topográficas + Projeções cotadas Caracterização de superfícies topográficas.</p> <p>Ficha 21 Caracterização de superfícies topográficas.</p> <p>Bibliografia «Caracterização de superfícies topográficas». <i>Caracterização de superfícies topográficas</i>. Londres: Continuum University Press, 2007.</p>		<p>A28. Investigação & desenvolvimento Técnicas de investigação e desenvolvimento.</p> <p>Ficha 28 Técnicas de investigação e desenvolvimento.</p> <p>Bibliografia «Técnicas de investigação e desenvolvimento». <i>Técnicas de investigação e desenvolvimento</i>. Londres: Continuum University Press, 2007.</p>	
<p>A22. Operações topográficas + Projeções cotadas Modelação de superfícies topográficas.</p> <p>Ficha 22 Modelação de superfícies topográficas.</p> <p>Bibliografia «Modelação de superfícies topográficas». <i>Modelação de superfícies topográficas</i>. Londres: Continuum University Press, 2007.</p>		<p>A29. Investigação & desenvolvimento Técnicas de investigação e desenvolvimento.</p> <p>Ficha 29 Técnicas de investigação e desenvolvimento.</p> <p>Bibliografia «Técnicas de investigação e desenvolvimento». <i>Técnicas de investigação e desenvolvimento</i>. Londres: Continuum University Press, 2007.</p>	
<p>A30. Avaliação Pratificação dos trabalhos.</p>			

Figure 9. Programmatic grid for semester II

CONCLUSION

Looking at architecture training teaching-learning strategies, focus must fall upon research methodologies engaging abstract thinking, theoretical background, technological awareness and graphic speculation, all condensed on Design Studio. Regarding the Geometry course, its strategic reorientation aims to foster essential knowledge for architectural training and practice, through a simultaneous engagement of all its dimensions, such as projective systems and geometric lexicon, inquire, interpret and envision of form/space, in order to inform, support and substantiate architectural design practice and thinking.

To such concern, drawing, as support and materialization of Geometrical reasoning, must be instructed with the theoretical and practical resources that consent to pass beyond the immediately visible. We are thus led to value the process of thinking and making architecture in its most different features and ways of substantiation: from the first sketches that clarify the posed problem; to intermediate state drawings and models that generate critical thinking and open the way to hypotheses; to the final set of drawings, models, or even texts, which established the proposal and communicate it.

A procedural dimension that integrates states of incompleteness, error or digression, either abstract (idea) and material (graphic), from which Christenson asserts: *“Through numerous procedures and acts of architectural representation, architects make and test statements, define priorities and later question them, generate alternatives and options, concretize and abstract concepts; in short, they produce architectural knowledge”*.⁸

The exposed course readjustment, which corresponds to the emergence of distinct and simultaneous functionalities as well as the prevalence of geometrical reasoning over a mere mechanical approach, diverge from the contemporary concern with 'finished' or unambiguously defined states, often overlooked by the priority given to digital uniformity. A reorientation of the teaching-learning process, where distinct and simultaneous functionalities arise (namely the simultaneity between free hand drawing and technical drawing), as well as a project-based Learning methodology fostering student's autonomy and creativity in mastering thought and practice. As Holl's stated: *“Working with doubt can produce an intrinsic affirmation of human choice that gives presence to an idea”*.⁹

NOTES

¹ Gaspard Monge. *Géométrie descriptive. Leçons données aux écoles normales* (Paris: Baudouin, 1799), 1. “La Géométrie descriptive a deux objets: le premier, de donner les méthodes pour représenter sur une feuille de dessin qui n’a que deux dimensions, savoir, longueur et largeur, tous les corps de la nature qui en ont trois, longueur, largeur et profondeur, pourvu néanmoins que ces corps puissent être définis rigoureusement. Le second objet est de donner la manière de reconnaître, d’après une description exacte, les formes des corps, et d’en déduire toutes les vérités qui résultent et de leur forme et de leurs positions respectives.”

² Marco Frascari, Jonathan Hale and Bradley Starkey. *From models to drawing*. (Abingdon: Routledge, 2008), 4.

³ In Marco Frascari, Jonathan Hale and Bradley Starkey. *From models to drawing*. (Abingdon: Routledge, 2008), 12-13.

⁴ Riccardo Migliari. *Disegno come Modello. Riflessioni sul disegno nell’era informatica* (Roma: Edizione Kappa, 2004).

⁵ Marco Frascari, Jonathan Hale and Bradley Starkey. *From models to drawing*. (Abingdon: Routledge, 2008), 7.

⁶ Mike Christenson. *Theories and Practices of Architectural representation* (Abingdon: Routledge, 2019), 2.

⁷ The elected theme may take advantage from possible opportunities in the articulation with other CUs, or with ongoing researches in the school R&D unit.

⁸ Mike Christenson. *Theories and Practices of Architectural representation* (Abingdon: Routledge, 2019), 112.

⁹ Holl, Steven. *Parallax* (New York: Princeton Architectural Press, 2000).

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LEONARD BERNSTEIN AND 'COMPLEX' MUSIC EDUCATION

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INTRODUCTION

The 53 episodes of *Young People's Concerts* were broadcast by CBS between 1958 and 1972. Each episode corresponded to the filming of a live performance by the New York Philharmonic, with Leonard Bernstein introducing, illustrating, and conducting the musical pieces, first at Carnegie Hall (until 1962), then in the Concert Hall at Lincoln Center.

The audience in the Hall consisted mainly of children and teenagers.

This paper intends to focus on some particular didactic strategies employed by Bernstein in his *Concerts for Young People*: selection of topics; segmentation of the chosen pieces of music; verbalisation of the content; and his manner of interacting with the students.

Bernstein's didactic strategies will be analysed under the lens of some modern music education methodologies and reference paradigms of general pedagogy: the recent Didactics of Listening developed by the scholar Giuseppina La Face, the conceptions of music teaching of the pedagogues Émile Jaques-Dalcroze and Edgar Willems, prevalent especially in the period after the Second World War and in the 1980s, and finally Edgar Morin's Theory of Complexity, evoked in the title of this paper.

The aim is to offer a lucid and objective analysis of Bernstein's concert-lessons, highlighting their strengths and potential weaknesses, and above all to emphasise the effectiveness of using audio-visual transmissions such as these in today's classrooms for a more comprehensive music education.

Bernstein and his *Young People's Concerts*

As previously mentioned, the *Young People's Concerts* of the New York Philharmonic were first broadcast on television when Leonard Bernstein became conductor of the Philharmonic in 1958. From then until 1972, CBS (at the time still officially known as the Columbia Broadcasting System) broadcast fifteen seasons, with a varying number of episodes per year, for a total of 53, each lasting about one hour.¹

Of great importance for the success of these broadcasts was the work of Roger Englander, who in 1958, when he started working with Bernstein, was director of personnel at CBS. Producer from the first season, Englander also became director from the second.

Bernstein controlled every aspect of the concerts: he set the topics, selected the compositions, chose potential guests and carefully drafted the scripts. In this regard, after Bernstein had written the first draft of the script, the production team, set up by Englander, met several times, generating several

drafts until the final product was approved. Once the script was finalised, Bernstein would, however, continue to make changes up to and even during the broadcast.²

The communicative strategy consisted in formulating a direct and captivating verbal text and in carefully calibrating the rhythm and pauses between the portions of spoken discourse and the pieces of music played.

I would like to focus in particular on two of Bernstein's teaching strategies: the “segmentation-selection” of the proposed pieces of music, and the “verbalisation” of the music.

To do so, I borrow the definitions of “segmentation-selection” and “verbalisation” developed by the scholar Giuseppina La Face, author of a modern theorisation of the Didactics of Listening.³

Segmentation-Selection

In her various essays on the subject, La Face has developed a teaching methodology aimed at leading students to understand a piece of music by listening. Knowing how to understand a piece of music by listening means grasping its unfolding, the connections and relationships between the elements, and being able to construct a map by means of mental processes such as knowing how to analyse, relate, and grasp analogies and differences. To do this, the teacher must be able to segment the piece of music in a way that conforms to both the constructive principles followed by the composer and the laws of perception. Furthermore, in order to assist students, the teacher must be able to select parts of a particularly long piece of music that lend themselves to partial listening, but which are significant, i.e. capable by their poignancy of representing the whole.

Verbalisation

La Face worked on another aspect of listening didactics, which is extremely useful for students not only with regard to learning music, but also for the reinforcement of linguistic and cultural-historical skills. This is the development of adequate verbalisation of the music heard. For the scholar, it is extremely important that pupils learn to describe the piece of music with critical distance, in an objective manner. There is the obstacle of specific technical vocabulary, but this can be circumvented. Technical terms can be converted into concepts, adjectives, referring to areas other than music, such as rhetorical-literary, psychological, scientific, etc. The vocabulary to be used, technical and connotative at the same time, can refer to musical terms, to qualities of sensory and affective experience; it can condense broad cultural-historical meanings (think of the adjectives ‘epic’, ‘lyrical’, ‘heroic’). In order to learn how to employ a language that is able to ‘narrate’ music, La Face also recommends taking examples from great role models. I think Bernstein can be considered one of them.⁴

SIMPLEX TO COMPLEX

In his concert-lessons, Bernstein paid great attention to the development of a discourse that proceeded from the simple to the complex by means of musical examples.

In this process, Bernstein employed stratagems that can be described in the terms ‘segmentation-selection’ and ‘verbalisation’, summarised above and extensively theorised over the last two decades by La Face. In the episode entitled *What is Sonata Form?* (broadcast on 6 November 1964), in order to illustrate the ABA tripartite form, typical of the first movement of a Sonata or Symphony, constructed precisely in “Sonata Form”, Bernstein began with the nursery rhyme *Twinkle, Twinkle Little Star*; moved on to the song *And I Love Her* by the Beatles; and finally to the more sophisticated Aria di Micaela from Georges Bizet’s *Carmen*.⁵ The transition from the simple to the complex often manifests itself in his lessons, moving from a more accessible example, such as a nursery rhyme or

popular song, to a piece of classical or, as he preferred to call it, 'exact' music (as every aspect was meticulously prescribed in the score by the composer).⁶ Bernstein almost always began his lectures with a question. He then had the audience listen to the entire musical composition, before segmenting and selecting the parts that serve to clarify the discourse, finally playing the entire composition again in the hope that listeners would hear it with new and more knowledgeable ears.⁷

Segmentation-Selection

As an example of the 'segmentation-selection' procedure, I offer here an excerpt from the episode *What is Melody?* (21 December 1962). Bernstein set out to explain counterpoint: the art of superimposing and interweaving two or more melodies. In particular, the goal was to get young listeners to grasp the individual melodies that make up a given counterpoint passage, and thus make them able to grasp its richness and valuable articulation. This is not an easy task - Bernstein was aware of this - because to an audience unaccustomed to a certain kind of music, counterpoint can give the impression of confusion and “absence of melody”. However, for those who learn to listen, counterpoint is a “wealth of melody”. To this end, Bernstein chose a central passage from the Prelude to Richard Wagner's *Tristan und Isolde*, characterised by a strong build-up of tension; he broke up the orchestra into its individual instrumental parts, first having the strings play their melody in an ever-increasing *crescendo*, then the horns and cellos “shouting” the first four notes of the motif (played on the piano by Bernstein earlier), then the trumpets singing the second four-note motif (again illustrated earlier by the conductor on the piano). After having played the instrumental parts separately with their different melodies, Bernstein allowed the audience to listen to the piece again in its entirety, with all the instruments together. The young people now listened with “different ears”, better able to distinguish the different melodies and instrumental timbres.

Verbalisation

With regard to “verbalisation”, Bernstein argued that music should not be given meanings that do not belong to it. According to the conductor, there were widespread but erroneous ways of talking about music: the typical lecturer's way, which only uses anecdotes without saying anything about music; and the typical analyst's way, which vivisects pieces of music in a dry and self-serving manner. Alongside these was an even more dangerous way: that of explaining the musical journey through fictitious, invented stories that have nothing to do with the piece of music. To overcome these dangerous (because they are misleading) expedients, Bernstein aimed to develop an adequate narrative of the musical journey through similes and metaphors.⁸ For example, the conductor emphasised how the tripartite and symmetrical structure of the sonata form can be found in nature - the tree consists of a central trunk and lateral branches - or in the human body - our face has a central axis, nose and mouth, and two identical lateral elements, eyes and ears, or in man-made architecture - the bridge with its horizontal axis and vertical pylons at the sides. Or the musical notes that aggregate to form intervals and then melodies are like atoms that aggregate to form molecules and then living beings (*Musical Atoms: A Study of Intervals*, 29 November 1965). Bernstein therefore attempted to explain complex musical concepts with the refined use of similes and metaphors. Added to this was a great and surprising communicative power. Bernstein was an enthusiast; he loved what he did, and this can be heard and “seen” in his broadcasts.

ACTIVE LISTENING

Bernstein showed that he had the utmost confidence in the power of words and especially music, as well as in the ability of his young audience to understand. The evolution from the simple to the complex is also evident in the language used, which moves from the descriptive-disclosive to the

technical-specialist, with tones presenting the most varied emotional nuances: emphasis, ostentatious enthusiasm, austere seriousness, ironic lightness. It is also evident that listening is not meant here in a passive way. Listening education, understood as creative 'doing', and not as mere passive acquisition, is also central to modern music teaching practices that descend from the pedagogical activism of John Dewey and Ovide Decroly.⁹ The current of pedagogical activism places the conscious participation of the learner at the centre of the learning process, stimulated from a sensory and motor, as well as a cognitive, point of view. Its translation into the field of music teaching is due to the work of a number of composer-theorists who developed autonomous teaching methodologies, but based on common assumptions, which spread especially between the post-World War II period and the 1980s, but which are still practised today and have become reference models in many music schools: Émile Jaques-Dalcroze, Zoltán Kodály, Carl Orff and Edgar Willems, to name the best known. Active listening is particularly central to the practices of Jaques-Dalcroze and Willems, which have many points of contact with Bernstein's ways of disseminating music.

Jaques-Dalcroze and Willems

The Swiss composer and pedagogue Jaques-Dalcroze devised “eurythmic gymnastics”, a method for teaching how to hear and understand music through bodily movement. He was particularly critical of the widespread practice of teaching children only to play or sing, and not to listen to music. Instead, through listening, children and young people, whether they wanted to become professional musicians or simply mature and grow through music, could be sensitised to beauty. Precisely because listening, according to Jaques-Dalcroze, far from being a passive activity, brought into play the creative instinct and the critical-analytical spirit, both of which are present in children and young people.¹⁰

Edgar Willems also cultivated a conception of integral music education, dedicated to the training of music-sensitive people, not just professional musicians. The development of the musical ear, a much more central aspect in Willems than in other exponents of the so-called “active methods”, is realised through three phases: auditory sensoriality, affective listening and mental listening. Auditory sensoriality can be stimulated through the manipulation of sound objects. Affective listening triggers the involvement of emotions, imagination and fantasy. If sensory listening is a passive and objective action, affective listening involves an active and subjective action. Mental listening, i.e. true musical intelligence, corresponds to the ability to bring memory and creative imagination together. It is the last step, from which one can begin to study music theory, and thus to read and play an instrument.¹¹

The centrality of listening in the integral formation of the person is evident in all of Bernstein's work as a populariser. Far from considering it a passive enjoyment, the conductor felt that listening would help his students work on the hierarchy of elements and their continuity, on those aspects that make each piece a “whole”. Through listening to music and its interpretation, flexible, intuitive and creative thinking can be developed.

YOUNG PEOPLE'S CONCERTS: WHAT USE ARE THEY IN SCHOOLS TODAY?

To a contemporary glance, some aspects of the Youth Concerts today are questionable or unsuitable for the concrete educational context. I will just point out two of them.

The centrality of the method to Western art music of the classical-romantic period: Bernstein is eclectic, moving from the hit song to the complex piece of symphonic music, but, although he does not emphasise it, his belief that Western art music is the greatest achievement of human civilisation is very clear.

In his lecture-concerts, Bernstein tried to engage the audience, but certainly not enough. They are one-sided lectures, also due to the television format. There is a lack of concrete feedback from the students. It is not possible to verify the skills acquired. However, I believe that the videos of his

lectures could still be usefully employed in the classroom by teachers today, appropriately commented, updated and accompanied by timely verification. The episodes of the *Young People's Concerts* could, in other words, become a valuable tool for teachers, just as the instrumentalists of the New York orchestra were necessary for Bernstein to conduct his own broadcasts.

On the other hand, one should not forget that before the advent of playback devices, in order to listen to music one had to go to the theatre or a concert hall, and the musicians were heard and watched. It was in the 20th century that the importance of the musical 'gesture', of the movement of the body generating music through the relationship with the instrument, was emphasised by many composers of the post-World War II musical avant-garde. One need only think of Luciano Berio and his fourteen *Sequenzas* for solo instruments, which not only represent a kind of catalogue of the multiple sonic possibilities of each instrument, and the virtuoso abilities of the performers, but also possess an ostentatious theatrical vocation.

With the widespread availability of videos of musical performances, as well as popular music television broadcasts that exist today (*Young People's Concerts* are certainly not the only ones), the teacher can restore a fruitful combination of listening and viewing to the classroom.¹²

Video-Music Didactic

Various researchers have demonstrated the usefulness of music videos in the classroom. I will limit myself here, for reasons of space, to pointing out an important study conducted in the 1990s by Geringer, Cassidy and Byo.

In 1997, the three scholars led research aimed at analysing the responses of university students, not specialised in music, to listening to a music recording or listening to and viewing an audiovisual recording. The experiment was based on the first and fourth movements of Beethoven's Sixth Symphony; the students were divided into four groups:

- The first group listened to excerpts of a performance by Leopold Stowkowski
- The second listened to and watched excerpts from the film *Fantasia*
- The third group listened to excerpts of a Bernstein performance
- The last group listened to and watched excerpts from a video of Bernstein's performance

Finally, the four groups were tested. The cognitive measure in this study analysed the students' perception of music. The study asked questions about tempo, metre, structure, instrumentation, melody, harmony and dynamics. The test also included a part dedicated to measuring the students' emotional involvement while listening.

The second group that had seen the film *Fantasia* scored lowest on the cognitive test, but scored highest on the affective test. That is, these students, although emotionally engaged by the music, were not able to describe it effectively. The third group that had seen Bernstein's concert lectures scored the highest. Not only were they able to describe the music effectively and relevantly, they were also more emotionally involved than the other two groups who had only heard the music. Geringer, Cassidy and Byo believe that the video allowed the students to focus on the musical elements. Audiovisuals could therefore prove to be an important tool for teaching students the basic elements of music. As mentioned above, they could be a valuable tool for the teacher to conduct guided classrooms, preceded, accompanied and followed by questions to verify the results.¹³

CONCLUSION

What does Edgar Morin's complexity theory have to do with this?

In his various essays, which deal with issues related to schooling and the education of human beings across disciplines, Morin argues that man originates from living and physical nature and, at the same time, distinguishes himself from it and emerges through culture, thought and consciousness.

Morin devoted much of his work to a reformation of thought, to an integral education that overcomes the separation of disciplines. He argues that culture is split into two blocks. On the one hand, humanistic culture, on the other hand, scientific culture; on the one hand, the development of global and all-embracing thinking; on the other, analytical and sectoral thinking. This separation fails to grasp ‘what is woven together’, the complexus.¹⁴

I believe that an audio-based didactics of listening separates and isolates and risks not letting people understand and feel the complexity of music making, the joy that comes from physical movement and intellectual development.

I will conclude with one last example, not from the Young People’s Concerts, but from a more recent performance: Beethoven’s Piano Concerto Op. 37 No. 3 with Krystian Zimerman at the piano and Bernstein conducting the Vienna Philharmonic Orchestra in 1989. During the presentation at the conference, I showed an excerpt of this performance, available on YouTube.¹⁵ The musical genre of the concerto can be described in terms of the confrontation, at times conciliatory, at times more dramatic, between the parts where the solo prevails, i.e. the solo instrument, in this case the piano, and the parts assigned exclusively to the orchestra; I showed the transition between the last bars of the solo, very virtuoso as is traditional in the classical-romantic concerto, and the explosive return of the orchestra (from 6:19 – 7:25).¹⁶ Bernstein’s physical and bodily expression at the moment when the orchestra resumes the reins of the musical discourse gives an account of that manifestation of the ‘joy of music’ around which the conductor built his entire activity as a musician and populariser.

NOTES

¹ For a very well-documented history of these concerts see Alicia Kopfstein-Penk, *Leonard Bernstein and His Young People's Concerts* (Lanham: Rowman & Littlefield, 2015). For other possible ways to analyze this television program from a textual perspective see Anna Scalfaro, "Music Popularization for Youth on Television from the 1960s to the 1990s between the United States and Europe," in *The Oxford Handbook of Music and Television*, ed. by James Deaville, Jessica Getman, and Ron Rodman (Oxford: Oxford University Press, scheduled 2023).

² Roger Englander, "No Balloons or Tap Dancers: A Look at the Young People's Concerts," in *Leonard Bernstein: The Television Work* (New York: Museum of Broadcasting, 1985), 29-36; Richard Sandomir, "Roger Englander, 94, Producer and a Force Behind the Classic of 'Young People's Concerts'," *The New York Times*, March 4, 2021. <https://www.nytimes.com/2021/03/04/arts/music/roger-englander-dead.html?searchResultPosition=1>.

³ On the didactics of listening see the essays by Giuseppina La Face: "Le Pedate di Pierrot. Comprensione musicale e didattica dell'ascolto," in *Musikerziehung. Erfahrungen und Reflexionen*, ed. by Franz Comploi (Bressanone/Brixen: Weger, 2005), 40-60; "La didattica dell'ascolto," *Musica e Storia* 14(3) (2006), 489-544; "La linea e la rete. La costruzione della conoscenza in un Quartetto di Haydn," in "*Finché non splende in ciel notturna face*," *Studi in memoria di Francesco Degrada*, ed. by Cesare Fertonani, Emilio Sala and Claudio Toscani (Milano: LED, 2009), 225-250; "Testo e musica: leggere, ascoltare, guardare," *Musica Docta. Rivista digitale di Pedagogia e Didattica della Musica* 2 (2012), 31-54, doi: 10.6092/issn.2039-9715/3239; "Essenzielles Wissen und grundlegende Kompetenzen: das Largo concertato aus Giuseppe Verdis Macbeth," *Musica Docta. Rivista digitale di Pedagogia e Didattica della musica* 8 (2018), 1-25, doi: 10.6092/issn.2039-9715/8836.

⁴ On the concepts of 'segmentation-selection' and 'verbalisation' see La Face, "La didattica dell'ascolto," *Musica e Storia*, 14(3) (2006), 511-544.

⁵ The episodes are available in Roger Englander, executive producer, *Young People's Concerts* (Oberhaching: Unitel GmbH & Co., 2019), 3 Vol., 14 DVD.

⁶ The expression "Exact Music" is explained by Bernstein in the episode *What is Classical Music?* (broadcast January 24, 1959).

⁷ Brian D. Rozen, "Leonard Bernstein's Educational Legacy," *Music Educators Journal* 78(1) (1991), 43-46, doi: 10.2307/3398312.

⁸ Leonard Bernstein, *The Joy of Music* (New York: Simon & Schuster, 1959), 11-15. For the best understanding of Bernstein's ideas on the popularization of music see Bernstein, *The unanswered question: six talks at Harvard* (Cambridge, Mass.: Harvard University Press, 1976).

⁹ I refer here to some capital studies by John Dewey, *Democracy and Education: An Introduction to the Philosophy of Education* (1916) (New York: Simon & Schuster, 1997); *Experience And Education* (1938) (New York: Simon & Schuster, 2008). By Ovide Decroly see *Le programme d'une école dans la vie* (1921) (Paris: Fabert, 2009).

¹⁰ Émile Jaques-Dalcroze, *Il ritmo, la musica e l'educazione*, ed. by Louisa Di Segni-Jaffé (Torino: EdT, 2008), XXI-XXVIII. See also Kathy M. Thomsen, "Hearing Is Believing: Dalcroze Solfège and Musical Understanding," *Music Educators Journal* 98(2) (2011), 69-76, doi: 10.1177/0027432111425614.

¹¹ Ana Lucía Frega, "A Comparison of the Teaching Strategies of Maurice Martenot and Edgar Willems: Conclusions and Implications for Future Research," *Bulletin of the Council for Research in Music Education* 127, 63-71. (The 15th International Society for Music Education: ISME Research Seminar, Winter, 1995/1996). Willems expounds his theory in the two volumes *La préparation auditive de l'enfant* (with a preface by Jaques-Dalcroze) and *La culture auditive, les intervalles et les accords* (Genève: Pro Musica, 1940 and 1946).

¹² Jason D. Smith, "Can Video Save the Radio Star? Using Music-Plus-Video in the Classroom," *Music Educators Journal* 90(1) (2003), 37-41, doi: 10.2307/3399975. See also Kevin P. Bartram, "Lessons from a Master: Using the 'Bernstein Formula' in Music Classrooms," *Music Educators Journal* 90(4) (2004), 19-24, doi: 10.2307/3399994.

¹³ John M. Geringer, Jane W. Cassidy and James L. Byo, "Nonmusic Cognitive and Affective Responses to Performance and Programmatic Music Videos," *Journal of Research in Music Education* 45(2) (1997), 221-233, doi: 10.2307/3345582. See also by the same authors, "Effects of Music with Video on Responses of Nonmusic Majors: An Exploratory Study," *Journal of Research in Music Education* 44(3) (1996), 240-251, doi: 10.2307/3345597.

¹⁴ For the theory of complexity and its implications for pedagogy, see Edgar Morin, *La tête bien faite: repenser la réforme, réformer la pensée* (Paris: Éditions du Seuil, 1999).

¹⁵ This performance of Beethoven's Third Piano Concerto is available at <https://www.youtube.com/watch?v=Cus8ofkW9Hc&t=489s> (accessed June 30, 2023).

¹⁶ For a guide to the evolution of the musical form of the Concerto see Stephan D. Lindeman, *The Concerto: a Research and Information Guide* (London: Routledge, 2007). For a didactic declination of Beethoven's Third Concerto see Anna Scalfaro, "L'Allegro con brio del Concerto op. 37 di Beethoven: un modello di conversazione," *Musica Docta. Rivista digitale di Pedagogia e Didattica della musica* 6 (2016), 211-237, doi: 10.6092/issn.2039-9715/6586.

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CO-PRODUCING CIVIC PEDAGOGIES: COLLECTIVE LEARNING IN A COMPLEX WORLD

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INTRODUCING CIVIC PEDAGOGIES

Civic pedagogies are an emergent educational practice, within the arts and architecture, characterised by a situated mode of learning within (and from) the urban environment. They developed from discourse around critical education,¹ an emergent field which relates specifically to critical spatial and urban practice. Much of the theoretical background is taken from ‘place-based education’, which encourages learning outside institutional boundaries, utilising the city as a learning resource.² The aim of civic pedagogies is to empower citizen action, to build agency in learners to transform the built environment.³

Through process of literature review the research has identified several core characteristics for civic pedagogies:

- Firstly, they foreground Situated knowledge(s), recognising that knowledge claims are contingent on the communities from which they are rooted.⁴ Civic learning seeks to develop new forms of situated knowledge(s) for urban transformation with learners through collective learning practices.
- Civic learning is place-based, and the neighbourhood is the site of transformative action. Through a reading of one’s place within the city, learners make sense of our lived worlds and through direct engagement and connection with the neighbourhood, which can develop agency for urban transformation and civic action.⁵
- Civic pedagogies work most effectively in dedicated spaces of learning, such as ‘Urban learning forums’ and other informal spaces outside the traditional institutional learning environment, appealing specifically to the local needs and urgencies of the context.⁶
- Finally, civic pedagogies build alliances and a shared sense of solidarity between partners. Civic pedagogies produce ‘communities of practice’ as broad alliances of diverse groups committed to mutual learning, they build solidarity through the sharing of tools for other situated learning experiences.⁷

RESEARCH GAP AND QUESTION

To date, much of the research within this field explores the role of civic learning at the edge of academic institutions, through mechanisms of co-produced research via Urban Living Lab models, where civic learning is a by-product of the research process.⁸ Equally ‘Live Project’ pedagogies in the field of architecture, bring together students and community associations to coproduce a ‘real’ design projects.⁹ These processes are often enriching for all parties in a mutual learning process but

are not often designed as civic curricula from the outset. This paper focuses on civic pedagogies in complex worlds, taking place beyond the academy in non-institutionalised settings, by focussing on one case in East London. The summer of 2022 highlighted the precarity of our urban environment in London; wildfires, water shortages and toxic air were just some of the material impacts of the climate crisis. In parallel, climate anxiety is commonplace, with citizens wanting to take action but feeling powerless to act themselves.¹⁰ This is compounded in the neighbourhood of study with high indices of socio-economic deprivation, and the material impacts of the ‘cost-of-living crisis’ most directly felt.

In response to the urgencies of this context, the paper seeks to understand the role of such civic pedagogies in producing agency with(in) learners for action; through the development of knowledge(s), skills and tools to live beyond this current state of crisis. It asks, What is the role of civic education in addressing the multiple urgencies of our time? What methods and conditions enable civic learning to thrive?

The following paper reflects on embedded, practice-based research, through the co-design of civic pedagogies in East London. Unpacking the core participatory methodological approach through one case, the R-Urban Poplar eco-civic hub, presenting several reflections and findings to help inform civic pedagogies in the future.¹¹

EMBEDDED RESEARCH WITH R-URBAN

The papers positionality is shaped and supported through theory, with my own practice-based approach resonating with the work of scholar activists such as Derickson, Routledge and Cope – who seek to bring about change within communities on social and ecological matters through the research process, in doing so they position the researcher as an active agent for change working with specific communities of place.¹² The research is structured through practice which allows me to find space to critically reflect upon both my historic practice as a spatial practitioner,¹³ whilst in parallel continuing to test and develop the practice through the research process, via multiple cycles of participatory action research.¹⁴ This is what Nelson refers to by “Practice-as-research” and the idea of knowing through the multiple modes of praxis.¹⁵

In adopting this I’ve embraced an embedded research position, given my long-standing ties to the host community in Poplar and developed a co-inquiry approach as response. For the past 5 years my practice has been rooted within one community and place, as facilitator and designer of the R-Urban Poplar Eco-civic Hub.¹⁶ The hub explores the potential of bottom up, open-source strategies for resilient and ecological transitions for urban living.¹⁷ The Poplar hub was started in 2017 and is now in its 7th year of operation, the hub itself has developed iteratively in response to local needs, interests, and funding. The hub was initiated by public works, in collaboration with Atelier d’Architecture Atugeree (aaa) who co-founded the R-Urban project in 2011.¹⁸ R-Urban Poplar is part of a network of eco-civic hubs, with 5 operational hubs in Paris and one in London.¹⁹

The ‘R’ of the R-Urban strategy has multiple meanings; primarily meaning resilience but also resourcefulness, re-use and repair highlighting a strategic approach and core values of the project.²⁰ Whilst the aim of urban strategies like R-Urban is to co-create resilient communities, this is not something which materialises spontaneously. Resilience within communities is something that needs to be nurtured and cared for. Civic resilience is fostered through two primary modes; firstly through the development of working prototypes, in the form of eco-civic hubs, which demonstrate circular, closed loop systems as an alternative to existing resource management within cities. These hubs offer material, working examples of potential low-impact living and the prototype systems which can enable them. In Poplar, the hub focuses on two main themes:

- A just food system, developing food growing projects, food waste recycling, anaerobic digesters and composters at the neighbourhood scale.
- Resource/material re-use through an onsite workshop, repair café and built prototypes using re-used materials wherever possible.

Alongside the physical hubs the strategy develops the capacity for resilience in communities through programmes of civic education. The site hosts several public programmes and workshops which aim to develop green skills and situated knowledge to help aid this transition.²¹ This is central to the R-Urban strategy as to support this ecological transition we need to learn new ways of being in the city, learn new skills to support low impact lifestyles and un-learn harmful habits.

CO-PRODUCING CIVIC PEDAGOGIES – CLIMATE COMPANIONS 2022

Through the PhD research we developed and tested the first cycle of action research in Poplar. For two-weeks In September 2022 R-Urban Poplar hosted the ‘Climate Companions Festival of Learning’. This was conceived as a two-week curriculum in the broadest sense; a programme of workshops, events, community meals and talks with the aim of exploring the local neighbourhood of poplar, “finding ways to creatively engage with our changing climate and build new companions for care and action in the neighbourhood”.²²

For this first two-week curriculum, the aim was to develop skills, knowledge, and capacity locally towards civic agency and resilience. However, this first curriculum is to be seen as longer cycle of action research, with further programmes developed for Summer 2023. The curriculum was curated with local partners and practitioners through an open-call process, alongside a co-design workshop with local members of the R-Urban hub to identify learning needs and desires. The brief for practitioners was left open to be explored in relation to the primary aim and theme around climate action and change within the neighbourhood, this gave space to develop and test new ideas for workshops. Here the role of researcher was developed around initiating a collective learning process and curating a learning programme which met local challenges and needs. The curriculum design worked strategically with local partners and groups already engaged in climate and neighbourhood issues, supporting existing initiatives where possible. Whilst in parallel drawing on knowledge from outside the neighbourhood where gaps and competencies were required to address learning needs.

Co-design of the curriculum was an iterative process engaging in a Participatory Action Research (PAR) methodology utilising a co-inquiry approach.²³ Positioning the researcher as both an observer but co-learner in the pedagogic experience with other participants. Within the curriculum the author facilitated several learning sessions, focussed on the disciplinary background in architecture and construction. Finding ways of making eco-construction in hempcrete accessible to novice makers. The programme itself took place primarily within the space of the R-Urban Hub, most sessions were about learning new skills or sharing situated knowledges around ecological and sustainable practices. Many sessions focussed on learning new skills such as eco-construction methods, learning to repair, mend and learn ecological crafts such as making and working with natural dyes. Alongside this, some groups ran sessions centred around food and cultural practices. A Bengali feast was an opportunity to learn about Bengali food growing, specifically which Bengali food crops were thriving in London’s changing climate, whilst preparing food together. Meals became a focal point throughout the curriculum, creating discursive spaces to digest learnings from workshops and build relations with other participants. Most sessions focussed on ‘learning-by-doing’, getting hands-on with a skill, craft or a material. This in turn makes space for conversation and discussion, often at the more personal level between groups of participants. Workshops were generally organised around situating your own existing knowledge or understanding in dialogue with an ‘expert’ or workshop lead.

Although most sessions took place within the hub itself, a handful were designed to engage with the wider neighbourhood of Poplar. These sessions focussed on embodied ways of knowing and reading the city, or developing what Anna Tsing refers to as the ‘Arts of Noticing’,²⁴ whether that was through a multi-species lens, by focussing on listening and making sound recordings of the neighbourhood or by exploring the neighbourhood through urban foraging walks. Each session was aimed towards a different reading of the urban environment, whilst simultaneously connecting to urban challenges e.g. air quality, or altering perceptions of the neighbourhood which participants were familiar with.

RESEARCH FINDINGS AND QUESTIONS FOR THE FUTURE

Since the first trial curriculum the research has carried out a series of semi-structured qualitative interviews with participants of the programme and conducted a post-evaluation survey with learners to critically reflect on to the impact of this first trial pedagogy and help to develop new methods and tactics for future civic pedagogies. Through thematic analysis of this data, we’ve identified a number of initial findings which seek to aide future pedagogic leaders interested in civic education.

Firstly, the importance of the physical space of the R-Urban Eco-civic hub in the experience of learners. Interviewees frequently reflected on the role of the hub itself (both the physical qualities of the space, and the role of hosts in creating a welcoming, inclusive space for civic learning. The generosity and flexibility of the hub was seen as important to the learning experience, describing the R-Urban site as an “*urban oasis*” which gave participants freedom to explore learning at a comfortable pace. Learning took place in the outdoors with most of the hub infrastructures being in the open air, which connects participants to their physical environment, through the weather, the smells of pollution or through the visible prototyping within the space. Respondents appreciated the learning taking place outside established institutional learning environments such as classrooms or community centres, allowing them to be more hands-on and engaged.

The curriculum participants were inherently inter-generational with learners ranging in age from 5-70, part of the pedagogic challenge is to create a workshop with appeals to all ages, interests, and abilities whilst remaining critical and complex. The R-Urban hub is typical of what McFarlane described as urban learning forums,²⁵ or what has been established as Urban living labs, which seek to provide peripheral spaces outside formal education institutions to engage communities in urban learning, citizen science and sustainable transitions.²⁶ R-Urban itself can most directly be understood by what Harriet Bulkelly et al describe as an Organic Living Lab, reflecting the network of civic collaborators who came together to make the hub happen without a major institutional stakeholder.²⁷ Having such spaces is vital for on-going civic education, creating spaces outside our typical learning institutions, which offer more freedom to learn for learnings sake, without pressure of assessment and qualification.

The second finding is on how participants altered their perceptions of the built environment through workshops which learnt from/with the city. This reflection focusses more specifically on the workshops which took place outside the space of the hub and focussed more on urban exploration such as the Moss Walk, the foraging walk and listening to the neighbourhood workshops. These workshops centred the ‘Arts of Noticing’ as ways of exploring the surrounding context; through sound, through taste and through multi-species lens by observing moss habitats. These acts form part of an embodied learning experience, where learners became aware about urban issues and opportunities which had previously gone un-noticed. This new knowledge (where to find wild food, how to identify plant species, how moss in cities relates to air quality, or how the urban soundscape reflects the nature-culture of place) develops a self-awareness within learners, about their own

neighbourhoods and lived experience of it. Interviewees highlighted how this process developed a newfound consciousness within the city, often altering established perceptions of the home neighbourhood. Whilst these sessions were highlighted as being impactful it was untested to what extent this led to changes in habit or led to further agency within participants.

Finally, the climate companions programme had a central role in forming what Etienne Wenger understood as a community of practice an intentional community with a mutual desire to learn from and with one and other.²⁸ This was a key outcome of the process as this was the first trial civic curriculum, with a follow up planned for Summer 2023. Here the idea of companionship and alliance forming is key, building mutual trust between participants from a diverse range of backgrounds and skills. Moving forwards, this newfound community of practice will play a more central role in the co-design and co-production of future pedagogies, identifying learning aims, needs and urgencies, for future curriculums to address in the local context.²⁹

This process highlights the importance of the role of researcher/practitioner/pedagogue as host and initiator. Making participants feel connected, motivated to learn and excited to be part of the process requires the building of trust with the community. The survey highlighted the role of R-Urban members as welcoming hosts, facilitating and mediating the programmes – whether offering cups of tea, space for personal conversations or creating a space for all. If civic pedagogies are to overcome existing knowledge hierarchies and imbalances, they must centre collective learning experiences which foreground trust, commonality and allyship between multiple struggles.

CONCLUSION

For pedagogues of the future, building this community of practice, forming companionships, and long sustained embedded research will be central to addressing the multiple complexities of our time. Embracing the messy nature and the multiple identities within the research process is part of an on-going ethics of care for co-learners and researchers in a collective negotiation of values and caring needs. Civic pedagogies have a role to play outside our traditional learning environments, offering opportunities for communities to engage in knowledge production in direct response to local needs and desires. This process, which centres participation and collective learning is one which can be empowering for those who are engaged and tackle local urban challenges by learning together. For civic pedagogies to thrive they will need spaces outside our teaching institutions, where learning can take place in a welcoming and caring environment. Pedagogues need to form trust within the communities they are working, which inevitably takes time and suggests more researchers take on the challenge and complexity of embedding themselves within neighbourhoods

OPEN ACCESS STATEMENT

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NOTES

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⁸ Harriet Bulkeley et al., "Urban Living Laboratories: Conducting the Experimental City?," *European Urban and Regional Studies*, 2019,

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¹³ *As a member and co-director of art, design and architecture practice public works*

¹⁴ Alice McIntyre, "Action and Change in Participatory Action Research," *Participatory Action Research*, 2014, 33–48

¹⁵ Robin Nelson, "From Practitioner to Practitioner-Researcher," in *Practice as Research in the Arts: Principles, Protocols, Pedagogies, Resistances*, 2013, 23–47

¹⁶ Petrescu et al., "Sharing and Space-Commoning Knowledge Through Urban Living Labs Across Different European Cities."

¹⁷ Doina Petrescu, Constantin Petcou, and Corelia Baibarac, "Co-Producing Commons-Based Resilience: Lessons from R-Urban," *Building Research and Information* 44, no. 7 (2016): 717–36

¹⁸ *R-Urban Poplar hub emerged as an outcome of the closure of the R-Urban Wick hub and site in 2016*

¹⁹ Doina Petrescu and Constantin Petcou, "The Role of Architects in Initiating , Sustaining and Defending Urban Commons in Mass Housing Estates" no. May (2023)

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- ²⁹ *This Community of Practice have since been involved in the curation of the 2023 instalment of Climate Companions festival, via two co-design discursive dinners and continue to be involved as part of a project steering committee*

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KREDA WORKSHOP - 2IMAGINE . 2DRAW . 2CREATE - LIGHT AND SHADOW IN ARCHITECTURE ARCHITECTURAL DRAWING AS PEDAGOGIC AND DIDACTIC EXPERIMENTATION

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INTRODUCTION

Kreda Workshop (2Imagine . 2Draw . 2Create) is a pedagogic and didactic experiment that was held in the auditorium *Rainha Sonja* of the Lisbon School of Architecture, University of Lisbon, called the ‘Cube’ for three hours on the afternoon of the 28 of September 2022.

We invited forty-three students of the 2nd and 4th years of the Architectural Integrated Master Course to draw on big black walls of the ‘Cube’ Auditorium and create Light and Shadow drawings with white chalk on the auditorium's surfaces. The ‘Cube’ Auditorium was divided into five workstations. Each station was dedicated to one of five Architects selected in history: Alvaro Siza, Antonio Sant’Elia, Peter Zumthor, Souto Moura, and Tadao Ando. The forty-three students were divided into five groups. Each group initiated a set of drawings of an Architect that other groups would subsequently continue. Each group spent ten minutes in each drawing space working on the walls dedicated to the selected Architect.

As the output, several big-scale drawings were created. Further, a group of the participating students was interviewed. The process, the results, and the interviews were recorded and qualitatively analyzed where some relevant findings were found.

DRAWING IN ARCHITECTURE - THE BACKGROUND

The design phenomenon in architecture is inseparable from the human being-drawing binomial. Human needs to exteriorize ideas to operate over them. To write down calculations is to assist human cognitive processes in solving. As exteriorizations of human minds, drawings are extensions of them. They are an integral part of the mechanisms of cognition and invention.

Currently, architecture is going through a unique moment of particular richness and diversification of available graphic means of representation and creation. Today, architects have, for their conception, a variety of options that can range from the simple and quick note of an idea made with the pencil on the knee to the other extreme cases where architects draw with algorithms of artificial intelligence. Through the diversity of approaches proposed by design, architects find different forms, with particular and complementary characteristics, to express and develop their thinking.

In this resourceful context, we organized the Workshop Kreda exploring the intrinsic relationship between architecture and drawing (fig.1). We focused on architectural interpretation, comprehension, and creations through drawing, primarily through the drawing of light and shadow as they are the very origin of architecture. “Architecture is the masterly, correct, and magnificent play of masses brought together in the light. Our eyes are made to see forms in light; light and shade reveal these forms...”¹



Figure 1. An examples of the Kreda Workshop outputs, photo by Miguel Miranda and Daniela Barreto

According to Ewenstein and Whyte, the design phenomenon in architecture is closely tied to the human capacity for drawing and externalizing ideas. Drawings are extensions of the human mind and play an integral role in cognitive processes and invention. They are a means for architects to express and develop their thinking, offering a range of options for representation and creation.² The use of drawings in architecture is not limited to the act of representation. Drawings are extensions of the human mind, aiding in cognitive processes and invention. Drawings can also evoke understandings of place as provisional, mutable, and open to interpretation and appropriation.³ They contribute to creating an atmosphere and can shape the experience of architectural spaces. Architects today have a wide range of graphic means, allowing for diverse approaches to representation and creation. Tools that aid visualization and understanding architectural descriptions are also crucial for effective communication and analysis. So, using drawings in architecture is an essential aspect of the stages in design process – analysis, experimentation and synthesis.

However, it is essential to consider the limitations of the human mind in processing complex tasks.⁴ In architectural education, the complexity of design tasks can overwhelm the cognitive capacity of students. Therefore, instructional design that supports complex learning tasks is crucial to alleviate the cognitive load on learners. In this context, we created the Kreda Workshop which explores the potential of ‘drawing in architecture’ and supports learning of complex phenomena of Light in Shadow in Architecture by design and creation.

LIGHT AND SHADOW IN ARCHITECTURE - THE OBJECTIVES

The Kreda Workshop makes part of the research conducted within ADAPT research group at Faculty of Architecture, University of Lisbon. The ADAPT group focuses on research by design exploring contaminations between Architecture and other fields of actuation such as philosophy, art, drawing, technology (adaptlab.fa.ulisboa.pt).

The Workshop succeeded the seminar - Light and Shadow in Architecture - that we organized on the morning of 28 SEP 2022 at Espaço Rainha Sonja (Cubo/Cube), at Lisbon School of Architecture, where we invited four Architects, Marek Baranski, Jorge Cruz Pinto, Pedro Pacheco and Nuno Mateus, to share their visions and approaches to this primordial matter of Architecture- Light and Shadow.

The main objective of the Workshop was to, following the seminar, explore the notions of Light and Shadow in Architecture through deep students' engagement in hands-on creation. We designed an experimental pedagogical and didactical setting where students were learning by interpreting and exploring the notion of Light and Shadow in Architecture using one of the most expressive methods for architectural design - the drawing.

THE WORKSHOP SETTING - THE THEORETICAL BACKING FOR THE RESEARCH

The Workshop is grounded in several theories that underpin the process, findings and practical conclusions.

One of the grounding theories that supported the Workshop were theories of Active Learning and Authentic Tasks. Active learning theories emphasize the importance of active engagement in the learning process⁵. The Kreda Workshop encourages students to actively participate in the creative process, which enhances their understanding and retention of the subject matter. Additionally, the workshop incorporates authentic tasks, which mirror real-world challenges and provide students with opportunities to apply their knowledge and skills in practical contexts. According to students' responses in interviews, the authenticity of the task was one of the most regarded qualities of the workshop. This authenticity is expressed in several characteristics of the Workshop:

- a) Interpretation of light and shadow in inverted manner - instead of drawing forms and shadows, students drew light with white chalk on black boards;
- b) Creation as bodily experience - instead of table drawings, students created big scale pieces through whole-body gestures and full-body experience;
- c) Absence of notion of individual authorship - all the drawings were produced by all participants.

Another theory that supports the research is Reflective Practice. The interviews conducted in the reflection phase draw from theories of reflective practice by Schön and Dewey.⁶ These theories emphasize the value of critical reflection and its transformative power in the learning process. By incorporating reflective practice through students' interviews, the Kreda Workshop allows participants to reflect on their learning experiences and make connections between theory and practice.

The departure from traditional evaluation structures in the Kreda Workshop aligns with theories of Self-Regulated Learning.⁷ Self-regulated learning theories emphasize the importance of students taking control of their learning and exploring without constraints. By removing external evaluation pressure, the Workshop empowered students to regulate their learning and develop a sense of autonomy.

The collaborative nature of the Workshop also taps into the concept of Communities of Practice.⁸ Communities of Practice are individuals who collectively engage in a particular discipline. The collaborative environment in the Kreda Workshop supported more profound learning and understanding by providing opportunities for students to learn from and with their peers.

In conclusion, the student experiences in the Kreda Workshop (table 1) emphasized that architectural education can be significantly enriched by embracing experiential learning, collaboration, reflective practice, and the appreciation of light and shadow. These practical conclusions are rooted in well-established educational theories, underlining the relevance and applicability of these principles in architectural pedagogy.

THE WORKSHOP PROCESS - THREE PHASES

The workshop was structured into three successive and complementary phases (fig. 2): Creation, Reflection, and Erasing. All the phases took place inside the ‘Cube’ Auditorium in the Lisbon School of Architecture, Portugal, a closed space with a high ceilings and no natural light.

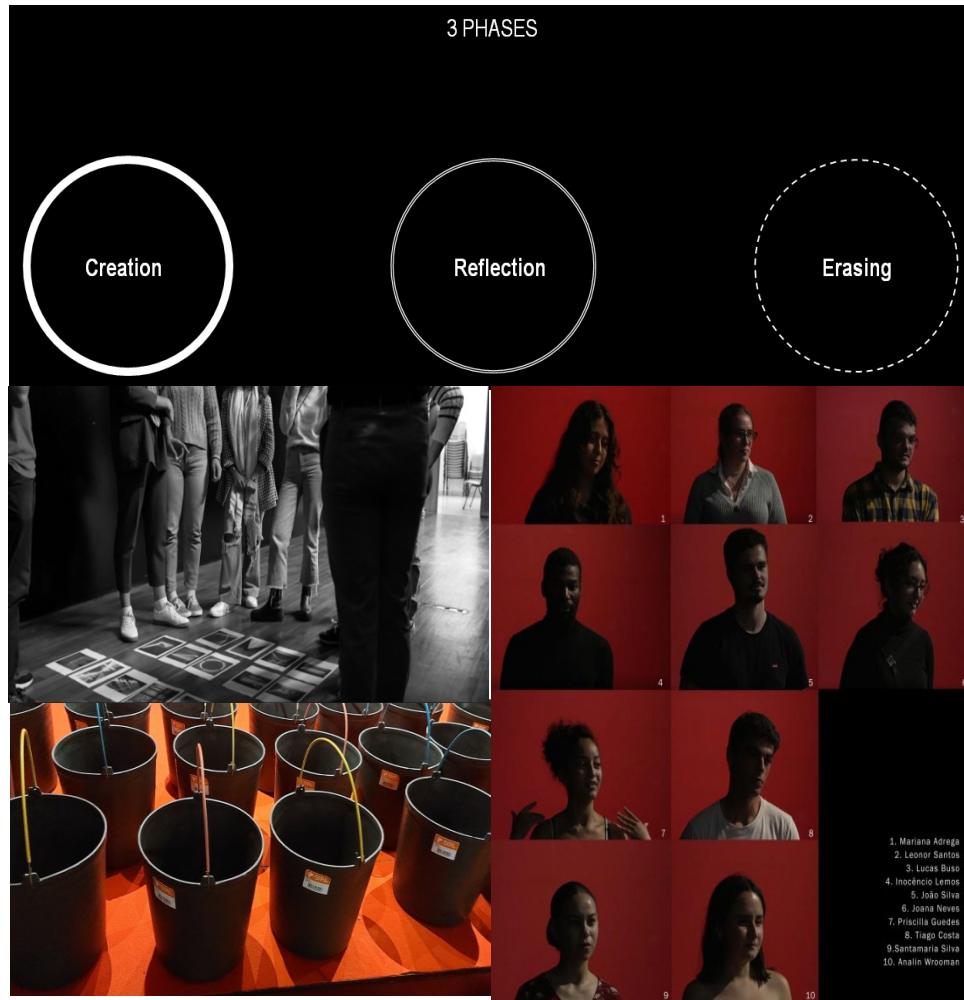


Figure 2. the overall structure of the experiment, photos by Miguel Miranda and Daniela Barreto

Creation | the first phase of the process

The students were organized into five groups, and each group was challenged to draw freely based on the study and interpretation of architectural images from the work of five Architects selected by us. These architects are distant in time and space, from several generations and different nationalities. As a basis for Kreda experiment, student were given a set of photographs of the works of each of the chosen Architects: António Sant’Elia (1888-1916), Italy; Álvaro Siza Vieira (1933-...), Portugal (Pritzker 1992); Tadao Ando (1941-...), Japan (Pritzker 1995); Peter Zumthor (1943-...), Switzerland (Pritzker 2009); Eduardo Souto Moura (1952-...), Portugal (Pritzker 2018).

Using drawing as a vehicle and Light and Shadow as architectural expressions, the students reinterpreted the architectural production of the five master Architects. They were invited to study and explore the phenomena of Light and Shadow in Architecture through the works of the five Architects and draw them on blackboards using a single risky material - white chalk.

Reflection | the second phase of the experiment

After the first phase, we interviewed a group of ten volunteers from the forty-three students, who participated in the Workshop. They expressed their discoveries during the work carried out in the Workshop and the impact that the challenge had on their way of thinking and expressing architecture through drawing. Ten students were interviewed, by use of open-ended questions, which allowed us to obtain valuable insight about their interpretation and satisfaction concerning the work carried out. Students were invited to reflect and answer the following questions:

1. What motivated you to participate in the Kreda 2 Imagine + 2 Draw + 2 Create workshop experience, an integral part of the Light and Shadow in Architecture Seminar?
2. What was most exciting and surprising about the experience?
3. Did it exceed expectations?
4. What discovery occurred in the process of designing the architecture of the architects [Alvaro Siza, Antonio Sant'Elia, Peter Zumthor, Souto Moura, and Tadao Ando]?
5. What is the most rewarding part of this simultaneous and group experience?
6. How about the feeling of developing work without classification?
7. How will you keep this experience in your memory?
8. Where did the atmosphere of the workshop place take you? On feet, with music, in a short time, with a sense of urgency, without natural light, filmed, large scale, group, simultaneous
9. Choose two words that best describe the experience.
10. Workshops... Are they for learning?

The students' responses to these ten questions were diversified yet repetitive to certain extent allowing us to infer the most significant qualities of the Workshop. In the following table we systematized answers in two groups: 1) the Students' **Reflections on the Workshop** and its initial predefined factors, 2) the Students' personal **Reactions to the Workshop**.

Reflections on Workshop	Reactions to Workshop
Outside-classroom experience To draw with music A thought behind use of light To draw in darkness To draw on walls Scale of drawing Drawing over black We are not used to switch Working with other who follows a proposed idea Grasping and apprehending architecture No classification, no pressure, no fear Auditory stimulus In counter-light Large panels Working in group Working with light	An experience different from anything at the University Immersive experience Not knowing what is going to happen Free movement Curiosity Teamwork was impressive From black to white With others and other years of study Working with chalk and on blackboard Scale of work was surprising New working material Large gestures and big scale Challenged to work in group Inversion of what is habitual Not worrying Common rhythm Liberating Suspense
	New kind of experience We left this place and came back to ourselves We were what we essentially are Possibility and liberty Liberating without being limited by classification Intense experience with musing and darkness Immersive and dynamic Incredible Striking Magic I felt so many things I was absorbing and absorbed in to the experience A pleasant chaos Will keep it for life

Table 1. Students' responses decoded and organized into two groups

Overall, feedback from students regarding the Kreda experiment was highly positive, describing the Workshop as one of the most interesting and memorable experiences during their architectural course.

Erasing | the third phase of the experiment

Erasing the white chalk drawings on the large black boards - leaving them as clean as at the beginning of the work - was the third and final phase of the experiment. The same students who drew on the surfaces also participated in the process of cleaning the same black walls.

The black panels of the 'Cube' were freed to enable many other experiences usually carried out in this unusual and enigmatic space located at our Lisbon School of Architecture at Lisbon University.

This final phase of the experience, also made it possible to approach and explain to students about the passage of time and its impact on the constructed work. Architecture undergoes constant modifications and inevitable degradation with use and exposure to time.

NOVELTY OF THE EXPERIMENT

The process inverted a standard drawing process as it is commonly held at the Lisbon School of Architecture, and students had to draw light instead of form. The emergence of drawing from a black background sensitized the students about the value of shadow, which is usually deemed as a complement to light. The drawing over black demonstrated to students that shadow can be read as an origin of materiality where the form becomes visible with light, but already exists in shadow before it gets lightened. A similar understanding was brought to us by Louis Kahn in his speech at IDCA - International Design Conference Aspen Colorado on June 6, 1972: "In the search for beginnings in me, I have come across a thought which really generated, by many influences, out of the realization that material is spent light."⁹

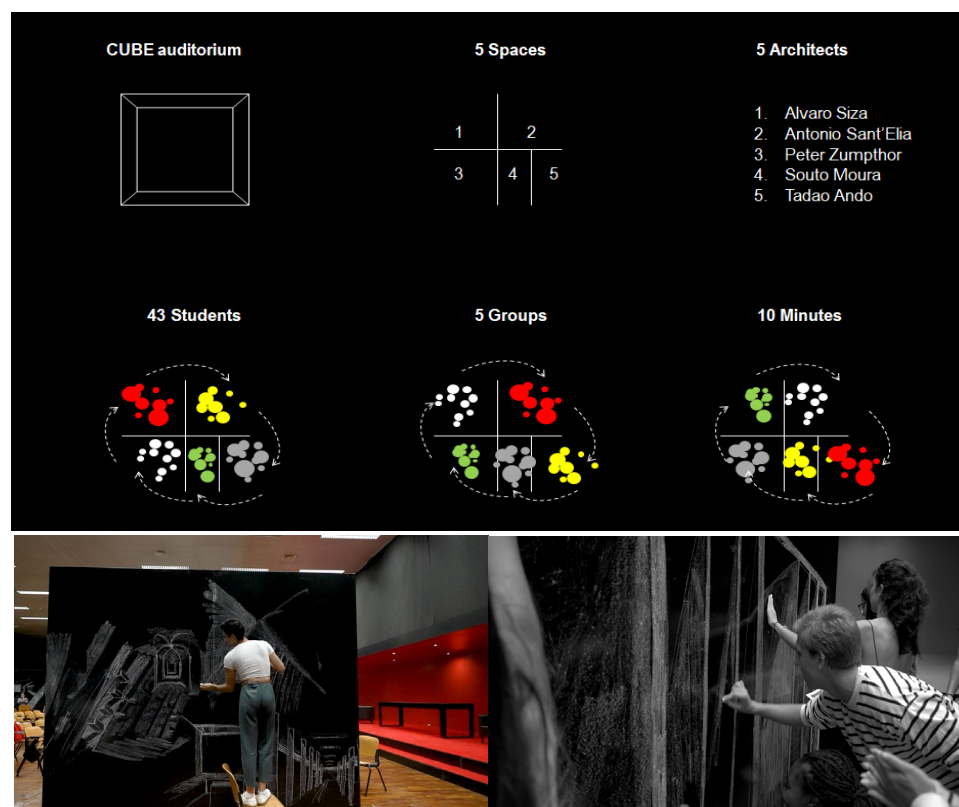


Figure 3. the Process of the Kreda Workshop experiment, photos by Miguel Miranda and Daniela Barreto

The workshop challenged the common notion of authorship as more than one person produced the drawings by. Students were divided into five groups, and each group had chosen a drawing station with an architect whose work was going to be reinterpreted (figure 3). In a rhythmic sequence, the groups were rotated, changing the stations. They had to leave the drawing they initiated, letting it be finished by someone else. On the other hand, they had to embrace the others' drawing ideas. This condition of shared authorship was complemented with an absence of evaluation, which liberated the authors from any evaluation-related pressure.

Apart from drawing on blackboards, the workshop also introduced a change in the drawings' scale and the presence of music. Instead of drawing on a regular 'table size', the drawings were produced in a larger format, on vertical three-meter-high panels. The scale condition and the presence of music had a repercussion on drawing gestures, and stimulated the notion of body movement. The students had to keep moving away from the panels to have a general overview of the drawings they were creating. Moreover, the vertical dimension of the panels obliged drawing to be executed on feet. Complementarily, their size propelled students to use full-body gestures and draw with more than just a hand.

Furthermore, the Kreda Workshop introduced several innovative elements and processes within the traditional architectural education framework. One of these elements was precisely dividing students into groups and requiring them to switch stations in a rhythmic sequence, which promoted the exchange of ideas and a culture of shared authorship¹⁰. As mentioned, this approach challenged the traditional notion of individual authorship and emphasized the importance of collaboration and collective creativity. The absence of evaluation in the workshop allowed students to explore their creativity without the pressure of academic assessment. This approach aligns with experiential learning, where students learn through hands-on experiences and reflection.¹¹ By removing the evaluation component, students could focus on the learning process and experimentation, leading to enhanced creativity and innovative thinking.¹²

The Kreda Workshop also shifted the focus of architectural drawing from form to the interplay of light and shadow. Drawing on blackboards highlighted the significance of shadow as a source of materiality, echoing the insights of architect Louis Kahn.¹³ Kahn emphasized the importance of understanding the role of shadow in architectural design, stating that "material is spent light." In addition to these shifts in authorship and perspective, the Kreda Workshop explored scale and sensory stimuli.¹⁴ Instead of drawing on standard-sized surfaces, students were tasked with creating large-scale drawings on vertical panels, reaching up to three meters in height. This altered scale, combined with the presence of music, transformed the act of drawing, encouraging more extensive body movements and a heightened sense of spatial engagement. Stepping back regularly to gain a comprehensive view of their work reinforced the importance of holistic architectural perception.¹⁵ These innovations in the Kreda Workshop resulted in an immersive and dynamic learning experience that deviated from traditional pedagogical methods.¹⁶ By encouraging students to embrace unconventional approaches, the workshop showcased the potential for architectural education to evolve and adapt to the ever-changing field of architecture. It offered new perspectives, enhanced creativity, and fostered innovative thinking among future architects.

CONCLUSION

As a pedagogic and didactic experiment, the workshop Kreda challenged the typical way of drawing and conceptualizing architecture at the Lisbon School of Architecture of the University of Lisbon (figure 4). The experimentation was done on different levels by introduction of various unexpected factors: the background material was black, the drawing material was white chalk, the scale of the

drawing was extended in its dimensions, the authorship did not exist, the evaluation factor did not exist, students from various years worked together, the content of the workshop was previously undisclosed to the students, among other previously described factors. These initial factors we predefined for the experiment inspired a set of very different reactions that we inferred from the interview and presented in the **table 1**. The students' reactions demonstrated that introducing divergent and different methods and methodologies through extra-curriculum experiences enriches the learning process and creates a profound impact on students. The quality of the results proved that high concentration and intense learning can result from new challenges located outside the comfort zone.



Figure 4. the Kreda Workshop experiment, photos by Miguel Miranda and Daniela Barreto

Shaping Future Architects: Insights from the Kreda Workshop Experience

The Kreda Workshop experience can also offer several significant benefits to the learning process in Architecture, such as:

1. **Enhanced Creativity and Innovation:** The workshop fosters creativity and innovation among students by encouraging them to explore unconventional ways of thinking and drawing.¹⁷ This newfound creativity can be integrated into their regular coursework, leading to more innovative design solutions in their architectural projects.

2. **Deeper Understanding of Architectural Concepts:** Through experiential learning and collaborative drawing, students gain a deeper and more intuitive understanding of architectural concepts.¹⁸ This knowledge can better prepare them for more advanced coursework and practical applications in their future careers.
3. **Strengthened Collaboration:** The collaborative nature of the workshop enhances teamwork and communication skills among students¹⁹, which is highly beneficial in architectural practice, where collaboration with diverse professionals is essential for project success.
4. **Reduced Fear of Evaluation:** The workshop allows students to take creative risks by removing the fear of evaluation, reducing anxiety related to assessment, and thus promoting a more open, exploratory, and confident approach to learning and design.²⁰
5. **Application of Theoretical Knowledge:** The practical application of theories in the workshop reinforces the importance of theoretical knowledge in architectural practice. Students see how theoretical concepts, such as constructive alignment and reflective practice, can be applied in real-world scenarios.
6. **Critical Reflection:** The emphasis on reflection during the workshop encourages students to assess their work critically and their thought processes. This skill is transferable to their regular coursework, enabling them to evaluate and improve their architectural designs.
7. **Appreciation of Light and Shadow:** Understanding the interplay of light and shadow is crucial in architecture. The workshop highlights the significance of this aspect and promotes its incorporation into their architectural designs.
8. **Cultivation of a Collaborative Learning Culture:** The success of the Kreda Workshop can inspire a shift towards a more collaborative learning culture at the Lisbon School of Architecture. Encouraging students to engage actively in a community of practice fosters enriched and interactive learning experiences.²¹
9. **Validation of Experiential Learning:** The workshop validates the benefits of experiential learning in architectural education.²² This recognition may prompt integrating more hands-on, practical experiences into the curriculum to complement traditional classroom learning.

Validation of Experiential Learning

The collected data confirms that experiential learning has significant benefits in architectural education. The Kreda Workshop demonstrated that experiential learning fosters creativity, enhances understanding, and promotes a more open, reflective, and confident approach to architectural education.

To sum up, the scientific analysis of the student experience at the Kreda Workshop provides valuable insights into the impact of experiential and collaborative learning on architectural education. These insights can inform teaching strategies, curricular development, and instructional practices in architectural programs, ultimately shaping the future of architectural education.

Kreda Workshop MANIFESTO

The responsibility is collective.

The output belongs to all of the participants.

There is no evaluation or judgment.

Freedom is imperative.

The scale is in-between drawing and architecture.

The work is done on foot, with music, in a short time, with tension and sense of urgency, and without natural light.

The work is developed simultaneously with others.

The process is recorded.

The work is deleted.

The process remains.

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COMMAND AND CONTROL IN CHALLENGE-BASED LEARNING: WHY A DASHBOARD IS INDISPENSABLE

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INTRODUCTION

The "Virtual Environmental Challenge" or VEC¹ is a pedagogical language learning module structured in the form of a competition where the challenge is to design a university ecocampus initiative. The project is aimed at both language teachers-in-training and language learners. The project is very much designed to place Didactic students in the role of teachers and encourages them to plan and organize classes for the student teams they are responsible for, in a way that makes them reflect on the learning process and the teacher/student relationship. It is also about facilitating students to research and collaborate, thus expanding their knowledge and skills and their ability to learn for themselves and their team. The aim of creating such a Community of Practice (CoP)² is to encourage meaningful interactions and the sharing of ideas and knowledge and in so doing, benefit from synergies that will permit the students concerned to create something more than the sum of their individual parts.

The VEC is situated within the framework of a European ERASMUS+ KA2 project called TRIP (Training and realization of innovations in 'Internationalization at Home' Pedagogies) which to date has allowed over 250 language teaching and learning students to experience Challenge-Based Learning (CBL)³ and Internationalization at Home (IaH).⁴ The dashboard set up for this project serves not only as an organizational guide for the participants, but also as a monitoring and tracking tool for the teachers.

The VEC is implemented using an action research approach⁵ within which students are given the opportunity to build not only learning communities but gain valuable skills and experience while partaking in the challenge. The challenge has two types of students: those who participate as challengers and those who participate in organization and teaching roles (the latter group is generally made up from Masters of Language Education students). The Master students discover the importance of cooperation and classroom dynamics by offering their learners (participant students from international partner universities) collaborative online learning spaces and dynamics in the form of weekly virtual sessions in line with IaH and CBL approaches. Together, students become co-creators of content that we promote via our online project blog.

This paper will present the "dashboard" which is used to conduct the VEC project and reflect on educational implications and the "variables" of the dashboard. The objective of this research is to optimize the methodology and the necessary tools not only for the VEC but for projects using the same educational components.

LITERATURE REVIEW

This literature review provides insight into the theoretical foundations of the VEC project, focusing on the integration of a CoP and CBL within language education. The CoP and CBL frameworks play crucial roles in promoting environmental consciousness in the VEC. CoP facilitates knowledge exchange, experiences, and ideas among teachers, teamchairs, and participant teams, fostering a sense of belonging and collective responsibility. Meanwhile, CBL offers opportunities for applying knowledge and skills to real-world environmental problems, encouraging active engagement, critical thinking, and sustainable solution development within a multidisciplinary context. CBL is a relatively new methodology in higher education, and within the VEC context, it describes the relationship between teamchairs (master-level teachers-in-training) and international language students forming participant teams. CBL draws from various educational theories and pedagogical methods, such as problem-based learning and inquiry-based learning. CBL serves as a framework for pedagogical innovation within the VEC, providing multiple entry points, local solutions to universal challenges, connections with multiple disciplines, and the development of 21st-century skills. It also leverages Web 2.0 tools for organizing, collaborating, and publishing, allowing students to actively participate and document their learning experiences throughout the challenge.⁶

The integration of CoP and CBL within the VEC aims to create an educational environment that promotes environmental consciousness and enhances the learning experience in a learning by doing manner. The emphasis on active learning and engagement empowers participants to address environmental challenges from a multidisciplinary perspective. The use of digital communication technologies and online platforms within the VEC's CoP facilitates collaboration, knowledge exchange, and environmental education opportunities. These tools enable the creation of OERs through video recordings of participant productions, which are used in subsequent editions and the training of future participant teams. Additionally, digital tools support the production of presentations, videos, and graphics, while video calling technologies enable international interactions.

The implementation of a CoP in the VEC aligns with the CoP master-apprentice model described by Lave & Wenger.⁷ The CoP creates a space for peer teaching and learning opportunities, fostering collaborative relationships among teachers, teamchairs, and international participant groups. The COVID-19 pandemic accelerated the adoption of virtual CoPs and digital communication technologies, allowing for instant communication and the continued evolution of the VEC project. These innovations, including video recordings, OER development, and video calling, have become integral to the VEC CoP's success and its ability to provide a dynamic and evolving learning environment for participants.

The VEC is also tuned to modern classroom practices. Both as part of the MLE and in the VEC students are taught through their own experience in flipped class⁸ scenarios. In these scenarios, students take the lead and instead of teachers teaching and presenting in the traditional sense during class time, students take to the floor and present their work or ideas to the class.

DESCRIPTION OF THE VEC

The VEC is part of a Masters of Language Education (MLE) and an ERASMUS+ project called TRIP, funded by Key Action 2 (KA2). TRIP is a consortium of five European universities focused on the UN Sustainable Development Goal 4, which aims to ensure inclusive and equitable quality education for all. TRIP aims to promote Goal 4 through inclusive Internationalisation at Home (IaH) by integrating international and intercultural dimensions into domestic learning environments.⁹ The VEC is currently focusing on the theme of the environment and allows students to work on developing transversal skills and competencies to address societal challenges.

Originally developed as an English language module during the COVID-19 lockdowns, the VEC 2020/21 was an international challenge and hybrid educational experiment within the context of the EMERGE Alliance. EMERGE is part of the European Universities Initiative (EUI) under ERASMUS+. It aims to enhance European universities' competitiveness through a cooperative interdisciplinary challenge-based learning approach.

For the first edition, the VEC was managed by a co-head of the MLE, who recruited interested international universities into the project while leading classes with MLE teachers-in-training. Students gained teaching experience by collaborating with international partners and organizing and facilitating the VEC with support from teachers, support staff, and PhD students. Together, the participants and organizers form an overall CoP¹⁰ which facilitates the sharing and creation of open educational resources (OER)¹¹ in virtual spaces.

The VEC is based on CBL methodology, giving each teamplayer a specific role such as organizers, teamchairs, and participants. The word teamcher is formed from two words “team” and “teacher”¹² which best describes the role as both an educational facilitator and also a team leader who guides participants through the VEC challenge.

The VEC's first edition was an English language module with eight national and international university teams. Virtual classroom meetings were facilitated through a shared document Dashboard, which gave teamchairs and participants a place to sign up and organize their sessions and submissions. On the organizational level, country coordinators recruited participant students from their own universities and entered their students' emails into the Dashboard before the VEC started. Teamchairs then used the Dashboard to discover their teams and they contacted their respective groups using the emails to schedule virtual meetings and/or invited participants to join a group chat on WhatsApp. The six virtual meetings led by teamchairs followed a set pattern, including brainstorming, finalizing topics and materials, creating a logo, and preparing presentations.

The VEC has proven to be highly adaptable, allowing for different language editions and international scalability. It can be implemented outside classroom hours or as an in-class module. Teachers can also mix groups of international students if a transnational timetable can be agreed on. The interdisciplinary nature of the project—due to language students studying different languages—makes the VEC easy to integrate into teachers' syllabi. Future plans include adding languages (Spanish and German) and additional topics (gender, race, and discrimination) in 2024.

Project Characteristics

The VEC project utilizes an online learning space and OERs such as license free Massive Open Online Courses (MOOCs), YouTube videos, the Digital Dashboard, and a variety of digital tools. As mentioned earlier, the primary objective of the project is to encourage the CoP to actively engage in the creation, enrichment, and sharing of OERs.

The project is structured as a tournament that comprises of four distinct phases.

In Phase 1, each participating team is tasked with creating an eco-campus logo. This logo should represent their vision and commitment to environmental sustainability within the campus context.

Moving on to Phase 2, teams are required to deliver a 20-minute slide presentation. This presentation should showcase their knowledge and understanding of the project's objectives, as well as their proposed strategies for implementing and promoting the use of OERs within their respective communities.

Phase 3 introduces the "Pecha-Kucha" trailer, where teams must create a concise and visually engaging presentation. The trailer should effectively communicate the key ideas and main points of their OER initiatives within a fixed timeframe.

Finally, Phase 4 of the project entails teams delivering a presentation in the style of a TED Talk. This format encourages teams to deliver compelling speeches that captivate the audience, inspire change, and highlight the potential impact of their OER projects.

Through these four phases, the VEC project provides an opportunity for teams to demonstrate their creativity, expertise, and dedication in fostering a culture of knowledge sharing and open education through the creation and dissemination of OERs.

Organization

There are four main groups of actors in the VEC, the participants, the teamchairs, the mentors and the coordinator.

The student participants from each of the participating universities have to follow written instructions, collaborate in their team and with their teamchair, participate in instruction related to either a MOOC (English version) or a YouTube channel (French version), attend meetings and produce the content of their presentations.

The teamchairs have to read and understand the resources they are presenting, be it a MOOC or a YouTube video, liaise with their participant team and support the theme they wish to pursue, as well as supporting their team with production preparation and guiding them towards success.

The mentors organize the competition and plan events, form “teamchair” teams, facilitate participant/teamchair relationships and interactions, communicate general information to coordinators, identify and promote useful digital tools, create resources (such as tutorials and template emails) and creating educational tools such as evaluation grids.

The country coordinator—generally a role filled by a teacher-researcher from an international university—communicates general information to teams, advises and accompanies their university’s team, attends debates, acts as a competition judge and rewards the students with 3 ECTS credits.

The Dashboard: description and results

The Digital Dashboard is essential to this project, both as a tool for participants and for the VEC manager and to maintain control over the project.

There are five tabs on the dashboard, which are as follows:

1. General organization
2. Weekly Tracking
3. Teams
4. Teamchair page
5. Resources

The General Organisation tab provides all the information any of the different actors involved in the project may require and provides them with a clear roadmap they can refer back to, to understand the structure and timetabling of the project. It also permits managers to plan and schedule the whole project from the very beginning, something which is indispensable when working with different universities, in different countries, and different languages, across different time zones.

The Weekly Tracking tab provides a rolling, week by week liaison, update and feedback between teamchairs and student participant teams and is invaluable, as not all students fully comprehend - sometimes due to language difficulties - what they should be doing in the beginning and this tab helps to keep them focused and motivated and any problems or misunderstandings can be quickly identified and addressed.

The Teams tab is a space where everyone is identifiable and which facilitates easy and direct communication, at first by email, but thereafter, often by other platforms, such as WhatsApp. It also permits the VEC manager to see if all the teams are signed-up.

The Teamcher tab is for teamchers to enter their emails as their first point of contact and then they move to the collaborative tools of their choice. Managers can follow the process of teamcher designation and can make sure the teams have a teamcher guiding them.

The final tab is the Resources tab and this is truly a collaborative resource, as everyone involved in the VEC project can contribute to, enrich and also benefit from the collective knowledge and expertise of everyone involved in the project.

The usage of the dashboard in 3 consecutive editions of the VEC/VSC reveals the following:

- 100% of the signing up process is completed on the spreadsheet provided for that purpose;
- The drop-out rate is effectively monitored thanks to the reporting on the dashboard;
- The weekly reporting serves as a basis for the flipped classes organized with teamchers where possible difficulties and ideas to overcome difficulties are discussed.

DISCUSSION AND CONCLUSION

The Dashboard offers significant value to the Master students at Rennes 2 who are undergoing training as French and English teachers. This tool also proves useful for other participating students, as they facilitate and enhance the presentation of information—an essential skill in numerous professional settings. Moreover, the repository of resources remains constantly updated and, through the sharing of knowledge and expertise, provides students with tools that may not be encountered within formal information technology curricula. The rapid pace of technological advancement outpaces the ability of information technology courses to keep pace.

Furthermore, in addition to the digital tools, the VEC dashboard's resource tab and associated links allow for the sharing of a wealth of articles and resources that students can utilize to deepen their understanding and knowledge of the subject matter. This synergy between the digital tools and supplementary resources serves to stimulate and motivate students. For Master Didactics students, it provides a clear perspective on effective teaching methods and optimal student learning approaches.

The dashboard serves as an indispensable component of the VEC organization. It not only facilitates the registration and sharing of digital spaces among teams but also enables organizers and country coordinators to track the progress of both teachers and participants. This dashboard functions as a vital reporting tool, ensuring consistent engagement from all teachers and participants. Furthermore, it ensures the aggregation of current digital resources sourced from the CoP. Additionally, the dashboard's openness to the participation of new teams contributes to the expansion of the VEC. It also aids VEC organizers in effectively communicating the overall organizational structure of the VEC to prospective partners. Moreover, it succinctly summarizes the key outcomes of previous editions of the VEC. The template can be customized to accommodate future editions of the VEC, integrating any potential organizational changes that may arise.

ACKNOWLEDGEMENT

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CINEMATOGRAPHY AND FILM STUDIES

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INTRODUCTION

Cinematography has been regarded as a technical discipline rather than artistic. This assumption has deep roots in film education. Photography is in its base a technical discipline that requires quite an amount of knowledge to be performed properly and adequately. The learning of the exposure process either with film celluloid or with digital formats knowledge of the craft is mandatory.

To produce a moving picture many departments and specialised professionals take responsibility. The making of a film is a collective process that requires each of the elements to comply with his/her task to fit in the collective process.

Producing an industrial film or an art film the process is the same. Requires several departments to accomplish the process.

The camera department is headed by the cinematographer/director of photography. He is responsible ultimately for the artistic and technical quality of the photography of the film.

Cinematography should be regarded not to be exclusively a technical discipline to be taught as such but should widen its boundaries and take a different path towards an artistic and philosophical approach.

The use of the image as an artistic tool for the film is demonstrated in the essay «One Film Three Visions».¹ The results applied by the cinematographers demonstrates the influence of the cinematography into the perception of the viewer. So, the decision of the cinematographer is crucial for the story. Even though we know that there are many conventions in cinema, that doesn't mean that the cinematographer has no space to create new styles and aesthetic values for the film and therefore to influence the course of the viewer's perception. Cinematography should be regarded by education, not to be only strictly considered as a technical discipline but also an artistic and creative one.

THE WORK OF THE CINEMATOGRAPHER

The cinematographer creates mood, by using illuminating techniques, handling colour, framing composition, that produces a visual effect. Adding to that, a multiple number of different approaches in aesthetics and style can be applied by using frame compositions, camera movement to enhance emotions and help the story to evolve and so manipulating the cognitive experience of the viewer.

The cinematographer has the entire responsibility to guarantee the technical and artistic quality of the image. To that the cinematographer needs to perform a series of tasks during shooting and must work diligently in pre-production with the director and other sectors to reach looks and mood pretended for the film.

The cinematographer's choices on lenses, type of camera, lighting fixtures, is the result of the work

combined with the director's view, plus the coordination with other departments like production design by choosing locations, colours, wardrobe, and all that is going to directly influence the look of the film.

During shooting also, the positioning of lighting features, giving certain directions and intensities, likewise with frame composition and camera movement combined are going to give a definite mood and emotional effect. It is in this field of choices and options that the cinematographer bases his claims to be seen as an author, rather than just a technician, like Vittorio Storaro paraphrased, "Photography means light-writing, cinematography means writing with light in movement. Cinematographers are authors of photography, not directors of photography. We are not merely using technology to tell someone else's thought, because we are also using our own emotion, our culture, and our inner being".²

Seems that lighting in the cinematographic context has crucial importance in the sense of establishing and creating the suitable atmosphere for the narrative and, consequently, becoming a psychological medium for the spectator.

Hence the meaning that can be derived from the fact that one can opt for taking the path of lighter or darker lighting. Or even opt for having a moving camera or preferring static shots. The image will inevitably have a decisive influence in the viewer's cognitive reception. Granted, the representation process which is inherent to any work is grounded on some conventions and reinforces the centrality of creating a visual atmosphere suited to the plot of the film.

This representation process involves technical and artistic options which stimulate the spectator's senses and are constituted by a set of elements which form the image in its entirety, namely composition, camera movements and lighting. These combinations are crucial for the creation of the essential atmosphere for the work's narrative. It is through these elements that the visual message and its meaning are created.

The cinematographer can and indeed should guide the spectator's gaze to the element that should be highlighted for the development of the narrative. Such as, for instance, isolating an object, casting less light on one character than on another, lighting with more contrast one character or another, focusing on one area of the frame, leaving one space without interest in the shadow, and often hiding flaws in the set or excessively empty spaces. There is a broad range of elements that the cinematographer can manipulate to guide the viewers' attention. «The spectator may be unaware of this visual guiding of her/his attention, but the cinematographer will manipulate the tools to weave the texture of a shot to give the viewer a place and a position in the diegetic world.»³

These conventional codes and norms are also questioned in the sense that they are not linear, from the viewpoint of the message. These are not mathematical formulas to apply in this or that narrative; they are, rather, mere ways of communicating but which are not hermetic in this communication process. How each person, individually, interprets the film or the images greatly depends on their interests, their culture and, partly, also on their state of mind now of viewing.⁴

The performance of the Cinematographer/Director of Photography in film is seen predominantly as a technical rather than an artistic activity. Although the profession integrates both areas, directors of photography have been recognised for their technical prowess and less for artistic skills.

If we analyse the countless functions, tasks, knowledge, and artistic ability this function involves, it is fair to question whether the contribution of the Director of Photography is not sufficiently acknowledged for the crucial role it plays in any work of fiction.

Cinematographer and Director of Photography means the same profession. The designation for cinematographer is applied only for movie production and director of photography is applied for a broader area of image capture including cinema and television.

The cinematographer is responsible for the technical and artistic quality of the film. It is their task to materialise in images the director's vision, and thus their main goal is to translate the orientations of the script onto the screen, following the guidance defined with the director. To obtain these effects, the Director of Photography must combine the use of lighting, framing and camera movements.

The cinematographer performance is not entirely autonomous. Cinematography depends on many other factors and sectors which constitute the making of a film and, essentially, on the guidelines received from the director. That is the reason to launch this essay which tries to isolate as much as possible the role of the cinematographer and analyse its influence on the viewer's perception.

THE ESSAY. ONE FILM, THREE VISIONS.

Taking in consideration the difficulty to separate the work of the director and the one from the cinematographer it was necessary to prepare an essay where there could be an attempt to isolate as much as possible the tasks and duties of the cinematographer. For this purpose, it was created the essay called «One Film, Three Visions» which consisted of shooting the same script three times where the only variation was the cinematographer. Everything else was the same.

This experimentation had only one director who was common for the three cinematographers. The conditions for each one of the cinematographers were the same: receiving the same instructions from the director; the same script; the same set; the same technical support team; the same editor and the same actors. The goal is to compare the contribution from the three different cinematographers, to understand to what extent, the personal choices of each cinematographer influence the presentation, the plot and, consequently, to influence the audience perception.

Each film has a duration of about three minutes. It was based on the poem of Jacques Prévert – *Déjeuner du Matin* ⁵ the reason to choose this poem was the fact that it was not dreamlike or oneiric in its contextual language. On the contrary it was quite straightforward in its words and would fully fill the intentions of the exercise. The voice over is from the actress herself reading the poem. The music used by the 4th orchestra by Joseph Mahler which goes entirely over the film from beginning to end. Ilse Hofman the director wanted to have the same sound across the films to have the same sentimental feeling.

THE CINEMATOGRAPHY ANALYSIS

The objectivity of the essay was to find differences amongst the three experiments. One of the first aspects would be to observe the cinematography. In this respect differences are found from film to film in terms of colour tone and contrast.

CONCLUSION

Research that focuses on cinematography as an art form is currently still a rarity in academic studies. On the contrary, there are rather a considerable number of publications on cinematography, but which focus essentially on the technical aspect, restricted only to the learning of the craft, and do not deal so much on the artistic or theoretical aspect of the image.

The main objective of this study is to find elements that may foster a broader and more comprehensive reading of the activity of the cinematographer.

However, we can also consider, without any prejudice to this study, that, although differences were found in the performance of the directors of photography, some larger and others of a smaller scale, drawing a clear boundary between the contribution of the director and that of the cinematographer is difficult, if not impossible.

Isolating the duties of the cinematographer was, from a production point of view, a crucial factor to ensure that the performance from actors was identical in each film. The director was concerned with

giving the actors precise instructions on acting, both regarding body language and facial expressions. They, in turn, repeated them skilfully from film to film, as they did with their positions on the set. In this way, absolute equality was also ensured.

Once the production was completed, the short films were viewed by an audience. The audience consisted of focus groups, who answered a questionnaire that focused about their viewing experience of the three versions.

The survey was divided into two levels, one on the emotional dimension and the other on the technical aspect. Then, the answers were subject of a statistical analysis that served to obtain the conclusions of the research.

Analysing the answers of the respondents, we can confirm that there were differences in the experiences lived by the viewers with each film. For some, there was a greater degree of difference between the films and for others there was less, but still enough to lead us to consider that in fact cinematography is an important and differentiating factor regarding the narrative and, therefore, influences the cognitive reception of the viewer.

Is the cinematography decisive for viewers to follow a certain sense of narrative? – The answer is yes, judging by the results obtained from the survey, in which viewers revealed to be emotionally closer to Film 2 than to the others, since the use of the camera and lighting is emotionally more appealing in their sensory experience when viewing the film.

Regarding the technical dimension, which was also addressed by questions asked by the focus groups, the answers also offered results that confirmed the initial expectations, like for example aesthetic approaches in framings, by light direction, camera movements, applied, have different outcomes in the viewer's perception of the narrative. From the given answers by the respondents, it was possible to identify details that were interpreted and perceived differently in the three examples. The answers allowed us also to identify which framing options were directly related to the emotional intensity and experience lived by the focus groups.

At this point, we can conclude that cinematography plays an important role in the construction of the cinematic atmosphere, especially when it comes to narrative and aesthetical aspects. Cinematographers manipulate a range of tools, including cameras, sensors, lighting, lenses, motion support equipment, and with them they can create credible and meaningful images.

The cinematography in cinema has been an activity somewhat underestimated. It is not uncommon to have analysts, critics, academics, and many others to refer and to attribute cinematography directly to the director omitting the cinematographer.

This essay attempts to prove that cinematography plays a very relevant role in the construction of the cinematic atmosphere and in the construction of the diegesis of the motion picture.

This factor certainly leads to questioning the thesis of the single author of the work, since this study indicates that film is a collective endeavour, which brings together all pieces from many professionals to form a whole.

The role of the cinematographer has, however, a personal specificity that is intrinsic to it, inseparable from the way of applying and interpreting the guidelines coming from the director and the script, which allows him/her to put a personal signature on the final work. This personal specificity, of an authorial nature, makes a difference. These differences from one film to another were what we could observe and from which we were able to draw these conclusions.

This experiment, with «One Film, Three Visions», enables us to redefine the role of the director of photography from the artistic point of view as well as their contribution with substantial creative functions, above all in the construction of the cinematic concept. It allowed us to bring to light this specificity, demonstrating that the activity is not limited to the technical area, but that it has artistic

attributes that can decisively influence a cinematographic piece of work.

We raise awareness to the tasks, responsibilities, and nature of the cinematographer's role in cinematographic work, while also further acknowledging the work of the cinematographer.

Cinematography teaching should take a different perspective and place in education. It should not be locked in the technical corner of film studies but should be rescued for the field of arts and be treated as such. Meaning and semiotics are aspects to be dealt with by studies of cinematography.

NOTES

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ARCHITECTURE FOR SOCIAL PURPOSE

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INTRODUCTION

We live in an increasingly complex world full of real challenges within communities, cultures, ideologies, and inequalities. As educators – our vision should be to prepare students to tackle serious issues and contribute to alleviating injustice challenges by pushing design boundaries to focus on community interventions with the aim of global impact, demonstrating the power of architecture. The notion of ‘community’ has become a key term at the intersection of architecture and social injustice. These areas have long been identified as an aspect of higher education within which new skills can be developed for a larger social purpose. Oppressed societies, whatever their level of formal education, have the ability to understand and interpret the world around them, to see the world for what it is, and to move to transform it.

The fairness between individuals and society can sometimes be measured by comparing the distribution of wealth differences. The increases in migration to parts of the UK can place additional pressure on communities, affecting some socio-economic groups. Certain groups are more prone to harm and losses as well as being impacted by social injustice and climate change than others, or, in other words, they are more vulnerable to climate change impacts.¹

The notion of a ‘just transition’ is an integral part of the commitments adopted by the UK to tackle some of these issues. The Paris Agreement acknowledges ‘the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities’ and highlights the importance of workers in responding to climate change.² Birmingham is a city where ‘social injustice’ and the impact of the ‘climate emergency’ are active today and will remain so until necessary changes are introduced. The city is one of the most deprived areas in the West Midlands Metropolitan Area and is ranked the third most deprived English core city after Liverpool and Manchester.³ It is known that deprivation is concentrated inside the city’s ring road and within the city’s existing tower blocks (Fig. 1).

Addressing issues to better protect communities, architecture, education, and social injustice has had a soft relationship that is often unseen and misunderstood. This lack of connections reveals an opportunity, pedagogically, to exemplify the role social injustice and the climate emergency can play in the context of education by examining the role of robust designs as a pedagogical studio framework to enhance student learning experiences, putting social injustice at the center.

This paper suggests the need to formalise, be upfront, and be more explicit about the role of social injustice within the higher education setting, leading to a greater focus on experiential learning and

shifting the student's mind away from preconceptions about the profession. It seeks to transform consciousness by providing students with ways of knowing that enable them to know themselves better and live in the world more fully and encourages students and educators to not only critique oppressive systems but also participate in active healing and community empowerment. The research explores the evolving relationship between social injustice and architecture education in the context of established programmes. The studio was pedagogically informed to explore various urban approaches, challenge preconceptions, and come up with a radical design solution for the future by responding to a variety of real-life social factors in the urban context in Birmingham, answering the question, 'Can architecture eradicate social injustice.'



Figure 1. *Medway, and Thames Towers on the Cromwell Street Estate, Nechells Green* Severn,

METHODOLOGY

Architecture begins with learning about the people we are designing for and understanding who they are. The year three studio's methodology was to 'tap' into the student's own physical experiences of a wide range of injustices. Many students came from diverse backgrounds, either cultural, educational, or financial, and there remained areas of opportunity to encourage students to become activists for change. Other students who are from less diverse backgrounds will not have had reason to experience the consequences of injustice in the built environment because of their upbringing at a level of a culture⁴ where many of our students have never experienced injustice before or have even ventured to suppressed parts of the city. This opportunity became a key pedagogical approach through collective learning, reflection, and dissemination to advance their learning through others. It should be noted, any previous years' teaching chose not to address issues around 'social injustice' and it remained important for students to establish an identity when they move into the industry and whether to tackle justice design as a career aspiration.

Observational methods and a solid ethical⁵ understanding to learn from moral philosophy in order to grapple more fully with the challenges communities face further played a role in the studio learning through the systematic recording of observable phenomena or behaviours in a natural setting⁶ and the

studying and understanding people within their natural environment, leading to ethnographic descriptions.⁷ Participant observation as either a covert or overt approach through community activity in which students participated in the daily life of the community under study, observing things that happen, listening to what is said, and questioning people, over some length of time, remained central to the studio's methodology.⁸ We encouraged students from early discussions to consider an array of community injustice themes, such as unfair labour practises, racial discrimination, and discrimination due to gender, orientation, ethnicity, and age, to be sustainable and responsive and raise awareness through architectural spaces. Can food waste and aquaponic systems be a solution to food poverty due to a lack of community food banks? Consider local food and water systems and small-scale production that are sustainable economically and ecologically. How can increasing green space transform community engagement? Can pop-up educational hubs enhance levelling up? The project challenged ways to empower communities through small-scale design with the authority to claim the environment around them.⁹

Delivering three studios consecutively as part of the year's pedagogical framework helped to explore how small-scale approaches to architecture contribute to alleviating current challenges and demonstrating the power of architecture in helping students become 'agents for change'. As part of the studio's ambition, students were asked to inspire the next generation of communities and consider the longevity of design through material choices, construction methods, and adaptable spaces. A central element of the studio's methodology was mapping through a variety of scales and model-making to a scale of 1:10 as part of the studio's experiential learning. The studio followed five stages: *mapping injustice; injustice as narrative; injustice policy/artifact; abstract representations; and agents for change*. We found that students cannot begin to understand the built environment and its contribution to oppression until they understand that a difference exists between their experiences of place and others. Because of this, each stage was designed to evolve students' injustice thinking across a variety of scales across the city of Birmingham. The following section discusses the project's journey in uncovering injustices and the production of radical small-scale architecture.

ARCHITECTURE FOR SOCIAL PURPOSE

Designing architecture for social purposes means putting people first, and from the start, students began researching the geographic, social, historical, and cultural context, helping to inform the project question(s) and guide their project towards dismantling social injustices. Students developed comparative strategies to uncover blind spots, uncover injustice through urban approaches, challenge preconceptions, and shine light into dark places, discovering a wide variety of active injustices, such as high levels of educational poverty, access to green space that is not used, and the levels of food poverty that exist today.



Figure 2. Left: Spatial mapping exploring found injustice of food poverty (right) and the high crime levels active across Birmingham

As part of the project's early discoveries, students created multi-layered maps in three dimensions exploring macro and meso analysis of the city that fused exploration, site analysis, research, and investigation of the Birmingham context. Students investigated concepts through the discussion and architectural drawings of large-scale mapping (Fig. 2 Left) where through the layering of research, projects explored linkages (both theoretical and practical) to physically link elements together, highlighting injustices and similarities between different parts of the city (Fig. 2 Right). Mapping challenged the wider context of the city by looking at the availability of green space, accessibility, education levels, and crime rates using online databases, revealing the levels of crime such as abuse, assault, and sexual violence active today. Students further revealed other areas of opportunity, such as the energy and fuel crisis and the impact this was having on low-income communities, and abstractly proposed ideas of using unused green space to grow corn, which could be turned into corn-based ethanol to power homes where advocating for fuel poverty defines energy as a social necessity, or, in other words, as a social need that includes protection for the most vulnerable members of society.¹⁰ To further the contextual understanding of found injustices, students approached through primary research, community observation, and physically experiencing charities and community organisations through volunteering to further understand their role as designers of how to tackle injustice. These early moments of research set the narrative towards the production of an injustice policy used to guide the project as a continuous reference point.

Existing UK policies sometimes refer to principles of social justice. Social injustice and climate change often do not consider the full range of aspects that affect the vulnerability of different people and places, and neither do they necessarily deal with how to deliver equitable responses, especially in Birmingham. The outcome of found injustice research became used to design injustice policies, and in some cases, a policy artefact helped to develop an early conceptual architectural intervention or abstract representation responding towards dismantling their found injustice. One such injustice concept experimented with food waste and resin to create artifacts to represent food injustice abstractly (Fig. 3, Left), which informed early architectural massing and building placement within a community. Other injustice policies consider social and cultural benefits that extend well beyond the footprint of individual buildings establishing visions for reducing the carbon footprint, decreasing waste, and improving sustainability, education, and fairer communities.



Figure 3. Left: Exploring with resin samples representing food poverty and its place within the Nechells Green Community. Right: Abstract massing to determine building position within Nechells Green Community.

As part of the studio's pedagogical approach, projects challenged what spaces were needed to better serve their community. How many? Who will use them? And for what use? Through the wide range of found injustices, the theme of disability injustice remained one of the most reoccurring, with residents not being able to leave their homes due to poor circulation infrastructure and limited lift accessibility inside many of the city's tower blocks. One design challenged the opportunity of growing food through window farming and hydroponic gardening to grow vegetables indoors on windowsills using reclaimed books as planters. The ambition was to share food in tower blocks to tackle food poverty vertically for those residents who struggled with access. A further design explored food poverty but with a much different approach by designing a starter kit delivery box including all the basic equipment and instructions on how to grow your own food, as many people in these communities were illiterate about how to use their garden to grow food, where the food would be collected, processed, and served through a community kitchen (Fig. 4, Left).

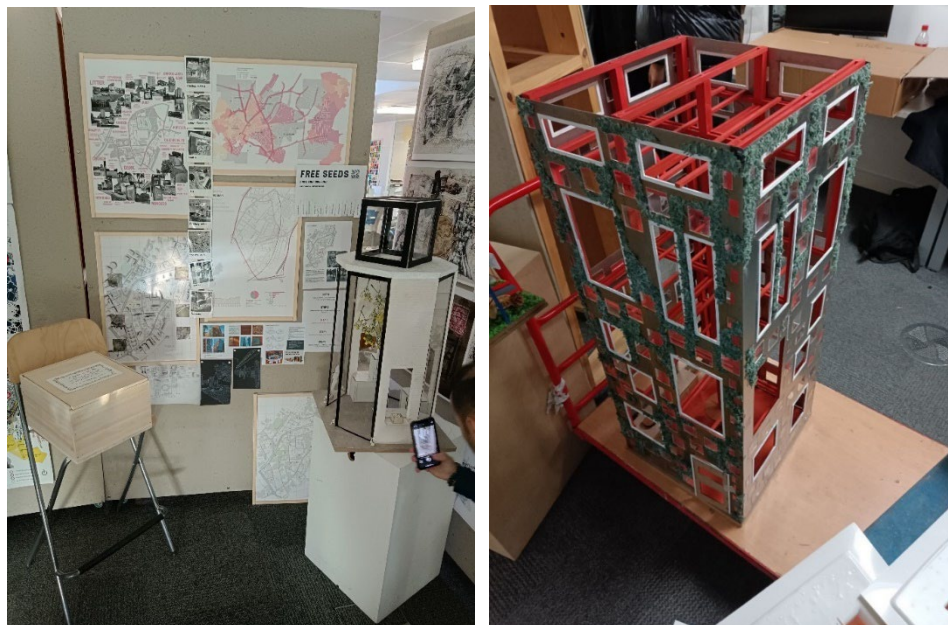


Figure 4. Left: A community food hub where food grown from a free seed box is then shared, stored, and cooked to serve food to the community to tackle food poverty. Right: A community designed around self-food growth/production to tackle food poverty in Nechells Green in Birmingham.

A similar approach to a community food kitchen was a community food bank and kitchen where food production would grow on the side of the building through unused surface areas (Fig. 4, Right), designed from observational research through an existing food bank designed to eradicate food poverty. A further project revealed the energy and fuel crisis and the impact this was having on household bills by pushing residents into poverty, revealing a concept of using the communities unused green space to grow corn, farmed by the community, to be turned into corn-based ethanol produced through a distillery. Students found access to the properties of nature was a fundamental human right that architecture should fully support.¹¹ As the global climate emergency accelerates, students went on to establish beneficial connections to the natural context and how this becomes a valuable equality and equity issue to alter their perception of social injustice and the climate emergency. In a system that punishes poor schools with a lack of funding, outdated books, and decaying buildings, eradicating social justice in education is key. A further project explored the role of parasitic educational spaces to be attached to existing community buildings helping to challenge education illiteracy as many youths in communities in Birmingham fall short of reaching an educational level beyond college even with several universities located close to the city centre. When factors like wealth, gender, and/or race determine what kind of education an individual can receive, it was discovered that students who are not privileged enough to receive an education on par with more privileged students are given a poor foundation for the rest of their lives. When the education system isn't committed to providing equal opportunities and privileges in these communities, it negatively impacts society. As a way of tackling this, a further project looked at the lifespan of a temporary structure using industrial reclaimed card designed to decompose over time with the changing needs of the community tackling food waste by using recycled paper to be mixed with planting seeds to begin the process of growing food.



Figure 5. Left: A community space designed around decomposable architecture and self-food growth/production to tackle food poverty. Right: Growing corn to be processed through a distillery to produce fuel to power homes in Nechells in Birmingham

DISCUSSION

Through the wide range of project themes uncovered and explored, students challenged preconceptions focusing on the needs of people and communities coming up with radical proposals. The studio explored the role of designing physical manifestations of students' highest ideals and community values. What was seen is advancing 'social justice' through 'design justice' and increasing the diversity and inclusion of the profession through HE is inextricably linked to helping students and communities 'see' problems more holistically and find lasting solutions that satisfy the needs and encourage the achievements of everyone. The studio's pedagogical methods made possible robust approaches to questions of food, education, poverty, and disparity of wealth. Students found it more important than ever to work together to create a more resilient world by going beyond a 'silo' mentality, being prepared to tackle real issues, and shifting their perceptions of the role of architecture in improving communities' lives. Students recognised that inequities based on wealth, race, gender, and physical ability are reinforced by patterns of ownership in Birmingham communities and are rethinking how the built environment, from the macroscale of the city to the human scale can be shaped to have a positive impact on marginalised communities.

CONCLUSION

Teaching architecture depends on our ability to help close divides through the power of design. The generational movement against social injustice continues to change dramatically, and with that change comes a valuable opportunity in teaching architecture. The theme of *Architecture for Social Purpose* focused on the needs of people and communities and the dynamics of the interactions between those people for greater opportunity today and in the future. We have a moral obligation to tackle real issues with the aim of dismantling social injustice and designing purposeful and radical architectural designs. Birmingham is a city where injustice is active today and will remain so for the foreseeable future unless real changes are implemented. Over the course of the semester, *Architecture for Social Purpose* helped students realise that architecture depends on our ability to help close divides through imagination. There is 'real' power through spatial justice in small, designed spaces where culture is recognised, stories are told, and language is valued. The bigger, long-term goal in HE should always be to empower students to transform fundamental relationships with communities in a way that moves us towards a more meaningful, equitable, and sustainable world through small-scale design. This fundamentally influences how we think and act, individually and collectively, to transform our collective relationships and affect profound and lasting social change.

NOTES

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ARCHITECTURAL TECHNOLOGY AND ARCHITECTURE STUDENTS' FEEDBACK LITERACY: A CASE STUDY

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INTRODUCTION

Context

The body of research in higher education (HE) agrees on the value associated with high-quality feedback, which is considered amongst the main determinants of students' achievement.¹ Therefore, in the last decade, the literature has particularly focused on students' engagement with feedback.² With the shift of pedagogical theories from cognitivism to social constructivism, feedback has changed from a transmission (one-way) approach to a dialogic approach. It is considered today as a process where students play an active role in seeking information, discussing it, and making use of it.³ Despite its crucial role, feedback commonly appears to be unsatisfactory from National Student Surveys (NSSs) in HE.⁴ Feedback is clearly an area for improvement also in the discipline of architectural education.⁵ Although valuing feedback, and often lamenting the lack of quality feedback received, only a minority of students engage with it,⁶ causing high levels of frustration for staff and diminished performance for students.⁷

Recently, much emphasis has been placed on building SFL as a key to unlocking students' engagement and satisfaction with feedback.⁸ SFL is defined as "the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies".⁹ Such ability is not merely useful for students' success at university, but also constitutes a fundamental life skill, much needed in any workplace as well as for their growth as constructive members of a society.¹⁰

Carless & Boud¹¹ described four main features of SFL as follows:

- appreciating feedback (recognizing feedback taking place)
- making sense of feedback (understanding it)
- managing the effect of feedback (acknowledging its emotional impact)
- acting upon it (using it to improve one's work).

Most of the studies about feedback in architectural disciplines were conducted in Architecture and fewer in AT. In both disciplines, the design-studio experience is central. It could be considered a unique variant of problem-based learning¹² where, contrarily to other disciplines, there are many suitable answers to the given problem; these depend on each student's design process and choices. For this reason, in design disciplines, the role of feedback is particularly delicate and taking place not just at the end of the creative process but all through it (Fig. 1). In design studio modules, feedback takes many forms, such as: weekly one-to-one and/or group tutorials (in person and/or online), peers

reviews and interim and final crits, where students present their work in front of a jury of peers, tutors, and expert professionals.

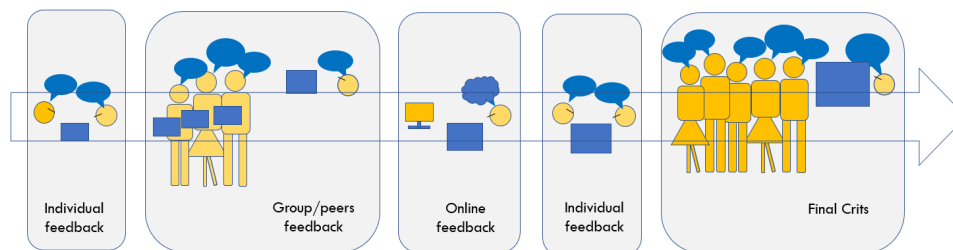


Figure 1. Feedback process in design studio modules

In both AT and Architecture disciplines, students are also exposed to a more subtle type of feedback, defined “intrinsic feedback” by Crowther¹³ in the context of AT. Intrinsic feedback takes place when students engage with physical experiments, modelling or reproducing building elements; this way they learn by doing, being involved in a form of experiential learning where the activity itself can provide feedback. This wide range of feedback experiences, combined with the increased use of online feedback strategies - during and after the COVID-19 pandemic - may facilitate students’ engagement with it in design disciplines.

There is growing emphasis today on how feedback is used by Architecture students to maximize their learning and improve their work.¹⁴ In developing a design project, the instructor takes an essential mentoring role alongside the students, offering feedback throughout the entire process.¹⁵ The student should grow thanks to the interaction with the lecturer, who may prompt new research questions, or suggest alternative pathways; it is then the student’s responsibility to further investigate the areas that could trigger his/her interest and to choose one solution over others. With this type of feedback, the role of the instructor is extremely delicate due to the level of impact that it can have on students’ choices, contributing to support or limit innovative solutions. Therefore, according to Johnson,¹⁶ feedback should be more dialogic than directive. Yilmaz & Daly¹⁷ suggested that feedback should strike a sensible balance between convergent and divergent thinking, both essential in creative disciplines. Smith¹⁸ came to a similar conclusion, investigating the relative utility of different feedback methods from the Architecture students’ perspective; he suggested that, when giving feedback, a delicate equilibrium should be aimed for, between providing clear direction and guidance and encouraging students’ self-reflection and critical thinking. Smith¹⁹ found that Architecture students generally prefer one-to-one tutorials, seen as less intimidating than group tutorials or crits, more personalized and more directive but also more suitable for an open dialogue between tutor and student. Therefore, he suggested that shorter reviews and smaller groups could help set up a positive, more inclusive environment for peer and group feedback. Smith²⁰ highlighted lack of consistency as a common limitation of feedback methods which imply more than one feedback provider; a limitation specific to crits was found in the difficulty for students to properly take in all the information provided whilst they are presenting.

Overall, crits are the most emotionally challenging form of feedback to engage with, as they take place in front of peers, tutors, and experts. Smith and Boyer²¹ proposed the use of additional, private feedback sessions after the crits to mitigate their emotional impact and encourage students’ reflection and action upon feedback. This approach was recommended as appropriate at the end of each academic year and especially beneficial for students who may have been badly affected by the emotional experience of crits. For the same purpose, more than one author suggested the use of digital

technologies. Bassindale²² showed that these can enable students to engage with feedback more freely - with less emotional stress - and effectively - taking in all the comments received during them - and facilitate the tutor in moderating notes, ensuring consistency. McCarthy²³ suggested using social networking sites, alongside the traditional teaching activities (i.e.: lectures, tutorials, and crits) to facilitate first year Architecture students' engagement with feedback and develop a sense of belonging. According to the author, the use of social media can particularly help to integrate international students and those that struggle with in-person social interaction. A similar blended approach was tested and proved successful by Harpur²⁴ with third year AT students. The study conducted by Hill²⁵ tested a tutorless first-year architectural design studio, where a range of innovative blended learning strategies were assessed in place of the tutor providing individual formative feedback to each student. The studio produced high quality results, despite the low level of students' satisfaction with the 'tutorless' teaching environment, possibly confirming Johnson's suggestion,²⁶ that students' growth (their ability to self-assess the quality of their work in this instance) does not always come from students' satisfaction. Online design studios became the necessity in most universities during the COVID-19 pandemic. The study conducted by Al Maani et al.²⁷ pointed out that online platforms - in place of face-to-face tutor time - were experienced as a challenge by the Architecture students during the lockdown, with difficulties in communicating design ideas without the use of hand-drawings or physical models. However, the tutorless online studio also showed to have some positive effects on the students' feedback experience, such as: easier contact with tutors online, enhanced independent learning and critical thinking skills, and inclusivity.

Aim of this study

Given this scenario, this study aimed to investigate the feedback literacy of AT students, and to propose recommendations for overcoming the barriers to students' uptake of feedback in studio-based modules.

METHODOLOGY

This research utilized a case study approach²⁸ investigating SFL in the AT undergraduate course at the UoB as witness population and comparing such data to those obtained from a small sample of Architecture students at the same university. Key to the case study approach is to investigate a subject within a context²⁹ and to generate theories from practice.³⁰ CS research is often associated with a holistic approach, one that accounts for complex sets of causes and the most suitable to answer "what" and "how" questions³¹ as those formulated in this study.

Concerning the practicability of generalisation from case study research, Tsang³² suggested that cases should not be considered as sampling units; they should be treated instead as experiments.³³ Swanborn³⁴ compared CS research design (intensive) to survey design (extensive): while survey research calculates frequencies to provide a statistical generalisation, the purpose of CS research is to expand and generalise theories, hence the outcome can be defined "analytical generalisation"³⁵. Such generalisation is not strictly linked to the number of cases investigated and could potentially be achieved also by means of one individual CS³⁶ (in this research: the AT course at the UoB). Due to the in-depth level of observation possible with CS research, analytical generalisation has, according to Flyvbjerg,³⁷ same if not higher value than statistical generalisation.

Data from the chosen population of students were gathered by means of a questionnaire. The data collection instrument was devised to investigate the four main features of SFL as described by Carless and Boud³⁸ and is accordingly structured in four sections. It is made of five-points Likert-scale questions³⁹ and open-ended questions⁴⁰ to facilitate a mixed-methods analysis of findings.

Before contacting participants, the study was reviewed and given a favourable opinion by the Learning and Teaching Hub UoB Ethics committee. Participants were selected utilising a convenience sampling technique.⁴¹ With the help of course leaders, invitation emails were circulated among AT and Architecture undergraduate students (29 and 230 respectively enrolled in the two courses). The invitation provided an information sheet - describing aim and methods of the study - and a link to the online questionnaire and consent form.

12 AT students participated in the study (41% of the total in the course); these are well distributed among Level 4, 5 and 6 and could be considered a representative sample of the total AT population at the UoB. Only 5 Architecture students took the survey (4 Level 6 students and 1 Level 5). This cannot be considered a statistically representative sample. However, most Architecture students' responses are from Level 6 students, therefore they can portrait a more comprehensive view of the feedback experience in the Architecture course; hence, they were considered representative of a snapshot of the population to which this study aims to compare its findings. Due to the limited sample size, a mixed-method approach was not applicable and statistical methods were excluded; it was decided instead to apply a prevalently qualitative approach for the analysis of results.

The analysis carried out aimed at assessing SFL and at comparing findings between the AT and Architecture cohorts of students. Manual thematic analysis was performed⁴² to:

- extrapolate themes from the written answers,
- highlight recurrent hurdles hindering AT students' engagement with feedback and
- aid devising suitable solutions.

The thematic analysis performed in this study can be considered theoretical⁴³ as it utilized an existing theoretical framework - Carless and Boud⁴⁴ four main features of SFL - as the basis for analysis.

ANALYSIS AND DISCUSSION

The first stage of analysis was conducted considering only the AT responses to the survey, then comparing them to those obtained from Architecture students. From the thematic analysis of students' definitions of feedback, emerged that feedback is always seen as a response to something that they produce. Only two AT respondents mentioned feedback as prompted by them, acknowledging a more active role in engaging with it. All the participants showed an understanding of feedback as a process in which they engage with information that is relevant to improve their work, in line with Carless and Boud⁴⁵ definition of it. Only 50% of the AT participants received guidance on how to understand and use feedback before coming to university.

AT students mainly recognize feedback when this takes place one-to-one; only a few of them acknowledged having engaged with group feedback (when provided online) or with peer feedback. Nevertheless, these variants of feedback are offered throughout the course; hence, this finding may confirm what pointed out by Boud and Molloy⁴⁶ that "students perceive that they receive feedback much less frequently than academics perceive that they give it". When AT students engage with peer feedback, they do not always appreciate it, and even see it as a waste of time. Lack of engagement and satisfaction with group and peer feedback is likely linked to another finding from the analysis: most AT students prefer a directive type of feedback, as noted by Smith.⁴⁷

Architecture students engaged more than AT students with online feedback, group, and peer-feedback and discussion of previous years' works; this is possibly due to the larger number of students in the course. Likely due to the wider range of feedback practices that Architecture students engage with, they feel better prepared to work collaboratively than AT students.

A small portion of Architecture respondents is unhappy with their understanding of assessment criteria and with fairness and level of detail of feedback; these instead are satisfactory for all the AT

respondents, possibly due to the smaller number of students in the course, which may facilitate one-to-one contact with tutors.

The feedback provided in the courses investigated highlights positives and negatives of the students' work, in line with the literature in this sector⁴⁸, balancing critique and prize. Most AT students think that feedback on their project helped them to identify good standards of work (75%), was fair and insightful (84%) and was detailed enough (75%).

For both cohorts, the main problem with feedback is in its timeliness; this confirms that feedback is valuable only when it can be actively used.⁴⁹ AT respondents attributed late feedback to lack of structure for the studio sessions and to low staff-students ratio. Some issues about the emotional impact of feedback were highlighted by both cohorts: feedback is felt as discouraging when it is not directive (does not clarify how to improve) or when it does not acknowledge time and effort for producing the work. Timeliness results the main determinant of students' capacity to deal with the emotional effect of feedback; late feedback can be demotivating and frustrating as one could feel unsupported and may have to operate changes when it is too late. Only one AT respondent took responsibility for engaging with feedback too late, pointing out another important aspect of feedback: it can be a daunting experience for those that struggle with social interaction. 75% feel that feedback improved their ability to self-assess their work and to review the work of others; nevertheless peer-feedback is the least liked, and even seen as an unnecessary distraction.

Most of the respondents use feedback to improve their current and future work at university - hence acknowledge their active role in the process, as suggested by Carless and Boud⁵⁰ - and in their profession - which is key in the current feedback paradigm.⁵¹

SUGGESTIONS

Peer-feedback is deemed by the literature extremely productive for studio-based modules, for both the reviewer and the reviewee, and contributes to create a more student-centred environment.⁵² To facilitate AT students' engagement with peer feedback, the studio sessions could be re-structured, as suggested by Liu and Carless,⁵³ to generate an environment in which providing and receiving peer feedback is a key part of learning and teaching activities. Using smaller peer groups,⁵⁴ the studio environment could also be more friendly and inclusive. The use of previous years good examples - to be exposed in the studio - could provide intrinsic feedback,⁵⁵ facilitating engagement with peer discussion.⁵⁶ Particular attention could be placed to expose first-year students to all types of feedback, to set the necessary foundations for those that do not have any feedback literacy when they start university.

Although most respondents stated that feedback was easy to receive emotionally, the literature suggests that the emotional impact of feedback should not be underestimated⁵⁷ due to its detrimental impact on intrinsic motivation,⁵⁸ especially for first year undergraduate students.⁵⁹ The findings of this study show a connection between the timeliness of feedback and how easy it is to deal with its emotional effect. To facilitate timeliness of feedback and ease the emotional impact of it, AT students at the UoB could be engaged with more structured peer and group feedback; this could also imply the wider use of online feedback, which can facilitate communication, hence inclusivity.⁶⁰ The use of peer/group feedback and online recorded feedback could also contribute to ease the pressure from staff, while facilitating students' uptake of feedback and the development of critical thinking skills, ultimately better enabling them to work in a team.

Fig. 2 shows a synthesis of the findings from this study, highlighting pros and cons of different types of feedback (as given by the literature), hurdles in engaging with feedback and reasons behind such

hurdles (from the analysis of findings) and finally the solutions proposed in this study (from the discussion of findings).

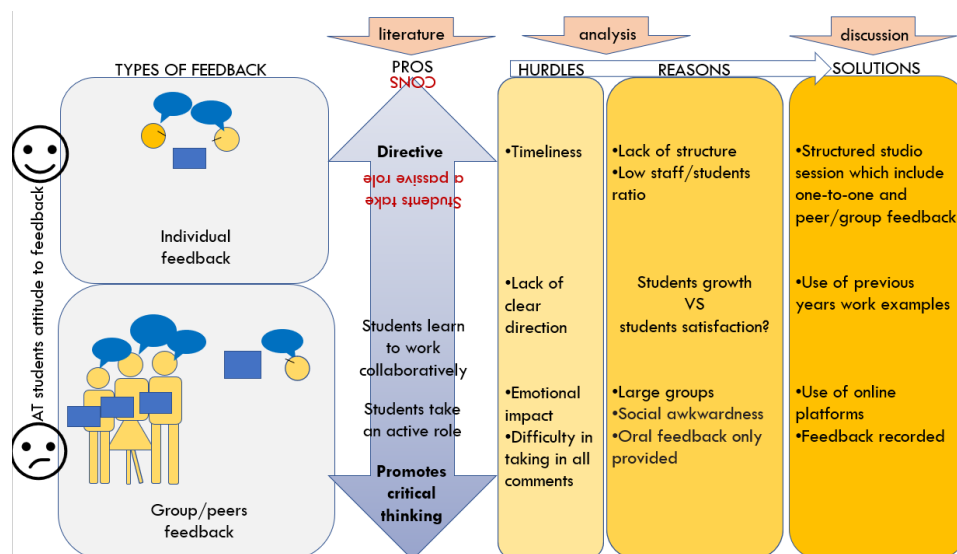


Figure 2. SFL: hurdles, reasons and solutions devised from the study.

CONCLUSION

Four features of SFL, as discussed by Carless and Boud,⁶¹ were investigated amongst AT students - and compared to a small sample of Architecture students - at the UoB. The findings of the current study, described in this paper, aided to evaluate the quality of students experience of feedback in the AT studio modules at the UoB and will help revising the structure of such modules to facilitate students' engagement with feedback and enhance their learning.

This study showed that both cohorts of students understand feedback as a process and engage with it to improve their work. The triangulation of the results obtained by the two cohorts and the body of literature shows that a more structured use of peer- and group-feedback - in person and online - could facilitate timely feedback, reduce the emotional effect of it and enable a more active role of AT students in their own learning, developing critical thinking and collaboration skills and ultimately improving students' achievement and satisfaction.

NOTES

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UTILIZING THE READYMADE AS AN INSTRUMENT TO DEVELOP AN UNDERSTANDING OF THE PRINCIPLES OF ART AND DESIGN WITH STUDENTS AS RELATED TO THE INTERIOR.

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INTRODUCTION

What I like to say to my students is one plus one is three. Or just think, imagine that one plus one is not two, outside of what you have been taught, what mathematics has instructed you to believe, what one may say or call the truth – to inspire them, to get them to be creative, to think outside of the box and to explore possibilities beyond and including all potentials. But of course, there are always different types of boxes, or in some cases, squares, or frames, pages, sheets of paper that could be considered the parameters for creation in some regards, but my aim, and desire, is to provide a space where to stretch the boundaries of the possible, of the creative spirit, that is the goal, that is the system from which to begin. Education is complex, in addition to the world being so, and our approach to cultivating this is just the start of our potential for expansion. Through the examination of a particular assignment, one that is concerned and focused around an established research trajectory (both of my own and many others), that of Marcel Duchamp's readymade, objet trouvé, or found object, this paper will explore how an everyday item can be studied by students and reconstituted through certain principles of art and design in order to develop a framework for approaching the complexity of creativity and its connection to education.

THE ASSIGNMENT

The readymade as most are aware of has its' origins in the art projects of Marcel Duchamp from over a century ago. So in many ways this assignment was geared towards attempting to answer this question: How can the readymade, particularly when associated with the historical personage of the modernist artist Marcel Duchamp, have relevance in a day and age when virtually all aspects of our lives are beholden to ready-made products, ready-made experiences, ready-made meanings?¹ This quote prompted the assignment for the semester, exercise number three, in a foundation course in interior design. How to organize and reconfigure the potentials inherent in the found object, or the readymade. The students were asked to bring objects from their house or car that they felt were commonplace, ordinary, without relevance or larger outside significance beyond the everyday. These were everyday objects that were going to be stripped bare and made new. To begin with we will look at some of the preliminary photographs, the studies of the everyday objects:

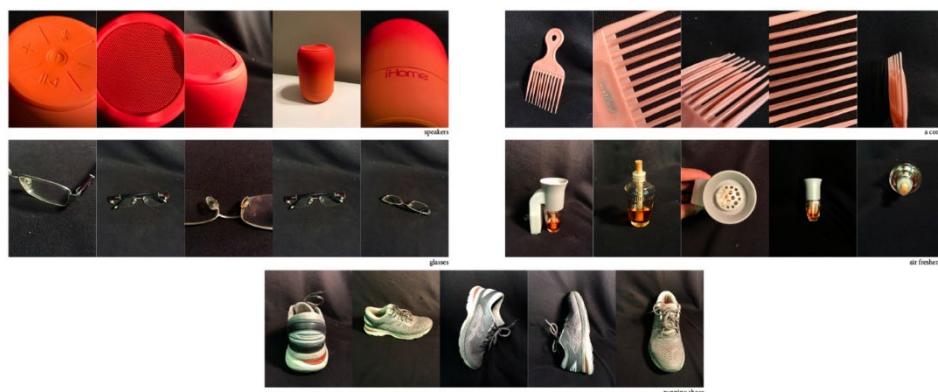


Figure 1. Photos by Serita Abayilo



Figure 2. Photos by Taylor Stone

In these two examples, the students brought in speakers, a comb, glasses, an air freshener, and one running shoe, in addition to a love mug, a can, a ribbon, a hair clip, and a pearl necklace. These photographs are nothing extraordinary or profound. They are quite banal and could almost be considered not proficient at all, but on the level of an introductory assignment, or an exercise within the second semester of a foundation course in interior design that is geared towards both 2-dimensional and 3-dimensional studies, the vision or the focus of the project was to start the students with a simple prompt. For the overall assignment there was some overlap in their choices of objects that they brought to the studio classroom but there was also a good deal of variety.

The students were then prompted to respond to a list of principles of art and design and asked to choose how they could connect the photographs of their everyday objects and ready-mades. There are sixteen basic principles of art and design: more or less, as sometimes they are grouped and organized differently, but for this assignment the students were presented with these concepts to organize their thoughts, and visual creations. The list is as follows: balance, symmetry, direction, emphasis, unity, repetition, white space, variety, proportion (scale), contrast, economy, rhythm, hierarchy, pattern, movement, and similarity. (227)

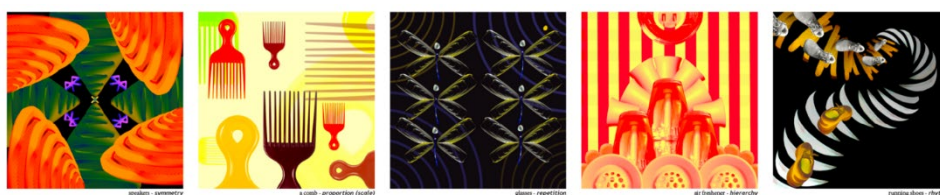


Figure 3. Digital Collages by Serita Abayilo

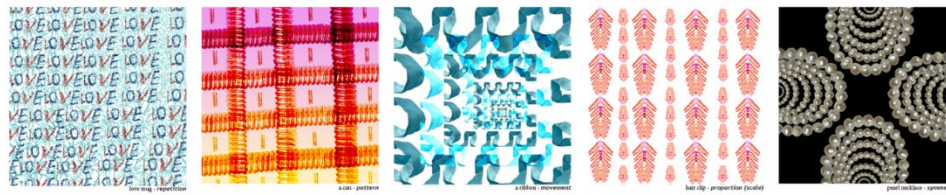


Figure 4. Digital Collages by Taylor Stone

For the final compositions that relate to the original objects the students had to choose five of the principles and create new arrangements of the objects, reconfigured and organized into compelling visual arguments. They crafted these into five-by-five square images created mostly in Adobe Photoshop or Illustrator. The most aspirational of the students challenged themselves by deconstructing the object and then creating new dynamic and original versions. From the above examples the repetition image by Serita Abayilo who utilized a pair of glasses to construct a series of creature like, one could say dragonflies out of the various component parts of the object, found object. And the hair clip which examined proportion in Taylor Stone's project is an excellent example of taking parts of the object, and the image and reconfiguring it into a new arrow with plenty of movement and flow created within the composition itself.

Upon Reflection

When considering the assignment and the exercises, process related to the completion of the project I've been drawn to Josef Albers and his endeavors. For his statement, One and one is two - that's business, One and one is four - that's art - or if you like it better - is life. I think that makes clear; the many-fold seeing, the many-fold reading of the world, Makes us broader, wider, richer. In education, a single standpoint cannot give a solid firm stand. Thus, let us have different viewpoints, different standpoints. Let us observe in different directions and from different angles...² This statement epitomizes many of the thoughts I've been contemplating in relation to art, design, creativity, education, and complexity.



Figure 5. Paintings by Josef Albers

Now it is useful to take a look at something art historically that is quite well known, some of the productions of Josef Albers, for the serialization of his project of studying color: For Albers made his first Homage to the Square in 1950, and during the next quarter-century he produced more than two thousand paintings and 160 distinct prints that adhere to a fixed set of formal parameters - a square with three or four concentric but unequal margins - through which the artist explored a seemingly infinite variety of combinations...³ in 1963, he published the first edition of *Interaction of Color*, which revolutionized the discourse surrounding perception and pedagogy.⁴

And considering the context of this conference, applying education in a complex world, we will take a look at one project from some of my students where they were asked to apply a series of terms, basic principles of art & design as connected to everyday objects, or readymade objects that they were set to bring into the studio classroom and photograph, alter, manipulate, and construct into new images - thinking outside of the box, but nevertheless within the boundaries of a square - but perhaps next time it will be a circle!



Figure 6. Paintings by Josef Albers and Mark Rothko

If one says “Red” (the name of a color) and there are 50 people listening, it can be expected that there will be 50 reds in their minds. And one can be sure that all these reds will be very different.⁵ And here are two examples of studies of reds: Josef Albers, *Homage to the Square* from 1968, and Mark Rothko’s *Orange and Red on Red* from 1957. Part of what is intriguing, especially considering Albers’ projects is the sheer volume (he produced more than two thousand paintings and 160 distinct prints that adhere to a fixed set of formal parameters) - and these parameters are essentially a framework like what I have asked my students to explore through the principles of art and design.

So then perhaps it could be a question of parameters and an approach to these parameters that allow a certain creativity to emerge. Or perhaps that is my question. What are the parameters and how can we approach these parameters in order that students or education, produces complexity.

Just like the earth, and the inner core. We begin with exploration, discovery, and experimentation. The core must glow. Red like the paintings, though the glow here is a bit more yellow, like the sun - nevertheless: Experimentation is at the core. Openness is at the core. Discovery is at the core. Innovation is at the core. The core is at the core. Flexibility is at the core. Flexible space is at the core. Undefined answers are at the core. Questions are the methodology to discovery, but how can we root into the core? For a definition of core, we could state the dictionary definition, and ask a question What is core? A basic, essential, or enduring part (as of an individual, a class, or an entity) the staff had a core of experts. the core of her beliefs.: the essential meaning: gist. This is a scientific visualization, nevertheless with a broad approach to developing students’ understanding in education as a solid basis can be built.

Though one quote that I keep on returning to is this statement from Chris Bardt, from his book *Material and Mind*: Education has long sidelined playing as a means of learning, and my students—coming to my class after a dozen years of being taught to the test and pressured to achieve grades—had naturally developed strong tactical planning habits aimed at “completing the work.”⁶ And I find

this to be very much true with many of my current students. Nevertheless, what I like to say to my students is one plus one is three (free) for thinking creatively requires openness and a willingness to explore. Or just think that one plus one is not two, to be inspired, to get them to be creative, to think outside of the box and to explore possibilities beyond and including all potentials.



Figure 7. Marcel Duchamp and his iconic Fountain

And this is found in the readymade. A concept that has its origins in the art projects of Marcel Duchamp from over a century ago, at least. Marcel Duchamp's 1917 iconic Fountain. The standard urinal produced by a sanitary ware supplier and signed "R. Mutt, 1917" shocked the art world. Duchamp was suggesting that an everyday item could be considered art if an artist presented it as such — kicking off a century of debate.⁷ The Tate Modern in London described the controversy, which resulted in the piece being thrown out from a major exhibition: [Duchamp] purchased a urinal from a sanitary ware supplier and submitted it – or arranged for it to be submitted – as an artwork by 'R. Mutt' to the newly established Society of Independent Artists that Duchamp himself had helped found and promote on the lines of the Parisian Salon des Indépendants. ... The society's board of directors, who were bound by the Society's constitution to accept all members' submissions, took exception to Fountain, believing that a piece of sanitary ware — and one associated with bodily waste – could not be considered a work of art and furthermore was indecent (presumably, although this was not said, if displayed to women) Following a discussion and a vote, the directors present during the installation of the show at the Grand Central Palace ... narrowly decided on behalf of the board to exclude the submission from the Society's inaugural exhibition that opened to the public on 10 April 1917.⁸ So, one must break the norms, to exceed the norms, to shift the paradigm forward.

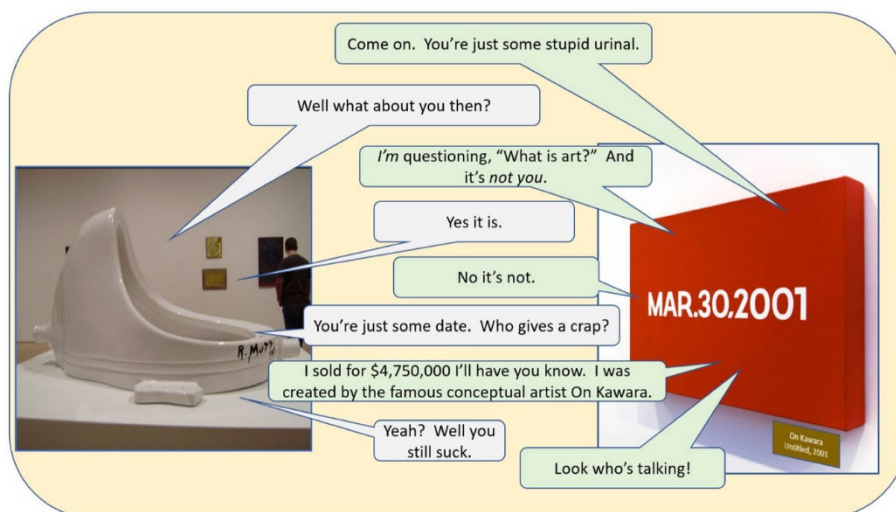


Figure 8. Marcel Duchamp's *Fountain* in conversation with one of On Kawara's *the Today series* paintings

As in this conversational cartoon between Duchamp's urinal and On Kawara's untitled date painting *Come on. You're just some stupid urinal. Well what about you then? I'm questioning, "What is art?" And it's not you. Yes it is. No it's not. You're just some date. Who give a crap? I sold for \$4,750,000 I'll have you know. I was created by the famous conceptual artist On Kawara. Yeah? Well you still suck. Look who's talking!*

From January 4, 1966, Kawara made a long series of "Date paintings" (the *Today series*), which consist entirely of the date on which the painting was executed in simple white lettering set against a solid background. The date is always documented in the language and grammatical conventions of the country in which the painting is executed (i.e., "26. ÁG. 1995," from Reykjavik, Iceland, or "13 JUIN 2006," from Monte Carlo); Each year between 63 and 241 paintings were made.⁹

One Million Years is one of the artist's best-known works about the passage and marking of time. It lists each year for the one-million-year period leading up to the artwork's conception and the million years that follow it. It is sometimes performed, during which pairs of performers (typically one male and one female for each segment) read dates from each list in order, simultaneously performing *One Million Years [Past]* and *One Million Years [Future]*¹⁰

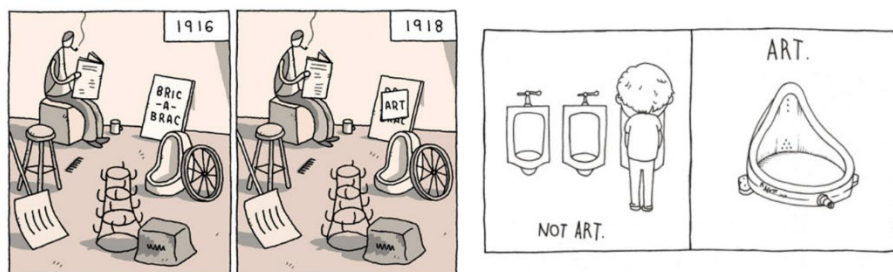


Figure 9. Two cartoon illustrations of the conceptual framework for Duchamp's *Fountain*

For an origin story of the ready-made I present the students with these images shown above. For if we trace the origins of the ready-made to 1917 as these cartoons illustrate, from one year the everyday

detritus of daily life would have been considered bric-a-brac, and as if overnight it became the art of the world, art world. (A somewhat dumbed down version of the whole affair, but useful nevertheless, in presenting the topic at least).

This Neo-Dada, which they call New Realism, Pop Art, Assemblage, etc., is an easy way out, and lives on what Dada did. When I discovered the ready-made I sought to discourage aesthetics. In Neo-Dada they have taken my ready-mades and found aesthetic beauty in them, I threw the bottle-rack and the urinal into their faces as a challenge and now they admire them for their aesthetic beauty.¹¹



Daniel Spoerri, La Douche, 1961

Figure 10. Daniel Spoerri's La Douche, 1961 © Adagp, Paris

But to get slightly more specific we'll look at a series of objects that continue the discourse between everyday objects, painting, sculpture, art, and not-art - in connection to and related to aesthetics. Here we see Daniel Spoerri's La Douche from 1961 - Affixing a real faucet and shower spigot to a laboriously painted landscape of a mountain torrent, Spoerri too uses trompe l'oeil to address the relationship between painting and object, diving fearlessly into the choppy waters of reality.¹² A shower applied to a picture of running water changes its course. Unlike the painting, the bathroom object is not represented, but presented. For Daniel Spoerri, the trompe-l'oeil gives way to the "un-trompe-l'oeil". The relief object is no longer an illusion but is tangibly real, in this case preventing any contemplation of the painted work. With these two previously-owned objects, the artist associates the watercourse with its domestic use: that of supplying water for modern interiors. Through this visual pun, the artist invites us to look at the modern world from an ironic, disconcerting, and disillusioned perspective.¹³

For another example we can take a look at Painted Bronze by Jasper Johns - what "initially seems banal—two 12-ounce beer cans standing on a simple rectangular base. But for Johns, these faux-liquid containers were rooted in rich personal and aesthetic histories brimming with meaning. First, they are not beer cans. They are bronze cylinders painted to look like beer cans. Each was individually

cast from real cans and then set into the independently fabricated base, which means the sculpture is a marriage of three separate parts, the most important of which are not beer cans but ale cans. This is a critical distinction. In the 1950s, regular guys drank beer. Sophisticated men drank ale. It was “lighter” and “means real business,” as advertisements asserted during the decade. No wonder Ballantine leads all ales in sales” billboards clamored...Everything about Painted Bronze speaks about difference. What looks mechanically produced for the mass market is actually hand-made for an extremely limited group of buyers. What seems consumable can only be absorbed by the eyes. What would be hand-held and raised to the lips cannot be touched, unless with special gloves. What is pliable is hard, what is a common material is precious, and what is cheap can be one of society’s most expensive consumer goods.¹⁴

And we can also consider, Andy Warhol’s Brillo Box (Soap Pads) 1964 - as a further reference to the connection between pop art, found objects, and the everyday...

I have always said that we have to put Duchamp’s urinal back in the restroom. Now that urinal is in the restroom of the Queens Museum, you can see it and pee on it.¹⁵ Therefore the functional object that was removed from its functional purpose over one-hundred years ago, becomes a functioning object once again, immersed in the gallery, its use returned to it, while previously it was beheaded, useless art object, signed, sealed, delivered (I’m yours) as Stevie Wonder would sing.

Two more recent contemporary projects dealing directly with the urinal are Tania Bruguera’s toilet at the Queens Museum from 2011 and Maurizio Cattelan’s 18-karat gold urinal from 2016, both in which the urinal has regained its functionality. On the existence of the golden toilet says Curator Nancy Spector from the Brooklyn Museum: The golden throne is meant to be a gesture of provocation, Spector says. "The fact that it is very welcoming, inviting for anyone to use, gets to the heart of a lot of questions around exclusivity in the art world and in museums in particular. And this notion of having a very intimate, private experience with a work of art, and a work of art that speaks quite dramatically about its own value, is fascinating on many many levels.¹⁶ Now this reminds us, or rather provides us with a concept, that of the question of use, in art, and how it can be related to the application of complex issues within the world of education. And to summarize and finalize the contents and some of the thoughts covered in this paper, I will end with a series of quotes that provide further context and a frame for exploration and direction for some of my future research.

Since the tubes of paint used by the artist are manufactured and ready made products we must conclude that all the paintings in the world are 'readymades aided' and also works of assemblage.¹⁷

Yet it is this quality of the readymade that is too often overlooked. As a mode of creation, it mimics precisely what we as consumers perpetually do within consumerist society: we choose from the multitude of already existing objects (pre-made en masse for the masses) to express our ‘self’.¹⁸

Although creativity is increasingly viewed as a key human ability that contributes to individual’s personal development, everyday life problem solving, professional accomplishment, and societal growth, the process that underlies the production of creative work remains somewhat mysterious.¹⁹

They had become academic “achievers,” products of a system that rewards knowledge more than understanding or questioning. To them, doubt - in the form of unsureness - was anathema.²⁰

Since ancient times, the creative process has been the source of interest and speculation. The “muse” as evoked in historical Greek texts involved a divine source which inspired mortals to express new ideas.

The inspiration was divine but the delivery process involved people who served as scribes or oracles.²¹

NOTES

- ¹ Julian Jason Haladyn, *Duchamp, Aesthetics and Capitalism* (New York and London, UK: Routledge, 2020), 1.
- ² Sarah Hermanson Meister, ed., *One and One is Four: The Bauhaus Photocollages of Josef Albers* (New York: The Museum of Modern Art, 2016), i.
- ³ Weber, Nicolas Fox, and Jeannette Redesnek, *Josef Albers, Minimal Means, Maximum Effect* (Madrid: Fundacion Juan, 2014), 36.
- ⁴ Sarah Hermanson Meister, ed., *One and One is Four: The Bauhaus Photocollages of Josef Albers* (New York: The Museum of Modern Art, 2016), 11.
- ⁵ Josef Albers, *Interaction of Color* (New Haven: Yale University Press, 2013), 22.
- ⁶ Christopher Bardt, *Material and Mind* (Cambridge, Mass: MIT Press, 2019), 10.
- ⁷ "Behold The Throne: There's A Golden Toilet At The Guggenheim", NPR, accessed June 22, 2023, <https://www.npr.org/sections/thetwo-way/2016/09/15/494082349/guggen-head-you-can-now-use-a-golden-toilet-at-the-guggenheim>
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- ¹⁰ "On Kawara", Wikipedia, accessed June 22, 2023, https://en.wikipedia.org/wiki/On_Kawara
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- ¹² "Found and Lost: On the Object in Art", Artforum, accessed June 22, 2023, <https://www.artforum.com/print/198908/found-and-lost-on-the-object-in-art-34337>
- ¹³ "Daniel Spoerri – La Douche", Centre Pompidou, accessed June 22, 2023, <https://www.centrepompidou.fr/en/ressources/oeuvre/4EtONGu>
- ¹⁴ "Jasper Johns: Painted Bronze", The Brooklyn Rail, accessed June 22, 2023, <https://brooklynrail.org/2022/02/artseen/Jasper-Johns-Painted-Bronze>
- ¹⁵ "Introduction on Useful Art", Tania Bruguera Dot Com, accessed June 22, 2023, <https://taniabruquera.com/introduction-on-useful-art/>
- ¹⁶ "Behold The Throne: There's A Golden Toilet At The Guggenheim", NPR, accessed June 22, 2023, <https://www.npr.org/sections/thetwo-way/2016/09/15/494082349/guggen-head-you-can-now-use-a-golden-toilet-at-the-guggenheim>
- ¹⁷ "The Readymade and The Tube of Paint", Artforum, accessed June 25, 2023, <https://www.artforum.com/print/198605/the-readymade-and-the-tube-of-paint-35050>
- ¹⁸ Julian Jason Haladyn, *Duchamp, Aesthetics and Capitalism* (New York and London, UK: Routledge, 2020), 1.
- ¹⁹ Todd Lubart, *The Creative Process: Perspectives from Multiple Domains* (London, UK: Palgrave Macmillan, 2018), v.
- ²⁰ Christopher Bardt, *Material and Mind* (Cambridge, Mass: MIT Press, 2019), 10.
- ²¹ Todd Lubart, *The Creative Process: Perspectives from Multiple Domains* (London, UK: Palgrave Macmillan, 2018), 4.

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A CASE STUDY USING SCENARIO PLANNING TO EXPLORE AND DEVELOP THE IDENTITY OF A GRADUATE PROGRAM IN A COMPLEX, UNCERTAIN, AND CONTINUOUSLY CHANGING ENVIRONMENT

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INTRODUCTION

Higher education faces increasing demands for relevance and value in a world where knowledge and intelligence are prized, and yet, often misunderstood and ridiculed. Artificial intelligence is nipping at our heels. The structures that govern higher education are medieval in origin, and often bureaucratic in form. What are faculty and programs to do to respond creatively and flexibly to meet the complex needs of tomorrow? This paper reports our experience crafting a graduate program using scenario planning¹ to generate several possible and desired future environments. This process is situated within and influenced by the phenomenon of our meaning of work and work environment. The outcomes of the process remain intangible and have created interesting tensions in trying to enact a relatively novel approach to program design and development. We explore our understandings of why and how this happened, along with the implications it has to the relationship we have to our work and what we want to achieve through it.

Academic program reviews at the university

Our university conducts Academic Program Reviews (APR) periodically. The faculty handbook provides guidance on academic program review under ‘Faculty Role in Governance’.² Interestingly, the when and why of conducting an APR is not stipulated. Rather, the language used is ‘periodic’. APR’S for our graduate program occurred in 1994, 2011 and 2019. These reviews involve an internal review team and the invitation of an external review team, including members from other programs on campus and experts from other institutions. The process takes at least 18 months, with the internal review and report occurring in one academic year and the external review and report occurring in the next. The Provost’s Office for Academic Programs retains a person who coordinates APR’s university wide. This most recent APR was conducted in 2019-20, where our scenario planning efforts emerged because we found ourselves asking questions about and prioritizing the focus on our program identity.

Shifting contexts

We were situated within a multi-faceted, complex, and chaotic context. The pandemic was still creating rampant levels of uncertainty and chaos to the university as it was struggling to make decisions that met the needs of faculty, staff, and students while maintaining enrollment and pivoting

back and forth from in-person to online. There were massive disruptions to the nature of work in how work was done, where it was done, and our relationship to it.

At the university level, operations were being centralized for increased efficiency. Faculty governance is a hot topic at our university.³ There is a disturbing disequilibrium between the attention given to the construct of faculty voice and our ability to speak and act on behalf of our programs. This was not so apparent at the outset of our scenario planning. It has become more prevalent as leadership shifts and the institution undergoes adjustment in its Carnegie classification from a Comprehensive to a Research II (R2) institution.

Our college had recently transitioned under new leadership with efforts to reorganize the departments and programs along with a new vision, goals, and expectations of success. These transitions and changes created high levels of uncertainty within our working environment. Personnel changes in our program faculty, our academic unit leadership and our college leadership made this APR process more complex. At the time of the APR, the program had three tenure-track professors and a valued Lecturer of 17 years. Two additional Full Professors were working in administrative roles and teaching one course. Following the APR, the Academic Unit Head stepped down, returning to faculty. A Full Professor took a leave of absence, the Associate Professor left the University for another opportunity in the private sector. As scenario planning proceeded, personnel changes did not stop. Each year brought a new interim academic unit head and the faculty member on leave now serves as an Associate Dean. Three of us anchored the scenario planning process.

How do we fit in this context?

Our college focuses on schooling and the preparation of school leaders. Our program focuses on adult learning and the preparation and delivery of learning and development opportunities largely in contexts others than schools. Recognition and demand for learning in contexts other than schools is strong.⁴ The workforce needs people who know how to develop learning environments for adults and organizations across a lifetime and through many careers. Our scenario planning was partially undertaken to address this gap in perspective in our own College. How do we better tell our story and show the need for and relationship of our work with those who have long dominated American Colleges of Education with a focus on teacher preparation? Can scenario planning provide new perspectives for us all?

OUR MEANING OF WORK AND COLLECTIVELY CRAFTING A PROGRAM

Prior to the beginning of our work to respond to the APR, the interaction of our working environment and ambiguous identity had created systemic challenges that were influencing our relationship to the work and what we wanted to accomplish.⁵ This is consistent with research positing that ambiguous identity can create trouble with internal and external operations and relationships within organizations.⁶ There was no faculty cohesion or shared mental model of the purpose of the program which created challenges in communicating our branding; curriculum design and development; recruiting of prospective students; managing expectations of current students; our relationships with students, colleagues, other programs, and administration; and even our fit within the college. These challenges created tension in aligning our own values with the organization and/or program,⁷ our socialization with others,⁸ and our perception of doing meaningful work. If left un/haphazardly addressed, there was the chance of remaining status quo which had the ability to decrease potential growth and development⁹ change our perceptions of our work, or even make us feel as though the work that we do is meaningless.¹⁰

Our meaning of work revolved around wanting to construct a clear, shared identity that could serve as a focal point of motivation and energy.¹¹ We were committed to doing meaningful work through this process, which is an essence of the meaning of work¹² focused on doing work that is purposeful and significant.¹³ This was an opportunity to try and shape our work meanings positively through crafting¹⁴ our program, at the collective level,¹⁵ and making our identity an asset instead of a liability.¹⁶ Elements of meaningful work can be reflected in our entire process, even influencing the selection of the intervention. First, we were able to have autonomy¹⁷ in how we wanted to address the APR findings. Given the potential consequences of not appropriately addressing identity and our absence from the initial data collection process that informed the APR, we decided we needed to understand the problem on a deeper level. This required an intervention that included more extensive data gathering initiatives. Second, we needed an intervention that was participatory to help create faculty cohesion and collaboration, so we'd have a shared mental model of our identity and a collective shared narrative of our meaning to work.¹⁸ Third, we wanted to engage in challenging work that required us to be innovative, creative, and progress towards long-term goals¹⁹ that incorporated flexibility and adaptability into our program. It's important to build fluidity into an identity²⁰ so that its dynamic²¹ in allowing for learning and adaptation.²² We needed an intervention that was systemic and strategically future-oriented while also situating us in a complex, unpredictable, and continuously changing environment. Given these needs, the scenario planning process was selected. This process allows for several plausible and desired future environments rather than single forecasting to make informed decisions by examining plausible outcomes, different driving forces, and impact levels that inform the design and development of the program.²³ This process provided a sense of contributing to the bigger picture²⁴ of making an impact and helping others.²⁵ It was engaging, provided a sense of ownership over our future, and increased commitment²⁶ to the program and our work. We also assumed that by participating in this process and addressing the APR findings that we would be understood, valued in our college, and our expertise acknowledged.

SCENARIO PLANNING PROCESS

We implemented the phases of the scenario planning process²⁷ including project preparation, scenario exploration with an in-depth internal and external analysis of the program, scenario development, scenario implementation, project assessment, and then the output of a strategic plan. We received support from leadership, the time and scope were defined, and we had agreement on outcomes to address the findings from the APR.

The scenario exploration phase required more extensive data gathering. An external and internal analysis was conducted using multiple methods of data collection. This included benchmarking with other programs in the field; employer/industry information; professional standards of relevant organizations; existing data from prior program reviews and alumni; interviews with faculty, students, and leadership; and a survey to prospective students. These findings informed the remainder of the phases.

During the scenario development phase, we brainstormed major forces that have impact on our program and ranked those forces by impact and uncertainty. Some example forces were cost of higher education, Covid, future of learning, growth vs. resources, alignment with the field, college perception of fit, leadership support, organizational structure, and the nature of work. We developed scenarios based on two variables that we agreed upon were high impact, high uncertainty—our *audience* and *delivery of program*. Through weeks of in-depth and meaningful conversations we had already established a shared understanding of grounding and bounding our identity back into the field. We created four scenarios using our audience and delivery of the program, while incorporating some of

the other discussed forces as characters and outcomes within the stories. Our scenarios revolved around microbrewery and wine establishments. These four scenarios were: 1) A local brewery that also distributes beyond the local market that represented the Hybrid program model: *You're here, or you're there, but not at the same time* 2) A local brewery that does not distribute that represented the In-person program model: *we're here, you're here, we're all here together* 3) A local winery that also has a brewery, distillery, and wedding venue to represent a Hyflex program model: *All things to all people on our time* 4) An online wine club to represent the online program model: *Anywhere, anytime with limited guidance*.

Once we wrote our scenario stories, we returned to our original question that drove the process on our identity and how we can position ourselves to be competitive within our field and enhance the value our degree provides to our students in the workplace. We implemented the scenarios through wind tunneling²⁸ them by asking questions, brainstorming ideas, and considering different plans and projects with each story. We become aware of indicators that a given scenario we created is unfolding and needs to be on our radar. These scenario stories helped us build resilience by resolving our identity issues, which helped us create a sustainable, comprehensive, and systemic action plan of other changes that we needed to address to align with our shared understanding of the program. However, this is where the process remains, unfortunately, somewhat elusive.

Outcomes

We had achieved our goal of doing meaningful work by collectively²⁹ crafting³⁰ a program, that we believed would make a positive impact on students, faculty, the college, and university. We were engaged and energized by the process and outcomes such as changed thinking and improved decision-making, learning, and use of imagination.³¹ There were changes within our control that we have implemented such as modification of the core curriculum, redesign and development of courses, and rebuilding relationships with alumni, departments, and programs within the university. We were also able to clarify our needs of resources and expertise for growth. The unexpected outcome was just how much we found ourselves limited by our systems and structures and how our clarity of identity created further dissonance with the college.

EXPLANATIONS AND IMPLICATIONS

Given these unanticipated consequences, we explore some plausible explanations for the outcomes and the impact on our meaning of work. When doing scenario planning there can be a problem of transference of the outcomes beyond the immediate group that participated in the process³². Research has cautioned using scenario planning based on the context of the organization and whether it's receptive.³³ We may have selected the wrong intervention³⁴ because when conducting change, we must be conscious of the relationship between the intervention and the organizational culture.³⁵ The intervention was correct for our problem because it forced us to imagine future scenarios to create an identity that is agile and grounded in the notion of change as constant, but misaligned with a bureaucratic, hierarchical culture³⁶ that functions on stability, rules, and centralization for efficient practices.³⁷

It's also possible that this change was perceived by others as a check-the-box event³⁸ rather than a continuous process of strategic thinking that required time and resources. We perceived ourselves as initially having autonomy because we were able to choose the way we responded to the APR. As mentioned above, there has been a shift in our ability to speak and act on behalf our programs at the university, which has become more apparent with our requests of organizational support. This is in alignment with a hierarchical structure³⁹ that encompasses top-down leadership for decision-making, and often short-term advantages without altering foundations.

This misalignment may also explain the tension between our identity and perceptions of fit within the college. Identities can be at conflict within an organization.⁴⁰ Given the focus of our college on schooling and preparation of school leaders, the organizational identity remains anchored in what has always been, which is reflective of the organizational culture.⁴¹ Since organizational culture is a shared construction of values and underlying assumptions⁴² our college has not been forced to question or reflect on being more inclusive beyond its original purpose. We were not able to disrupt the current system and provide new perspectives, so without prescribing to that conformity, our value remains questionable to administration which then unfortunately influences the politics of power and resources. Consequently, research shows that there is a strong relationship among the meaning of work and individual perceptions of the job demands and resources.⁴³

We were crafting a program to be resilient and responsive to the complexity and uncertainty of the future. We had erroneous assumptions about the potentials of having a clear, dynamic identity within our context. We crafted a program we perceived as meaningful and now we are grieving the loss of something that *could have been*. This experience has uncovered a more significant gap in the alignment of the organization and our personal/professional values.⁴⁴ While innovation and inclusion are espoused values, the underlying assumptions of how to be successful in this work environment⁴⁵ seem to be prescribing to the conformity of the existing system.

We know that the outcomes of finding positive meaning of our work provides us with more energy, sense of commitment,⁴⁶ motivation,⁴⁷ and even increased performance.⁴⁸ How do we make sense of this misalignment? And how do we continue trying to do meaningful work while the value of our program and expertise is being questioned? Research explains that if people can't make explicit changes at their work, they instead change the way they think about their jobs.⁴⁹ They engage in cognitive crafting.⁵⁰ We are going to have to engage in deep reflection on how to develop a new relationship with the work that we do and how we can craft it to perceive it as meaningful.

CONCLUSION

Our hope is that others can learn from our experience. Many higher education institutions are structured as bureaucratic hierarchies that encompass traditional systems and structures, which can be a hindrance to being able to respond to complexity and chaos. In this type of environment, traditional management and leadership approaches are insufficient.⁵¹ Experience, especially given the lessons from the pandemic, and research shows us that organizations need cultures that encourage flexibility, adaptability, and speed.⁵² Meaningful change is not possible without an identity, but what we've learned is that's only the case if it's dynamic, inclusive, and an asset. Otherwise, change is conducted only to maintain the current system⁵³ versus trying to transform it. Colleges need to rethink their identities to be future-oriented, all of which requires some elements of culture change.⁵⁴

Programs, such as ours, are embedded within fields that must evolve with the changing nature of work and society. We need to be embedded within universities that have structures, systems, and processes that can allow us to move quickly and adapt to change. This requires flattening hierarchies, decentralizing decision-making authority, questioning the status quo, and anticipating multiple scenarios of the future.⁵⁵

Work plays a significant role in people's lives. We often use it as a vehicle to find purpose and fulfillment.⁵⁶ The decisions and behaviors of leaders and organizations can impact the relationship people have with their work. People want to work for organizations that have evolved and are doing meaningful work that requires innovation and creativity⁵⁷ to make an impact and help others.⁵⁸ Offering work environments that encourage this relationship with work is going to be a competitive advantage for higher education institutions to attract and retain faculty, staff, and even prospective

students. This level of autonomy, decentralized power and decision-making, and empowerment to adapt to change is going to be one of the most productive ways to contribute to solving the wicked problems of the world.

NOTES

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HOW MIGHT WE BETTER PREPARE YOUNG PEOPLE FOR THEIR FUTURES IN WORK?

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INTRODUCTION

The Future of Work is happening now, not on some far horizon. But in the future, work might be different to what it is now, so how does a school design learning with confidence, when what's ahead is so uncertain? The Manurewa High School Business Academy (Business Academy) offers a case study of a school working in partnerships with business, alumni and tertiary organisations to support multiple programmes and experiences for the young people it serves. The leaders and teachers who champion these programmes believe that preparing young people for their Futures in Work is a key responsibility of a high school, and that learning design is best done in partnership with those already in the world of work. The rationale is that a partnership ecosystem can enable schools to be adaptive, to policy changes, to their context and beliefs, now and in the future.

The context for our work is complex. Manurewa High School is based in South Auckland, a region that has a large and growing proportion of the city's youth. The school roll of approximately 2100 students represents 53 nationalities. The largest groups are Pasifika (50%), Maaori (33%) and Asian (12%). More than a third of students come from families that have been welfare-dependent for five years or more and may lack the networks that can inform and inspire their pathways. Lack of connections is a barrier faced by 33% of respondents in the Tertiary Education Commission's (TEC) research into Transitions from Secondary School¹.

Wider system factors, which include living in poor quality homes, see the community over-represented in statistics for negative life outcomes in health and education. The TEC research identifies the inequity in leaving qualifications for Maaori and Pasifika learners who are less than half as likely to leave school with the University Entrance (UE) qualification that would enable them to attend university straight from school. However, when they are enabled to achieve UE, they are similarly likely to choose a university pathway as non-Maaori / non-Pasifika leavers.

In 2022, Manurewa High School graduating students' intentions were (approximately):

- 30% into employment.
- 15% to university, while the numbers going into polytechnics or further education was slightly higher.
- 5% into apprenticeships.
- 3% undecided.

These percentages align with TEC national data² except for university transition, where the national figure is 30%.

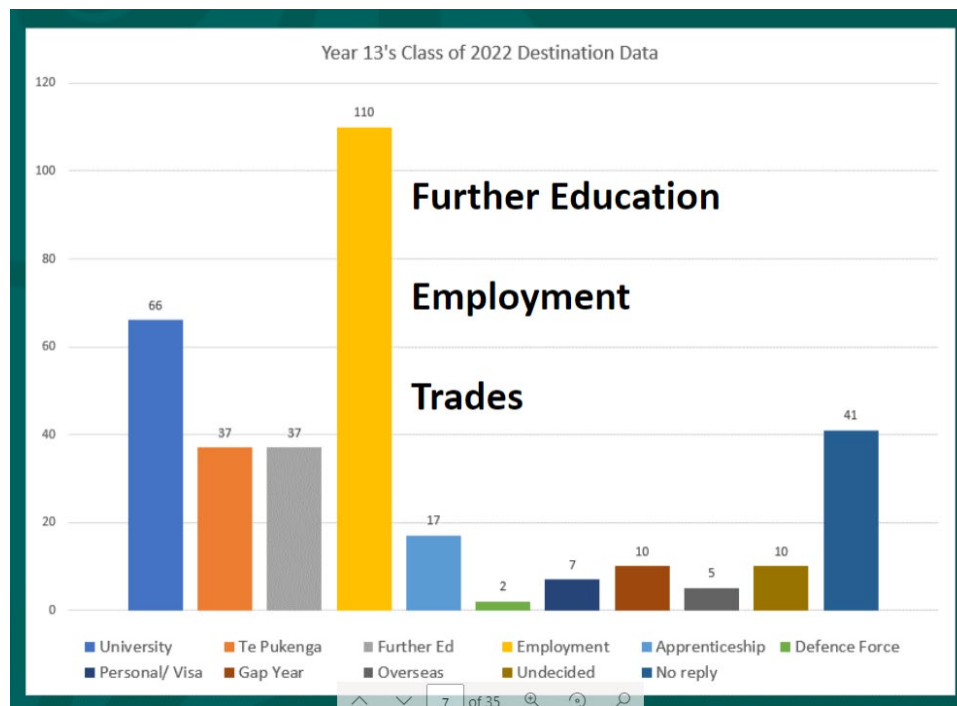


Figure 1. Manurewa High School Year 13 (final year) Student Destinations

The focus of Business Academy programmes to prepare young people for their Futures in Work keeps in sight both Education to Employment, and Tertiary Education pathways. “Pathway to Employment” provides transitional work experience, and a tailored curriculum. “Makerspace” emphasises entrepreneurial and digital skills development, and experiential learning opportunities through collaborations with the world outside of school. “Future of Work Emergent Curriculum Design” convenes expert panels to enable connections to be made that otherwise might be a barrier to informed understanding of pathways, both for the student and for the subject-specialist teacher. Encircling these programmes is a growing ecosystem of partners that enable or deliver learning, and sometimes do both.

The Business Academy was founded by a group from the University of Auckland and the business sector, led by alumni and business leader John Hynds. The vision is “to awaken the courage, creativity and perseverance that will drive businesses of the future”. The founders were inspired by the success of students in the Young Enterprise Scheme³ (YES) and wanted to support scaling of this success. Young Enterprise offers a complexity-rich curriculum that integrates knowledge of the economic system and business processes, cultural values, and skills.

From these enterprise-learning foundations, a trust structure was established in 2015 to offer independent governance and for fundraising. Early partnerships were formed with the University of Auckland Business School (the Business School) and EY. The Business School opened up learning resources for students, and created pathways through a full scholarship programme offered annually to three students. EY codesigned a group mentoring programme where its staff volunteered time in structured workshops to share skills and knowledge for future success. Opportunities for students have expanded to include participating in the EY Entrepreneur of the Year events, innovation labs, and university-based mentoring.

Over the past eight years, the Business Academy’s partnership-based mission has been fulfilled through programmes that have proven adaptive to a pandemic, and shifts in education policy and practice⁴. These programmes will be described further in this article.

Some core principles have emerged:

1. Embrace learning that can be “Anytime, Any Place, Any Space, and with Anyone”.
2. Learn about complexity in safe-to-fail ways.
3. Build in ways to develop curiosity, judgement and sense-making.
4. Integrate self-reflection, noting to be mindful of the two types of reflection: one in action and one while quietly removed. There are quite different sources of knowledge in these two contexts.⁵

The learning outcomes are defined in our concept map (Figure 2), but we see this as a work in progress. In the future, our programme designs could go deeper into a smaller range of learning outcomes. This is a big consideration as we begin to support other schools to integrate partnerships.

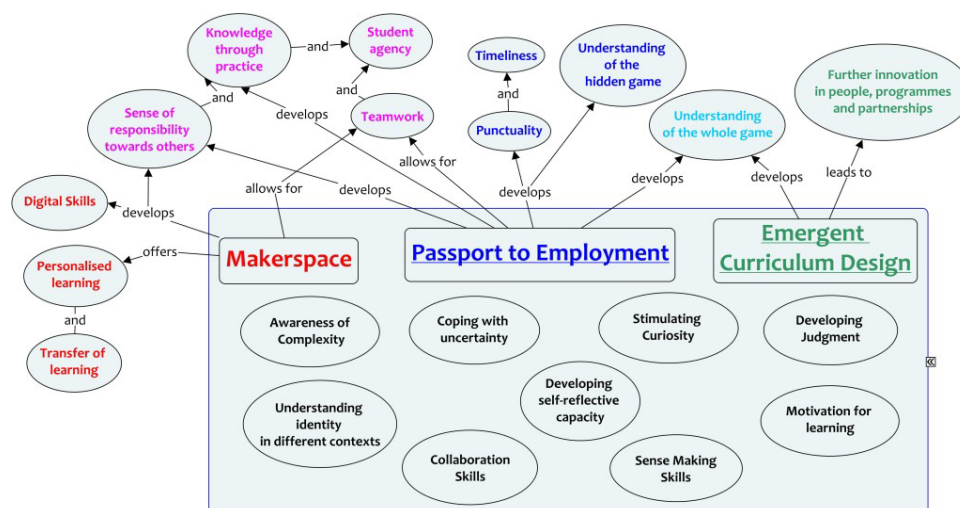


Figure 2. Concept Map - Business Academy core programmes, with their common and unique outcomes

FINDING PATHWAYS FROM EDUCATION TO EMPLOYMENT – WHATEVER THE SHOCKS MAY BE

We first codesigned the Pathway to Employment programme with two local businesses, Hynds Higrade and Mainfreight, as employer partners. They have in common work that involves logistics and distribution. Core components of the programme are:

- Students spend three days a week in school to gain NCEA Level 3 qualifications, and two days a week in the workplace.
- The school programme is led by a dedicated teacher who is given teaching time to provide pastoral care and support to the employer partnerships. In the history of the programme, there have been two dedicated teachers – the first came from English and the Social Sciences, and the second from Physical Education.
- The learning programme is designed around the lead teacher’s skill sets with other subject specialists complementing to ensure students access a wholistic programme of literacy, numeracy, wellbeing, and work-ready skills. Work-ready qualifications are offered through an appropriate external training organisation.
- In pastoral care, students need to be supported with unfamiliar processes like employment contracts, setting up their own bank accounts, pay systems, and drug and alcohol testing.

- New habits need to be developed – such as becoming a person who is timely to work and to tasks in work⁶. When mistakes are made, a trusted teacher helps the student to navigate school and work processes for review and restoration.

How have consistent weekly work experiences combined with a tailored curriculum and wraparound care developed the habits, motivations and confidence for youth to make successful transitions from high school to full-time work? Rosemary Hipkins⁶ offers a theoretical foundation from David Perkins.⁷ The programme design:

- Immerses the young person partially inside the future system to develop in a safe and supported way the responsibility for their personal choices and actions. Perkins calls this learning about “The Whole Game”.
- Allows the young person to participate in and experience different ways of gaining knowledge of themselves in different contexts. Perkins calls this “Playing Out of Town”.
- Develops understanding of the company structure, including the possibly unstated parts of company culture (“The Hidden Game”).

What our data shows about the success of the programme in enabling positive transitions:

- In 2020 and 2021, 80% of students completed the programme, and of those 80% took a job with the employer partner.
- In 2022, despite having the largest cohort of students (30 on the roll at the start of the year), we had the lowest rate of transition through the year, falling away to 30% by the end of the school year. Many students struggled with attendance and achievement, and many had to leave school to support their families through full-time work. We had four students who were in Year 12, ie the penultimate year of high school. We think the programme is best suited to Year 13.
- The labour market is not as strong in 2023 and stability has returned in student participation. The Business Academy has begun to support another school to access the programme, and there are 20 students across two schools with 1.25 equivalent teaching time. We are growing our understanding of the funding model required in scaling.

It is hard not to blame Covid for the ups and downs of the first three years, but still as the adults in the space, we look for and reflect on other factors. The Finnish “Human Learning System” case study offers guidance on the continuously reflective approach that’s needed for a system-wide, multi-stakeholder initiative.⁸ Questions we ask:

- Have we engaged families well?
- Has there been enough support by the teacher in the workplace?
- Have we got a process for that?
- Is our own wellbeing aligning with the programme’s needs or do we need more resourcing?
- Is the programme aligning with the students’ needs?
- What changes shall we make for next year?
- What have we learnt from inclusion of a new partner?

In the big picture of Education to Employment programmes in New Zealand currently, the guidance is that successful programmes need to be locally focused. In rural areas, exemplar models are partnerships between schools and a large local employer or industry. In urban areas, where there are multiple industries, there are multiple exemplar programmes including the Business Academy’s Logistics programme, Trades and Health Science Academies. Local employment makes sense logistically, but not necessarily when the goal is to access an industry that is clustered in a different part of the city, such as the Tech sector. There are many models being executed to address the specific problem of inequitable numbers of Maaori and Pasifika accessing jobs in Tech. The Business

Academy has begun to develop pathways from high school into high-value tech jobs through a new partnership with Entelar, where students start out learning the basics of laptop configuration.

THE WAY OF THE MAKER

Tech is in everything already, and we can be certain that the Future of Work will be one that leverages emerging technologies like Artificial Intelligence, Virtual and Augmented Reality, Digital Fabrication and the Blockchain.

Our Makerspace was purposely designed by students and adults to address the digital divide that sees Maaori and Pasifika representing only 5% of the Tech workforce in New Zealand. The Makerspace was established in 2018 with initial funding from the Ministry for Youth Development and Perpetual Guardian, and continuity provided by Foundation North. There were few sites to inform the setup and most were in community settings. The student codesigners noticed how none of the spaces had a classroom feel. In their design for our Makerspace in a repurposed prefab classroom, they removed the whiteboard and created a chill zone there instead. Student agency has been part of its DNA ever since.

Students work on projects with access to a wide world of technology including laser cutting, vinyl cutting, coding and robotics, 3D printing, and a range of digital design software. They can apply their cultural knowledge, creativity, curiosity, and collaboration skills in ways that are meaningful for them. A hand drawing or computer image can be transformed into a product they can sell, or covet as their own customised creation. They also make videos, podcasts, and music, upcycle computers, and create new electronic gear from waste. A lot of the students say that they come for the connection and collaboration with others. Some will say they didn't identify as being good with, or interested in, technology, but through the environment their curiosity and confidence have grown.

Adults in the space may be teachers but most of them are from the community. Generally they are learning from the students as much as they are sharing their wisdom.

The OECD Sun Model of Co-Agency⁹, developed in 2018, considers the highest level of Student Agency to be – “Young People Initiated, Decisions Shared with Adults”. It is inspiring to work in a space where the sun is always out.

After two years running purely as an after-school and holiday programme, Makerspace scaled into normal school timetable in two ways:

1. Through Waananga (interest-based learning) on a Wednesday. The Makerspace Waananga programme supports students to ideate, prototype and produce.
2. Through Te Ara Hou, an alternative education pathway for Year 10 boys and girls (two classes). Te Ara Hou students are re-engaging in education through personalised learning opportunities. In Makerspace, they can express their creativity and develop their confidence with digital tools.

As well as developing skills, Makerspace supports future employment pathways through:

- Connection with our external mentors who are role models as creative, tech entrepreneurs.
- Bringing in whaanau to share their skills and work experiences.
- Community Open Days, conferences, and online learning programmes that provide members with skills in event organisation.
- A commercialisation platform, Manu Toi, that provides members with earning-from-learning options – as production support and as entrepreneurs.
- Taking members out to workplaces, tertiary spaces, and tech events.

Our data shows that 100% of students who have actively engaged in Makerspace over 1-5 years of high school transition into Further Education. For the first 1-2 years out of school, many of these young people return to be part of the after-school programme.

Assessment is still absent in the more free-ranging Makerspace curriculum. However, we are developing a microcredential with the support of the Business School. Students aren't demanding qualifications, but we are curious to explore options for future use. The Makerspace is critical to our Future of Work emergent curriculum design for skills development, and for partnership collaborations.

FUTURE OF WORK ACROSS THE CURRICULUM – INCONCLUSIVE IN ITS ITERATIONS

The Business Academy has been on a journey of exploration in Future of Work curriculum design since 2018. It has required us to become comfortable with ambiguity, and be inclined towards iteration and adaptation.

Early on in the journey, we formed an advisory group that included businesspeople, the school principal, and Business Academy staff. The group met every few months to brainstorm the design of a learning process. We focused on the impact of exponential technologies and trialled a workshop for senior students who participate in our EY Mentoring for Success Programme. We included a group of teachers from Science and Social Sciences who we felt might be curious about the method and the content. The method involved:

- A keynote presentation. The speaker was Kinley Salmon,¹⁰ who shared two possible scenarios for the Future of Work in 2050: one in which New Zealanders mostly work in a creative tech-based economy; the other in which work is done by robots and our needs are met through a Universal Basic Income (UBI), leaving us to find our purpose in ways other than work.
- Facilitated discussions after the talk, led by Chris Woods, a professor in the Business School, supported by EY staff.
- We integrated the school Learner Profile (Figure 4) into discussion, considering whether it was fit-for-purpose. Students also reflected on what they'd learnt, by writing a letter to their "Future Me".

In these ways, we practised one of our core principles of applying education to be "anytime, any place, with anyone". We gave students an opportunity to connect with new people in a different context to inform their future thinking. The boundary spaces created allowed for rich interactions.¹¹



Figure 3. The Manurewa High School Student Learner Profile

Student feedback was positive that it was an enjoyable learning experience, but they thought the workshop would offer them more knowledge about their next steps from high school. Teacher feedback was also even – one noted the effort needed to learn outside the classroom, and the warmth and interest of “outsiders” in wanting to be involved. Another suggested they felt the topic was important.

The advisory group concluded that the scenarios approach may have been too far in the future to be relevant to the students. Less than three years later, Generative AI has stormed the education sector and the Future of Work, so perhaps the conclusion was flawed.

A second prototype, introduced in 2021, aimed to be more inspirational. With school in a Covid-19 lockdown, the prototype was delivered as a Facebook livestream and focused on themes of Climate

Change, Emerging Technologies, and Purpose, Values & Leadership.¹² The Future of Food was the focus of a second series¹³ of “Inspirational Talks”.

Teacher and student engagement in the livestreams was mixed – better for some of the talks than others.

In 2022 and 2023, we have been able to move from livestream to live hosted panels in school. Again, participation is low.

CONCLUSION

The barriers to integration of Future of Work knowledge and skills into a high-school curriculum are gradually coming down as the New Zealand education system shifts to Local Curriculum Design and National Education Learning Priorities, which are explicit about the need to work with others - Māori as co-signatories with the Crown to Te Tiriti O Waitangi,¹⁴ and with families and the wider community.

Business, alumni and tertiary education partnerships are a valuable and flexible resource for a high school, to inform and support students’ choices in pathways, and for curriculum enrichment. They can be shaped easily to suit the local context, and they can adapt as contexts change.

The work of Better Preparing Young People for their Futures in Work dips into the waters of Complexity, to apply education in new contexts, and integrate systems thinking.

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TRIALING OFFLINE INTERNET IN JUVENILE JUSTICE TO ENGAGE LEARNERS

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INTRODUCTION

In July of 2022 a trial study was started in the Juvenile Justice Center in Suva, Fiji. This study was being conducted between three groups, Inspire Pacific; who run the education courses at the center, Teacher in a Box; who supplied an offline internet server and a researcher from Griffith University; who was looking to develop a teacher/facilitator training program for digital literacy in using offline servers.

This paper discusses the outcomes of the trial over an eight-month period. It reviews how the introduction of the technology component changed the form and pedagogies in some of the education courses at the center. Moreover, how these changes have allowed for an expansion of the program to outside the center. With the new program designed to include preventative and aftercare for both the residents and their community.

Finally, it looks at how the trial has led to an adjustment in the form and functionality of the training package being developed to include training not previously recognized as being required, that was a direct consequence of the learning needs of the youth involved at the center. As well as a recognition that, although the package was being developed for teachers/facilitators, it needs to be able to be used directly with students for best effect.

Partners

Each of the partner organizations started working in their respective areas out of a desire to do something for another group. In both cases the initial program took a turn as the realities of the situations surrounding their specific needs became apparent. As the programs have grown and changed, they have both taken to working with partner organizations in order to achieve their aims and to engage with the wider community.

Inspire Pacific

Inspire Pacific (IP) started in 2019. At first it was simply a group of volunteers who went into the Juvenile Justice and Rehabilitation center in Suva, Fiji. What started as a weekly visit soon turned into regular courses. ¹During 2020 the onsite visits did not continue due to COVID restrictions. However, the background work in relation to the partnership between the Department of Justice and IP was ongoing. ²

The IP team currently offers five (5) different programs at the center in Suva. These are social interaction, cooking, leadership, arts, and the Teacher in a Box program. All of the boys who are at the center are able to join in these programs. ³

Teacher in a Box

Teacher in a Box (TIB) is an offline content server. These are upcycled laptop computers, used to provide quality educational content to areas where internet connection is limited or not available.⁴ The devices provided in Fiji were the base build of content, which covers literacy and numeracy in English along with a wide range of educational and community material. This was at the request of IP and due to the timing of the request as it was made early in 2020 at the beginning of the COVID pandemic.⁵ A second device was provided along with 20 donated desktop computers in late 2022 as part of a subsequent project.

THE TRIAL PROJECT

The joint project between the researcher, IP and TIB is a trial of a larger teacher training program in relation to the offline internet server. The project was set up as a single case study of the use of the TIB in the Juvenile Justice Center in Fiji. In July 2022 a two-day training session was held where the facilitators were trained in the basic use of the TIB. This related to the setting up of the physical device, searching for and opening individual items as well as an introduction to how to manipulate items on the device. In terms of teaching with the types of resources on the TIB which include Open Educational Resources (OER) Hilton et al⁶ point out that the ability to revise, remix, and reuse materials in new ways is one of the most important elements of OER. Di Blas et al⁷ take this a step further and discuss the different pedagogies required to make most effective use of OER. Both the pedagogies and the digital literacy to make best use of the devices for student needs are not able to be sufficiently explained in a short workshop style training. However, the precise learning needs of the teachers and facilitators was undetermined.

This larger project recognizes that the learning needs and societal demands of the current knowledge generation have meant that teachers need to develop a higher level of technological competency than in previous generations.⁸ For newer teachers, those who have grown up with technology, some of this is easier to learn than for those who have less experience with technology.

The aim of the trial was to define the learning needs, in terms of digital literacy and pedagogical training, that a group of people with differing levels of digital competencies would need in order to be able to effectively teach and interact with students who have very specific needs. This particular group agreed to participate due to their particular circumstances, making for a fast-paced microcosm of education.

Setting

The project is located in the Juvenile Justice Remand and Rehabilitation center in Suva. This center is operated by the Department of Social Welfare.⁹ Under Fijian law a Juvenile is classified as an individual who is over 10 years of age and under 17 years of age. However, anyone under 14 years of age cannot be imprisoned for any offence.¹⁰

The population of the center fluctuates over the course of the year as most of the boys are only there while on remand. This remand period is capped at three weeks.¹¹ There are a minority who are there to serve a sentence, and, over the course of a year there will be a few repeat visitors to the center. Throughout the year the center will see anywhere between 50 and 150 individuals make use of its facilities.¹² However, a large number of these do return during the course of the year.

Although designated as a center for juveniles, prior to the agreement with IP no formal provision of education for the residents had been entered into. Upon entering into the agreement with IP one of the first steps was to create a designated learning space. Currently a 20-foot shipping container is being used as the main storage and indoor learning area. However, when weather conditions and learning content permit, learning is done outside.¹³

The Project

This project is a microcosm of education due to the short length of time that individuals are in the center and the dual aims of engaging the residents into education or training in order to prevent them from returning. The residents of the center come from a variety of social and educational backgrounds with a distinct differences in their knowledge and understanding of how to use technology.¹⁴

Although computers have been in schools in developed nations for approaching 40 years they are primarily used as aids to deliver content. The most common experience of students in learning with computers is to learn from them through searching for information or making a final product, an assignment, or similar.¹⁵ To move technology from this level of use to becoming an integrated part of classroom learning requires training for teachers in how to do it. This training for this needs to be meaningful, applicable, practical and accessible.

The facilitators come from a variety of backgrounds and while all have completed different training in order to be part of the programs at the center, they also acknowledge that they are not trained as teachers. However, they do have a personal understanding of how to engage with and use digital devices in different situations.¹⁶

However, it is not simply a matter of learning how to use a device but also learning how to teach with the device and how to be effective with it.¹⁷ The majority of use of technology in schools and universities, even for the “digital natives”, is in productivity software. Things like word processing, email, presentations, and internet searches are what made up the majority of the computer use.¹⁸ To use educational technology for more than this requires a higher level of digital literacy. When moving from a paper-based system to an electronic one, more changes than the mode of delivery. One aspect to contend with is the preparation time for the facilitators, which can increase when using the technology over a paper or less interactive system. This can be due to having to consider the many different objects that could be used within the new system, what to use, what to avoid, and how to use it.¹⁹

Much of the existing training pre-supposes skills on the part of the teacher or facilitator and the trainer.²⁰ While most people in this situation have some level of digital literacy it is often at the user level. They are deemed to be information literate. A person who is information literate can use an electronic communications device *to locate, manage, synthesize, evaluate, communicate, and use information effectively and with integrity*.²¹ In contrast, a person who is digitally literate is able to use an electronic communications device to interact with society at large and thereby improve their own social and economic opportunities. Computer literacy, on the other hand, means that a person can comfortably use operating systems and programs for a computer. Someone who is technologically literate combines all of these skill sets.²²

The aim of the trial program is to see what the facilitators need in terms of training to improve their personal engagement with the technology and increase their competency in using it with the residents. To move from information literacy to digital literacy.

As the use of educational technology is one of the skills needed to master in order to be effective in teaching with it, it makes sense to use the technology as part of the training. The proliferation of apps, ease of access to web-based media and reduction in cost to access the internet, in many places, has enabled teachers to use technology to engage in professional learning online at their own pace and in connection with their own wants and needs.²³ This training can be online in the sense that there is a connection via the internet or simply online in that it is done via a computer. In the trial the training and access was done using the existing material on the TIB server.

When setting up an online learning or training it is important to know how well the participants are able to use the required tools in order to participate fully. While there may be a preference for face-to-face workshops this is acknowledged that in this situation it is not feasible or economically viable. However, learning support and discussion groups are a viable option given the available resources.²⁴ In this context both email and a Facebook group were made active.

TRIAL RESULTS

While the initial purpose of this trial was to determine what content was required and what content was desired in a digital literacy training package it quickly became apparent that an offline package needed to include content that had been previously overlooked. During the initial training in Suva, it was noted that, while the facilitators had sufficient digital literacy for basic computer operations, several of the residents did not have these base level skills. Over the next few months this pattern repeated itself on several occasions. The facilitators at the center noted that they had the ability to engage residents with content on the devices but only if the residents were able to use the device. If the resident was not able to use the device independently, at least at a base level such as turning the device on, navigating a menu, and opening a specific file, it created a barrier for both parties.²⁵

In terms of the research project this led to the inclusion of basic computer accessibility training in the overall program. This training could be used by either teachers or students. For the center, the facilitators and researcher worked together to create a “computer license”, similar in concept to the “pen license” or “Bunsen burner license” that may be familiar, which residents attained once they are able to perform basic computer skills.

It was also noted that the videos and audio training provided on the server, while covering the material, was difficult to follow for those whose English was not a native speaker level. English is the language of instruction in Fijian schools however many residents use another language outside of school. In the same light some of the training as provided contained too many elements in a single session for ease of understanding.²⁶ This led to the adjustment of the videos in terms of speed so that the audio was slower and sub-titles have been able to be applied. Additionally, those videos dealing with multiple concepts were broken into smaller segments for ease of understanding.

Unexpected Results

- An increased uptake in students attending literacy classes
- Requirement to teach academic subjects in smaller groups
- Streaming of literacy classes based on ability
- Inclusion of testing for literacy
- Creation of baseline numeracy testing
- Expansion of academic classes to include numeracy
- Students gravitating towards “games” learning different skills

Expansion of learning

Due to the size and location of the learning center, in the shipping container, only five of the desktop computers are able to be set up at any one time. A restriction on the residents having mobile communication devices means that the wi-fi operations of the TIB are not operational at the center. This means that the number of residents that can access the TIB at once in the Center setting is limited to the desktop computers.²⁷ As a direct result of this the literacy groups, which had been up to 15 in a group were redesigned to be a maximum of five in a group. This redesign also allowed for some streaming of the learning.

During the initial training period for the TIB machine the facilitators had made note of the fact that it was difficult to get some of the residents to attend literacy classes. When questioned about the classes, how they were operated, what they were called and so on the group decided that it might have been the way things were being named that had more to do with the resident's reluctance to join than the content.²⁸ The opportunity was taken to change the class name from "literacy" to "reading". Once the groups were being streamed, they were not noted as higher or lower literacy but simply as "fast readers" and "slow readers". In this way indicating that the skills exist but that they exist at different speeds. This also allows for the facilitators to work with groups more in line with their own expertise.²⁹

Working with their existing expertise has also allowed the facilitators to build on their skills and start to expand their knowledge. As a direct consequence, numeracy in the form of mathematics and with the potential to include financial literacy have been added as areas of study.³⁰

Expansion of Program

While the expansion of the education programs within the center to include numeracy and to better reflect learner needs in terms of literacy support have been of benefit to the residents this was not the only expansion afforded by the introduction of the online server.

As initially noted, a total of 20 desktop computers were donated at the start of the trial. Due to the size of the learning area within the center only five are able to be in use at the center at any one time. Another point noted by the IP facilitators and members was the number of residents of the center who returned during the course of a year.

By putting all of these factors together, a new program has been introduced in Suva, run out of a former café. This program is aimed at preventative care for those at higher risk of entering the juvenile justice system as well as aftercare for those who have left the center but not yet entered either the workforce or reentered formal education.³¹

This program, which is officially opening in June of 2023 is aiming to have up to 20 participants in the initial stage. The program will work both with the former residents of the center, their families, and the wider community. While the main aim of the program is to keep the enrolled students engaged in learning the program also aims to reengage the students into their family and community.³²

CONCLUSION

While this partnership started with a simple task of setting up a trial for a single program it has expanded the learning and understanding of all the participants. The impact that this trial has had on the training package cannot be understated. Material has been included that would otherwise have not been considered and diverse methods of accessibility arranged. As for the offline platform itself, there have been adjustments made as well as new inclusions based on the needs identified by the facilitators and users at the center.

However, the most significant changes have been in the programs at the center and the expansion beyond the boundaries of the Juvenile Justice Center. The use of the offline platform has gone beyond what was initially envisioned by the facilitators. They have been able to include more individualized learning as well as expanding the types of content being covered. Moreover, the plans to include both families and the community into the aftercare program for the youth leaving the juvenile justice system in Fiji are taking the project into new territory.

By working together on one project, a new potential pathway for lifelong learning has emerged for a group of learners who may otherwise have not been able to reengage with education.

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FROM CONTEXT SPECIFICITY TO ARCHITECTURAL DESIGN IDENTITY DISCOVERY

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INTRODUCTION

The discussion about developing an Architectural Design, in university teaching context, involves a critical approach to the complexity of a specific reality and exploring architectural design transformation capacity. We are facing a long-term process usually initiated at the faculties of architecture and carried out during an architect's lifetime.

Developing an Architectural Design is an act of synthesis. It involves apprehending the context attributes and searching for a specific architectural identity. The project process manipulates a wide range of information and factors, some of which have objective characteristics that can be quantified objectively, while others are subjective objects of interpretation. We face an intertwined universe where places, author and user references, choices, and speculation interact. Project development involves the manipulation of countless variables, conflicts, and constraints. Some identified from the start, others discovered during the elaboration process. We are facing a universe of complexity, where it is necessary to make choices for the synthesis elaboration. Information selection and path choices are inherent to the process.

The paper presents a case study based on context and architectural program interaction. We propose to explore and apply the possibilities of combining the apprehension of contextual characteristics (physical, human, and cultural) and architectural program (space formalization of the program).

The presented reflection supports the development of finalist students' projects, year 5 of Integrated Master in Architecture and Urbanism, at ISCTE, Instituto Universitário de Lisboa. The paper introduces the concepts of Context and Architectural Program followed by the studio strategy presentation. Afterward, we go through the different intervention moments, followed by two of nine examples of design proposals by the students. To finish, the conclusions are presented.

We anticipate enhancing the students' cognitive capabilities to critically evaluate the contextual framework, historical perspectives, and past experiences. By broadening their cognitive capacity, we aim to facilitate the synthesis of knowledge, leading to the exploration of novel possibilities.

CONTEXT

In architectural design, the word context is associated with factors that frame the act of designing. The context evokes several attributes that architecture is confronted with. It defines constraints, boundaries, and limits but also opportunities. It can be seen from multiple points of view and in different circumstances, whether physical and spatial, historical, social, cultural, political, et cetera.

The physical and spatial components are involved with objective attributes that refer to the human activity marks in the natural or built territory. They reflect the long-term appropriation and use of spaces. It concerns the physical aspects of the environment that intervene in our daily lives. From a broader perspective, geographical location constitutes a determinant factor. Climatic conditions, environmental conditions, and proximity to materials and resources are determinant factors to be considered. Recently some associated phenomena have gained relevance. Climate changes, availability of energy, water resources, and proximity to applied building materials, are some of them.¹

The historical components allow an understanding of the processes of transformation, referring to the overlapping of different occupations and the transformation of territories. The territory and the city can be seen as a complex system, resulting in multiple layers of occupancy overlapping. Somehow the city shape carries the conscience and the memory of itself. For Aldo Rossi, the historical method is a tool that allows for assessing the validity of proposals for a city.²

Christian Norberg-Schulz introduced the concept of *Genius Loci*, a quite wide approach that embraces a phenomenological view. Along with the cultural components, the concept focuses on the qualitative aspects of a specific place. The cultural perspective of a place goes beyond measurable aspects, it enquires about its essence and its meaning, related to the people who inhabit and use the space. It proposes to quest for the “spirit of the place”.³ This approach has been widely explored in different cultures and has a particular influence on the panorama of Portuguese architecture. The architecture and written reflections of Fernando Távora⁴ and Alvaro Siza⁵ are some of the examples that can be pointed out.

In contrast to relational places, defined by the articulation of physical elements and a strong connection between identity and history, there are non-places. They are non-relational entities. Both places and non-places are in permanent transformation and are rarely complete. They are like palimpsests where changes in relationships and identity are constantly being rewritten.⁶

ARCHITECTURAL PROGRAM

It is relevant to establish the difference between the current reading of the program, understood as the listing of requirements and compartments with a predominantly economic and functional character, and the architectural program, which defines the beginning of the creative process and the formation of architectural spatiality form. It is also important to mention that the terms architectural program derives from the written work of José Villagrán García.⁷

To approach the architectural program involves dealing with one of the columns of architecture fundamentals. Commonly it is associated with function and use of spaces, although we consider architectural program from a wider perspective.⁸ It is considered the relationship between the architectural form and space. This means that the architectural program (Figure 1) is understood as the program transformed into an architectural space entity and form. It contains cultural, functional, and social attributes that articulate multiple factors that intervene in architectural design. This transformation is developed throughout the architectural design.

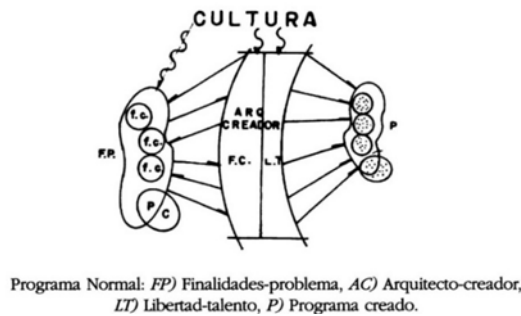


Figure 1. (Legend translation) Program structure Regular Program. FP) Problem-purpose, AC) Creator-architect, LT) Freedom talent, P) Created program⁹

The process takes place within a specific temporal, spatial (geographical), and cultural context. The main agent of this transformation process is the architect, the author of the project. This relationship, which is established between the geographical location (space) and a given historical time, establishes the principles of chronotopic law. Each architectural program is unique, characterized by a specific location, a historical time, and an author.¹⁰

Assuming the nonexistence of a direct relationship between the program and its formal implementation (architectural program), other contemporary perspectives are relevant to enframe the theme. Rem Koolhaas defends that during project design the relation between the program and the form is subject to manipulation. The architect can redefine the initial assumptions of the program, adding political or cultural components. On the other hand, he highlights the expressive potential of the programmatic contents and the instability and inconsistency of this relationship. As for genealogy, the program is articulated with the idea of organizing urban structures. Referring to his journey through the disciplinary universe, more specifically "Delirious New York",¹¹ points out that the architecture and structure of New York City are themselves a program of a cosmopolitan culture.¹²

From another perspective, Bernard Tshumi considers that the program received by the architect at the beginning of the project is not a neutral element. Its transformation into a formal and spatial structure (architectural program) involves the redefinition of its principles and priorities, according to the strategy defined for the project. Assuming the program as the origin of the project it is possible to define two moments in its approach and transformation. The first is involved in apprehending the information contained in the program and defining the intentions of its organization. The second moment explores the different possibilities of concretion of space/form relations. As a support tool, it is proposed the use of diagrams highlighting the elected concepts and objectives for the transformation of the program. In the development of this process, the physical context (place) assumes particular importance in the insertion of the project in a specific situation. This contextualization operation defines relevant limits and constraints in the construction of the architectural program.¹³

In the cases of Rem Koolhaas and Bernard Tshumi conceptual, cultural, and political programatic issues are to be included in the formulation of architectural design. Another important topic added to the debate focus on the physical, economic, and programatic characteristics of urban structures.

STUDIO, TERRAIN OF EXPERIMENTATION

The Studio teaching approach is based on the notion that "... the only learning which significantly influences behavior is self-discovered, self-appropriated learning."¹⁴ The mere acquisition of information does not produce significant fruitful knowledge. We can provide the best conditions, create opportunities, inspire, and encourage, but teaching is centered on learner self-discovery. Learning ultimately belongs to the student.

To avoid the rigidity of processes, maladjustment concerning student specificities and the expectancy that following a certain sequence of procedures will lead to a good result a specific methodology is not followed. Instead, various procedures are used aiming to find adjusted options to the student specificities. The approach is sensitive to student particularities, which must fit into the working group dynamics. However, it is possible to frame our approach in the universe of experiential learning and current education research on Constructivism. As for experiential learning¹⁵ research, thinking, doing, and reflecting are strongly connected through a non-linear or sequential procedure. This network of possibilities can improve the interaction between theory and knowledge acquired from working in real situations. Based on the experiment and in testing different design hypotheses, by trial and error, it is possible to identify what needs to be improved or modified to obtain a better result. Constructivist pedagogy is an active and collaborative process, "... it emphasizes what students have to do to construct knowledge."¹⁶ It is focused on the effectiveness of relevant and meaningful knowledge for the students and their capacity to produce and assemble knowledge. Being a student-centered process enables the capacity for the discovery of design possibilities and personal paths. Student characteristics and level of knowledge can expand through an intense interaction overlapping design and personality discovery. Teacher and student establish a reciprocal action in the discovery of a cultural, ethical, and personal positioning in architectural design contemporaneity and its insertion in the world context. Conceptual and abstract research plays an important role in the development of student skills.

TERRITORY CITY, TERRITORY PLACE

Caldas da Rainha is the name of the city proposed for the ongoing year 5 project studio. The architectural design exercise focuses on approaching the dynamics of relationships that are established between the existing, the proposed buildings, and the territory (Figure 2). Particular attention is given to public space relations. The projects are developed in a close relationship with the City Hall and Associação Destino Caldas, a very dynamic cultural agent in the city and region. Other actors - cultural agents, entrepreneurs, associations, real estate agents, and citizens in general - will be called upon to participate in debates, mid-term critiques, and project exhibitions.



Figure 2. Urban voids and project opportunities.

It is up to the students to develop the reading and interpretation of the existing territory and consequent selection of the specific place, theme, and program to be developed (Figure 3). Areas with greater potential for regeneration should be privileged: building refurbishment, public space, green areas, construction of new equipment and rehabilitation of the “natural” marks, etc.

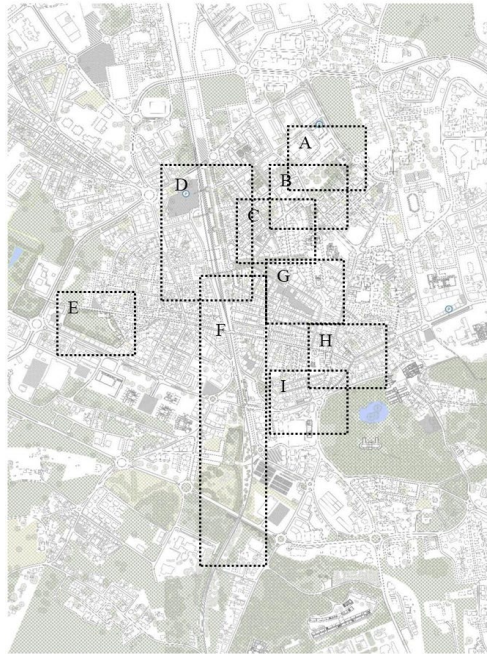


Figure 3. Proposals, general plan.

The proposals are engaged, among others, to promote:

- Critical reflection on the disciplinary field of architecture and its capacity for political action.
- An open city for free citizen.
- Local and global identity.
- The integrity of a sustainable environment.
- Programs and spaces that prove to be relevant and regenerative of the local context.

Context apprehension

The mapping of the city's territory was carried out using bibliographical research, information gathering, and a series of visits to the site. During an intense three-day stay in the city, different routes were covered and graphic records, photographs, and videos were collected. Students and teachers inhabit and felt the city "spirit" in the different living cycles of the day. On the last day, a session to present and comment on the results was open to partners and locals.

This phase focuses on addressing issues of context and mapping the city. Mapping Caldas da Rainha is understood beyond quantitative data, it seeks to frame the qualitative issues. Based on context apprehension, it is proposed to investigate the first fundamentals of the project. This is a very active phase, seen as a project in action. Imprecise intuitive proposals are developed allowing the discovery of potential ideas connected to the architecture world. The outputs can represent an important database to supply and inform further inflections on design ideas development. It also allows overcoming the "... fear of white paper"¹⁷ a paralyzing commonplace in the creative process.

The territory experience and apprehension intertwine with moments of project synthesis and “reflection in action”.¹⁸

Test, attune, experiment

Design development involves complexity. It deals with large amounts of information,¹⁹ so it is necessary to filter, select and reconcile, according to the principles defined for the project. The assembly of information and its organization can be a misty moment, which will gradually lead to a better adjustment to the project hypotheses. Through critical reformulation, the project's data gets closer to the formulated hypotheses. This is not a direct correspondence operation between data and the project, but rather the construction of a new architectural identity.²⁰ This construction is frequently involved in troublesome divergent situations, to be solved through data, constraints, and contradictions conciliation.

In developing the project's identity, the overlapping relationships that are established with the context are relevant. Architectural intervention can choose to respond, oppose, or be absorbed by the context.²¹ To be more specific, we will address the relationships established with the place. If we consider what Christian Norberg-Schulz claims “The existential purpose of building (architecture) is therefore to make a site become a place, that is, to uncover the meanings potentially present in the given environment.”²² The notion of place appears associated with the people who inhabit it, how they use it, what activities they develop there and the poetic and symbolic values assigned. The spirit of the place is understood by its unique character with a specific location and atmosphere.²³ These particularities are considered materials that feed the project design.

The definition of a new architectural identity relates to the concept of historical and cultural continuity. Continuity in the sense that place and dweller establish an intense interaction relationship.²⁴ Through a phenomenon of osmosis place and dweller become a new identity.

Darning the city – Proposal A (Maria Inês Vieira)

A large void in an expanding area of the city sets up the opportunity to complete the urban fabric and create green spaces for public and private use. It is also proposed a set of buildings that intend to filter and complete the built masses and the outer spaces (Figures 6, 7 - intermediate phase).



Figure 4. General intervention plan (Maria Inês Vieira).



Figure 5. Model of the proposed project. (Maria Inês Vieira).

Along the line – Proposal F (Sofia Ferrinho)

Along the line develops a pedestrian and bicycle connection between the city center and the School of Art and Design located in a pine forest to the south. In addition to the north-south connections, along the route, there are new opportunities for crossing the railway line, as well as new equipment, public spaces, and uses (Figures 4, 5 - intermediate phase).

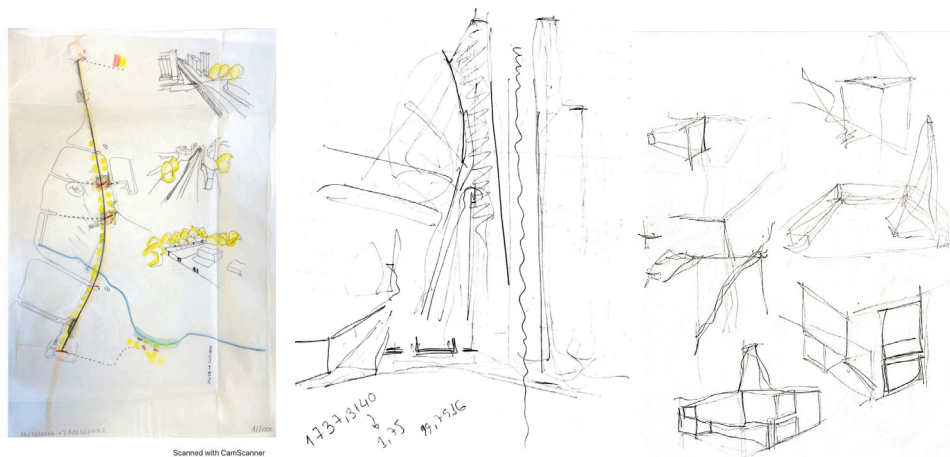


Figure 6. Study and development sketches (Sofia Ferrinho).



Figure 7. General intervention plan (Sofia Ferrinho).

Next steps

The final project work is transdisciplinary. The cross-links between theory and the project are decisive in its development and foundation. The elaboration of the project is articulated with a research process in the areas and themes that are related to the project decisions.

The project's drawn pieces will be accompanied by a reflection text and a reference map, which addresses the themes and options of the project. Composed of text and images, this text reflects the theme, the site, the process used, the strategy followed, and the final result. The reflection will include a selection of the most relevant phases of the project's evolution process.

CONCLUSION

Combining the apprehension of contextual characteristics and architectural program can constitute a relevant design activator. It implies a reflexive interaction of decisions regarding the context and the architectural program materialization in the project synthesis. It implies choices and decisions, which may be contradictory to each other.

Controlled simultaneity and multiple design possibilities conciliation enable uncovering the meanings potentially present in a specific architectural design. According to our experience, handling these two components simultaneously will reinforce a greater understanding of the problems and improve awareness of the options and decisions to be taken. Consequently, we believe that it can be a possible path for a critical reflective framing of the personal and creative identity of future architects.

However, it is a process that needs time for its implementation and application. It also needs particular attention in the implementation of self-criticism, which must be implacable, although seeking a balance in the articulation between action and critical reflection.

We hope to expand the student's skills to interrogate the context, history, and memories; to expand their capacity to integrate what exists in discovering new design possibilities. By finding new architectonic identities, and creating unique and meaningful architectural designs, it is expected that the students will discover their paths, who they are, and how they design their architecture. This way, we hope to be able to enlarge the range of self-reflective practice.

NOTES

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- ⁴Fernando Távora. *Da Organização Do Espaço*. (Porto: FAUP Publicações, 1999 [1962]).
- ⁵Álvaro Siza. *Imaginar a Evidência*. (Lisboa: Edições 70, 2006).
- ⁶Marc Augé. *Non-Places: Introduction to an Anthropology of Supermodernity*. (London, New York, NY: Verso, 1995), 77, 79.
- ⁷José Villagrán García. *Teoría de la arquitectura*. (México D.F.: El Colegio Nacional, 2007)
- ⁸Pedro Mendes. "O programa arquitectónico no projecto de arquitectura: referências ao contexto português, a partir de seis obras de três autores - Fernando Távora, Álvaro Siza e Eduardo Souto de Moura". (Universidade Lusíada de Lisboa, 2012).
- ⁹Villagrán García, 287.
- ¹⁰Villagrán García. *Teoría de la arquitectura*.
- ¹¹Rem Koolhaas. *Delirious New York: A Retroactive Manifesto for Manhattan*. (New York: The Monacelli Press, 1994).
- ¹²Ana Miljackl, Amanda R. Lawrence and Ashley Schafer. *2 architects, 10 questions on program Rem Koolhaas and Bernard Tschumi*. *Praxis: Journal of Writing + Building*: Boston. n.º 8 (2006), 6-15.
- ¹³Ana Miljackl, Amanda R. Lawrence and Ashley Schafer. 6-15.
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- ¹⁵Ipo Koskinen, et al. *Design Research through Practice: From the Lab, Field, and Showroom*. (Burlington, Massachusetts, USA: Morgan Kaufman, 2011).
- ¹⁶John Biggs and Catherine Tang. *Teaching for Quality Learning at University*. (Maidenhead, UK: Open University Press, McGraw Hill, 2011), 14.
- ¹⁷Manuel Tainha. *Arquitetura em Questão: Reflexões de um Prático*. (Lisboa: AEFA - UTL, 1994) 67
- ¹⁸Donald A. Schon. *Educating the Reflective Practitioner*. (San Francisco, CA: Jossey-Bass, 1987), 26.
- ¹⁹Donald A. Schon. *The Reflexive Practitioner. How Professionals Think in Practice*. (USA: Basic Books, 1984), 130.
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- ²²Norberg-Schulz. *Genius Loci*, 18.
- ²³Peter Zumthor. *Atmospheres: Architectural Environments; Surrounding Objects*. (Basel: Birkhäuser, 2006).
- ²⁴Juhani Pallasmaa. *Diseminaciones, semillas para el pensamiento arquitectónico*. (Barcelona: Gustavo Gili, 2022), 207.

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EDUCATING THE ‘CLIMATE CHANGE ARCHITECT’: AN APPLICATION OF COMPLEXITY THINKING TO ARCHITECTURAL DESIGN

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INTRODUCTION

In a famous article published in 2021 in the *The New Yorker*, Elizabeth Kolbert described climate change as ‘a vast experiment’.¹ Her essay proceeded to illustrate the nature, challenges, and openings that such experiment would engender by alphabetically listing the transformations, limitations, rhetorical arguments, projects, ideas that could furnish the culture of climate change. The list, the format utilised for the essay, is a compelling rhetorical device to begin to unravel what is at stake in climate change (from hereon in more aptly described as the climate crisis or emergency). Hierarchically flat, ranking items irrespectively of disciplinary boundaries, potentially infinite,² lists are also useful devices to foreground how design education, and architectural one, in particular, could respond to the challenges that the climate crisis presents. In fact, as Margaret Atwood also suggested, it is not just the climate that is changing (this is hardly something new, as climate has always been changing) but also everything else too; that is, the climatic mutations that we are witnessing shatter well established assumptions and call for a much more radical reconsideration of our ways of living, cultural values, and aesthetic canons.³ As ecological systems are characterised by deep entanglement between their parts and are subjected to different speeds of transformation, received notions of time, scale or binaries such as artificial vs. natural and scientific vs. humanistic all appear outdated to describe the climate crisis and grasp its challenges. For architecture, the task ahead is therefore not merely a technical one. Although energy-efficient buildings and resilient infrastructures will be necessary components of our cities, these technical implementations also appear superficial in regards to the magnitude of the challenges and transformations we will witness. The picture forming before our eyes though remain an uncertain one as the actual nature and extent of what changes await us remain much more unclear.

It is this very cultural milieu that animates the pedagogy and research of the Bachelor in Science in Architecture and Environmental Design (BSc AED) at the University of Westminster, London, UK.⁴ Inspired by Kolbert’s list, the discussion on the pedagogical methods and ambitions of the BSc AED will be broken down into short paragraphs that will map larger, conceptual issues that form the cultural landscape of the climate crisis onto the different components and exercises the students undertake as part of the program. The relatively short life of the program is such that the discussion is both an account of the work developed and a charter for future developments. The critical description of the pedagogical methods employed will be accompanied by examples of students’ work that have been produced over the last two academic years.

COMPLEXITY

The cultural, pragmatic, and technical implications of the climate emergency on education are profound and complex. In general terms, the climate emergency has been eroding previous certainties, be it the mode of inhabiting and constructing cities, to the very distinction between disciplinary domains. The humanities and sciences are often both called upon to renew their alliance to provide multiple, interwoven, and complex approaches to conjure up what architecture might look like in the response to the climate emergency. The reasons behind calling for radical repositioning of disciplines and knowledge have to do with the size of the task ahead: the relation between humans and non-humans mediated by the vast range of artifacts they produced must confront the decline of extractive economies and modes of productions resting on such economies. This model that has been the bedrock of Western societies for centuries has produced its own specific forms of urbanism and architecture as well as of knowledge and disciplinary boundaries.

In the BSc AED these issues form the basis for the main question we address: What does it mean to educate the climate change (CC) architect? With no clear precedents for what a CC architect should be, the question of what knowledge must be acquired becomes both an open and crucial issue. If, on the one hand, the problem is clear and precise, on the other, the answers are much more difficult to map with certainty. Notions such as that of complexity are therefore mobilised to navigate a fundamentally uncertain and intricate future landscape.⁵ More precisely, we identified a series of themes and questions that should guide the search and eventually define the figure of the CC architect. These themes relate to:

- the removal of previous boundaries between disciplines;
- the overlap between scientific and humanistic knowledge;
- the exploration of both practical and theoretical instruments to extend the domains of investigation,
- decentre the role of humans in constructing spaces to ultimately rethink what design will mean in a climate crisis.

Digital tools are perhaps the key instruments to manage complexity and expand the purview of designers: from extending the domain of what can be mapped beyond what can be directly experienced, to couple quantitative and qualitative elements, and facilitate a systematic approach to design.⁶ All three elements mentioned (relation between visible and invisible, evidence and intuition, and integrated approach) map well onto the challenges that the climate crisis is presenting us with: to refine boundaries, to include a variety of actors in shaping spaces, and to focus on their dynamic interdependencies.

The work of Suha Faisal Valiyaveettil's (2021/22) represents one of the most successful projects to date in constructing a rich and complex narrative in which environmental, cultural, social aspects co-existed. Her proposal for a zero-energy mosque linked up environmental simulations, social inequalities with the idea of designing cultural institutions for the climate emergency. (Figure 1)

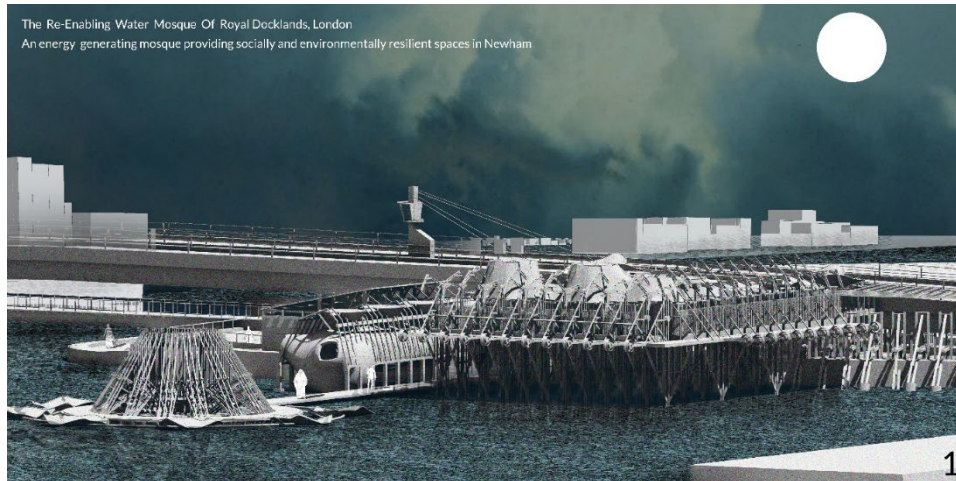


Figure 1. Aerial view of the Re-Enabling Water Mosque of Royal Docklands by Suha Faisal Valiyaveetil.

Time

One of the first received notions the climate crisis dislodges is that of time. As the Anthropocene shows that the natural and the artificial are not separate but rather entangled and co-producing each other, the natural world ceases to be a static, immutable backdrop on which human actions take place. It is along these lines that scientists can speak of ‘young’ mountain ranges or utilise geological vocabulary to discuss the impact of plastics in our environment. Consequently, design also needs to be conceived as a dynamic object that affects and is be affected by a variety of factors unfolding in time. In the BSc AED the relationship between time and design is two-fold. First, students design for a future climatic scenario that will be not only radically different from the present, but also worse off and with potential catastrophic consequences. This is radically different from the perception of the traditional architect who projects the present conditions into an unchanged future. Secondly, future climatic scenarios are based on probabilistic models: that is, models that predict a range of outcomes rather than a single one. From the point of view of design, this implies being able to accommodate and transform one’s design to a variety of scenarios, make propositions that are versatile and open to unpredictable conditions.

In order to familiarise students with this way of operating, we set exercise where they are asked to analyse future climatic scenarios and design for the worst climatic future scenario. Using a piece of software called Meteonorm™, students are asked to base their designs on the IPCC projections for climatic data in 2080 (Figure 2). Students are then asked to understand how the climate of London 2080 compares to the current one. That gives them a tangible understanding of the implications that the future climate and weather behaviour will have on the London site they are design for. Students are taught to deal with uncertain and probable scenarios rather than a fixed and static condition. Having to focus on the dynamic, changing aspects of design implies a greater emphasis on strategies rather than on formal composition. The buildings are design to become performing machine that reacts to the impact of climate change. They become the protectors of users and healer of their surroundings.

Meteororm Data Weather Analysis

Current (2020) and Future (2080) weather projections for London concerning Cumulative Rainfall, Dry Bulb Temperature, and Humidity. Consequences and Outcomes



Figure 2. Different diagrams showing the results of environmental simulations

INTERDISCIPLINARY KNOWLEDGE

As mentioned, a significant part of the challenge of educating the CC architect consists of the ability to move between disciplines. Though this is very much an ongoing process (as the Programme has only recently been concentrating on the Climate emergency) which require mobilising different forms of knowledge.

In the Cultural Context seminars students familiarise themselves with the theoretical and terminological concepts related to the climate emergency. Through a critique of the notion of sustainability and its long, only partially effective, legacy, students begin to map the complex and entangled relations between the climate crises and our cities. Notions such as circular economy, care, data and simulations, and cosmo-political design are analysed through readings and discussions whose outcomes help students to identify a specific interest within a complex and broad theoretical offer and develop the conceptual aspect of the climate emergency. During the research for their dissertations, they are also encouraged to project the topic of their research onto design to challenge how notions of program, scale, time, material, agency (human and non-human) need to be reevaluated in order to fully grasp the implication of the climate emergency.

The results of these researches are rich and varied. Mette Pedersen (2022/23) looked at history of the relation between climate and cultural practices by charting the relation between Sami, a Scandinavian population, and their territory. The research explored the range of practices and artifacts Sami developed to establish a relation between the different actors (human and non) animating their environment. Muhammad Uddin (2022/23) critically survey the different approaches to flood defence infrastructural strategies in Bangladesh. He compared the 'hard' approach taken by the government to build large concrete embankments along major rivers to mangrove plantations along the Gulf of Bengali, a much softer, reversible approach to the same issue. (Figure 3)



Figure 3. Samples of Cultural Context dissertations from Metter Pedersen and Muhammad Uddin

As part of a pedagogical method that seeks integration and overcoming of previous distinctions between fields, issues raised in the theoretical seminars are transferred across modules and re-evaluated from a different perspective. This is the case of the digital seminars in which students learn key software packages to map and simulate environmental factors. Here, digital tools provide insights on dynamic aspects of cities crossing different scales. For instance, Esma Sharif (2022/23) utilised the readings provided in seminars to develop an interest in air pollution and its impact people's health. Through the environment she could discuss a variety of concerns that are traditionally sociological in nature such as poverty and racial discrimination. In the digital workshops different pieces of software were introduced to visualise air pollution as well as to overlay diverse data ranging from social, environmental, and morphological aspects of the areas studied. Digital tools are essential tools to enable students to have tools that span across scales and allow different human and non-human actors to be portrayed together. (Figure 4)

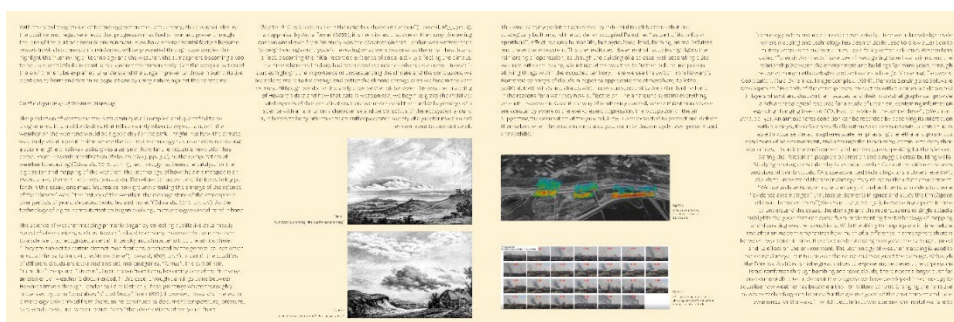


Figure 4. Samples of Cultural Context dissertations from Esma Sharif

KNOWLEDGE EXCHANGE

To facilitate interdisciplinary knowledge, two aspects of the program need foregrounding. First, the staff's educational background must be diverse and cover a variety of fields spanning from the scientific to humanistic. Secondly, students need to be exposed and engage in inter-disciplinary

workshops to understand the different languages developed to talk about the climate emergency and the different models for tackling environmental challenges. For this reason the staff teaching in the Program includes: environmental scientists, architects, environmental consultants, theoreticians, digital specialists, material scientists, and practitioners.

One particular example of this approach is the Co-Production interdisciplinary workshop organised by medicine students from Imperial College in London. The workshop brings together different expertise to imagine how environmental and organisational challenges may affect the notion of care and what existing or new spaces should be imagined. Some of the most interesting collaborations emerged from the workshop concentrated on the effect of the climate crisis on mental health and how public or medical spaces should be redesigned accordingly. (Figure 5)



Figure 5. Co-Production workshop organised between the University of Westminster and Imperial College in London

EVIDENCE BASED DESIGN

Philosopher Timothy Morton speaks of the climate crisis as the primary example of hyperobjects.⁷ Hyperobjects are peculiar: they are here and perceivable, albeit what we can experience is always only a part of them. Their vast distributed spatial and temporal nature is such that they can never be observed from without, as totalities. The climate crisis fits well this definition which we appropriate and instrumentalise to introduce students to the notion of evidence based design. Environmental conditions can be sensed directly (as students do during site visits) or indirectly (by consulting vast databases on weather recordings), however these readings are necessarily always limited, not only because of technological and human limitations, but also, more profoundly, by the fact that *this* climate will change and will do so in ways that we can only probabilistically predict.

If direct recordings capture the part of the hyperobject-climate we can grasp, digital tools are essential to engage with the aspect that elude us. Through digital simulations, students play out scenarios through which they can instrumentalise time as one of the vectors for design. Direct measurements

can not only be utilised to map present conditions, but also to form the initial seed from which digital simulations will play out different scenarios. Moreover, the iterative, experimental possibilities offered by digital tools change the nature of the design process. First, computational tools allow students to consider a variety of parameters simultaneously, therefore visualising both their individual and combine effect. Secondly, the design process can proceed through feedback loops in which formal, material, programmatic aspects of a design proposal emerge and get refined.⁸ As students progress through their design process, more parameters are taken into considerations. Ranging from the material performance of the building to the programmatic mix proposed. However, not all parameters can be effectively computed, and student are encouraged to make use of the other forms of inquiry and representation to straddle between the complex and competing demands a design proposal must address.

In 2nd year this approach unfolds through a series of design exercises that bridge several scales. The final brief retro-fits an existing tower. In Edoardo Ripamonti's (2021/22) project for a residential tower, environmental simulations were extensively utilised to organise the voids in the structure as well as the material and programmatic distribution of the different activities housed in the tower. The final configuration results from coupling the cumulative morphological transformations based on the evidence gathered or simulated and the ambition to create social mix and interaction even in tall buildings. (Figure 6 and 7). In the work of Evita Ratniece (2021/22), such approach helped defining the different features of a large wooden roof structure for a kindergarten for the local community. The morphology, siting, perforation patterns of the proposed roof were all guided by digital simulations. (Figure 8)

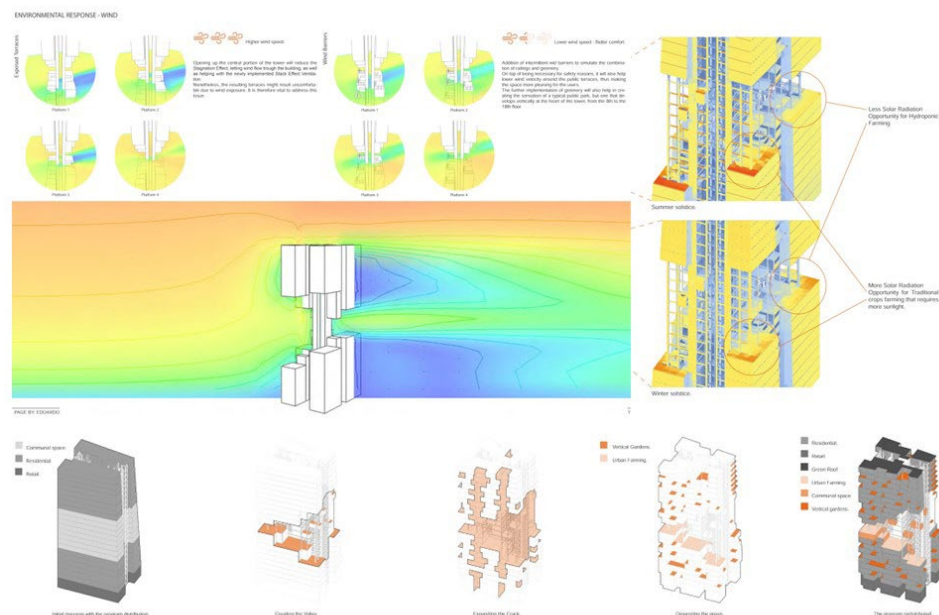


Figure 6. Proposal for a near zero-energy tower in London by Edoardo Ripamonti



Figure 7. Proposal for a near zero-energy tower in London by Edoardo Ripamonti

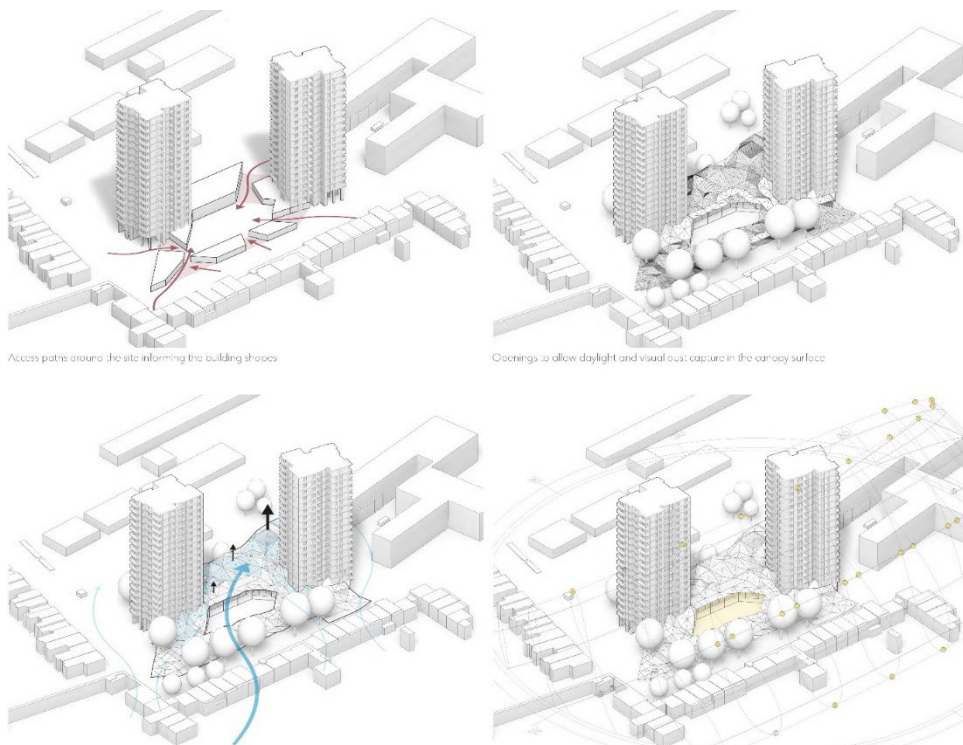


Figure 8. Proposal for a kindergarten as a shield against air pollution by Evita Ratniece

INTEGRATION BETWEEN TECHNICAL AND DESIGN

The end of the separation between the natural and artificial also weakens the distinctions between disciplines. The ‘technical’ and the ‘creative’ aspects of the design process are no longer separate or sequentially organised. Architectural proposals are considered in all their components: site, form,

material, program, etc. form a continuous in which each element is affecting and being affected by all the others. There must be an interaction and balance between the two. It follows that the technical performance must be charged with architectural, material, and social intentions. Issues of representation emerge from the conflation of technical, formal, and social aspects of proposals. This area of research is still in its early days and yet represents one of the most interesting aspects the Program tasks to study. What would the aesthetics of the climate emergency be like? What media could be mobilise and towards what effect?

One of the most effective bridges between the more scientific and creative aspects of design is represented by the use of data. Engaging sites through data offer a broader, non-human entry point on the impact of the climate emergency and environmental issues on territories. At the same time, data also allows students to remap social and political conditions and related them to environmental factors. The exercise that perhaps best describes these efforts is the ‘panorama of concerns’. Inspired by the work of Bruno Latour⁹, the exercises consists in producing one visual document, most often a drawing, that declares the range of concerns and agents involved in the project and their relation. Produced rather early in the design process, students are free to make use of any media they deem appropriate in order to chart out the range of issues their research will engage with. The ‘drawing’ is an exercise that aims at mapping the complex ecology surrounding architecture in the Climate Crisis, acknowledge the different scales, temporalities and agencies that all human and non-human actors will play in their project. In Suha Faisal Valiyaveettil’s case the panorama took the shape of an axonometric showing the relationship between flooding, local communities, and the production of jute (a local material in the area Suha studied).

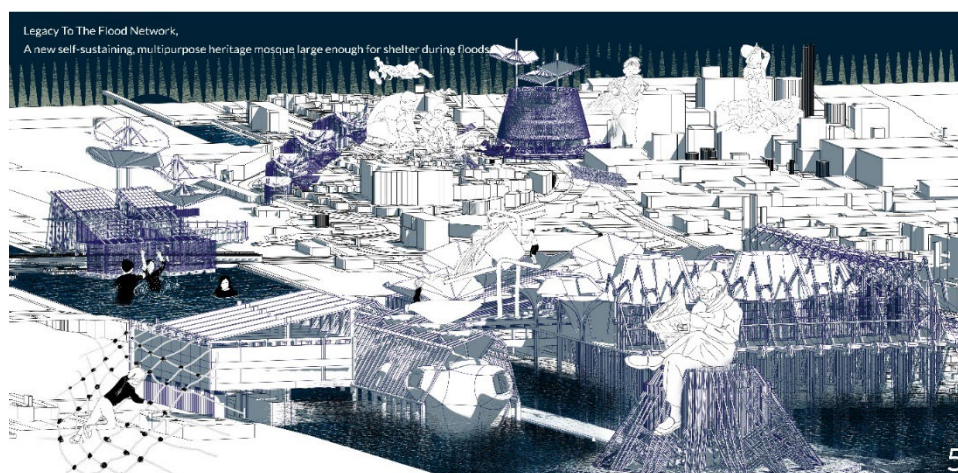


Figure 9.

CONCLUSION

As the BSc AED program continues to develop to concentrate on the challenges presented by the climate emergency some important points have been emerging. As Kolbert reminded us, the vast experiment that the climate crisis is requires an agile, multi-layered approach straddling scales, temporalities, and disciplines. Despite being energy hungry, digital tools are part and parcel of this challenge: through data we can access environmental phenomena that exceed our sensorial spectrum as well as map complex and time-based phenomena.

Some other issues remain more undefined and open to further research. What impact the climate crisis will have on the toolsets that architects will use has only been partially scrutinised. What kind of media and documents can be capture the complex, entangled culture of the climate crisis? What range

of interventions climate change architects should propose? All the questions will animate the future of the vast experiment of the BSc AED at University of Westminster.

NOTES

¹ Elizabeth Kolbert, "A Vast Experiment: Climate Change from A to Z", The New Yorker, November 21, 2021, <https://www.newyorker.com/magazine/2022/11/28/climate-change-from-a-to-z>.

² Umberto Eco, *The Infinity of Lists*. London: MacLehose, 2009.

³ Margaret Atwood, "It's Everything Change". Medium. 2016, <https://medium.com/matter/it-s-not-climate-change-it-s-everything-change-8fd9aa671804>.

⁴ The BSc AED engages climate change and design practice with an emphasis on physical ecologies of building, numeracy and computation, as well as the wider principles of social sustainability. Over three years, BSc AED students are equipped with knowledge and skills in predicting and assessing building performance from both qualitative and quantitative perspectives, learning both the poetic and scientific aspects of the design process.

In the first year, BSc AED students share the design studios with the BArch programme to acquire basic architectural design knowledge, observational and drawing skills through design projects and study trips. An evidence-informed design approach is introduced through lectures, hands-on workshops, group seminars, and individual study sessions.

In second year, through four design briefs, second year BSc AED students explore the urban dimension by investigating social, economic, and building related environmental and energy issues. The four briefs are written in collaboration with Technical Studies to ensure that students acquire an understanding of digital environmental simulations at different scales and learn to develop environmental design strategies based on an evidence-based approach to design.

The third year is structured around the Final Thesis Project; a research by design studio investigating innovative forms of performative architecture, negotiating social and environmental dynamics. Three separate modules allow students to enrich their projects by studying the relation between the geometry, the material system, and the performances of their architectural proposals. See: <https://www.westminster.ac.uk/architecture-interiors-and-urban-design-courses/2023-24/september/full-time/architecture-and-environmental-design-bsc-honours>.

⁵ Edgar Morin, "From the Concept of the System to the Paradigm of Complexity". In *Journal of Social and Evolutionary Systems*, 1992, Vol.15(4), pp.371-385.

⁶ Roberto Bottazzi. *Digital Architecture Beyond Computers: fragments of a cultural history of computational design*. (London; New York: Bloomsbury Visual Arts, 2018).

⁷ Timothy Morton, *Hyperobjects: philosophy and ecology after the end of the world*. Minneapolis: University of Minnesota, 2013.

⁸ Bradley Cantrell, Justine Holzman, eds. *Responsive Landscapes: Strategies for Responsive Technologies in Landscape* (London: Taylor and Francis, 2015). Roberto Bottazzi, "On Computer Simulations in the Age of Hyperobjects". In *Architecture, Energy, Matter: DS18 2013-2015*, edited by Lindsay Bremner and Roberto Bottazzi (London: University of Westminster, 2016), 16-21.

⁹ Bruno Latour, "Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concerns" *Critical Inquiry*, Vol. 30, No. 2 (Winter 2004), pp. 225-24.

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ARCHITECTURAL LIVE PROJECTS IN AUSTRALIA: A CONTEXTUAL REVIEW

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INTRODUCTION

Live Projects (LP) is an instructional approach that enables students to engage with real-world challenges and contexts through hands-on project experience.¹ LP typically includes participatory, collaborative, interdisciplinary, and professional learning aspects and education on construction methods. This type of project-based learning is practised in a wide variety of higher education disciplines, including business,² education,³ environmental science,⁴ and creative industries.⁵ The ubiquity of this approach demonstrates the universal benefits for students across disciplines.

In architecture, LPs are also known as ‘design-build’, ‘community design’ or ‘service learning’ projects. These terms are often contingent on the geographic region, output and motive of the project educator.⁶ Anderson and Priest note that LP are “also a pedagogic means to extend the institutional confines of the design studio”.⁷ Unlike a conventional design studio, LPs typically entail an ongoing process of negotiating with the client on factors such as project scope, timeline, financial resources, and expected deliverables.⁸ This dynamic engenders a heightened level of engagement between the design team and the client, often resulting in a more profound connection to both the client and the project itself.⁹

Whilst there is strong evidence of their use in the post-World War II period,¹⁰ architectural LP were seldom discussed in architectural scholarship until the early 2000s. By contrast, the last twenty years have seen a growth in both the volume of scholarship and the complexity of the issues being discussed.¹¹ This trend highlights the steady interest in this specific teaching pedagogy and its contemporaneity. However, another gap evidenced in a previous study¹² is the lack of educators’ perspectives regarding LP.

Accordingly, this paper aims to explore the characteristics of Australian LP as a teaching model and lessons drawn from an educator's perspective. This paper investigates LPs as a form of social and contextual learning, a community of practice, co-constructed knowledge, and professional identity. After the methodology section that explains our approach and its limitations, the second section presents the results, which are then discussed.

METHODOLOGY

This research uses a questionnaire with open-ended, quantitative and closed-ended questions. It was designed to collect information regarding the extent, type and perspective of LPs educators in Australia. The questionnaire was broken up into two sections. The first section questions the types of

LPs practiced, including group size, student experience level, operational parameters, collaboration, funding, client types, duration, intensity, outputs, assessments and learning outcomes. The second section sought LP educators' perspectives, including their motives, experience, engagement in scholarship, challenges and prospects.

The sampling strategy for this study consisted of higher education institutions offering accredited architecture programs in Australia.¹³ All twenty-two architecture schools were selected, with an estimated combined full-time workforce of 348 academics.¹⁴ Following a snowball process, the questionnaires were distributed to the institutions' Heads of School via email. A reminder email was sent one month later, and a second reminder was sent two weeks after the second email. Staff were given a two-month period to complete and return the questionnaire. To ensure known LP educators were not missed, questionnaires were sent to educators with a known interest or history of LP participation. A total of eleven questionnaires were returned, giving a response rate of 3%.

One obvious limitation of this method is the low response rate. As the total number of LPs being run in Australia is unknown, the response rate may reflect the limited number of existing LPs. However, this number may still be missing a portion of LP activity; thus, it limits inferences drawn from the findings. Another limitation may be response bias, defined by Paulhus as "...a systematic tendency to respond to a range of questionnaire items on some basis other than the specific item content".¹⁵ Since the respondents are being asked to self-report to fellow academics, this method is particularly open to the possibility of *Social Desirable Responding* bias.¹⁶

Situated Learning Theory

In developing both the questionnaire and its analysis, the researchers used Lave and Wenger¹⁷ *Situated Learning* framework. This theory emphasises the importance of learning within the context in which it will be used.¹⁸ Therefore, learning is not just the acquisition of information but a process of becoming a member of a community of practice - through active participation in the context in which the knowledge and skills will be used. Learning is said to be situated in the social and cultural norms of that community. As well as the physical environment, authentic activities - that are relevant to the learner's experience and goals provide a more effective learning experience.¹⁹ Much like LP learning, this theory also highlights the importance of collaboration with others and real-world experiences as a key element of the learning process.

RESULTS

The results were categorised into six sections: LP Characteristics, Context, Active participation, Authentic activities, Collaboration and Professional Identity.

Live Project Characteristics

The result indicated many notable commonalities, including group sizes, participant experience level, duration, output, budget and client type. For example, 73% of LPs included a group size between 1-30 students (with 45% reporting a group size of 11-20 students). Regarding students' program level, 63% were either in their last year of undergraduate study (3rd year) or masters students (4th or 5th year) of study. By contrast, only one academic said they taught LPs to 1st-year students. 70% of LPs had a budget between \$0 - 50,000AUD (25% of which fell in the \$15,000 - 50,000AUD bracket). Only 13% of projects had a budget higher than \$50,000AUD. Finally, LPs also tended to operate within an existing curricula framework (76%), with three respondents noting the project was run as voluntary courses (both paid and unpaid).

These commonalities may indicate the natural boundaries of this mode of teaching. Whilst there are notable exceptions, LPs tend to operate within institutional frameworks and with small groups of ‘experienced’ students. Rather than educator preference, these boundaries may result from relatively complex projects and the presence of real clients/communities.

However, LP characteristics also show considerable operational flexibility. For example, LPs could run for several weeks (28%) to multiple years (8%), with the majority (36%) running for a semester/trimester. In terms of outputs, 36% reported built outputs, 41% propositional (i.e. site analysis, community consultations, concept design, design reports), and 18% were full-scope projects (i.e. both built and propositional outputs). The source of this funding was also widespread and included income from the community and clients (27%) and external grants (23%). The type of LP clients included community groups (33%), NGOs or social enterprise groups (29%), public sector (25%) and private (13%). This flexibility has been the hallmark of this teaching method,²⁰ and likely reflects the adaptability required in real-world architectural engagement and therefore sought by LP educators.

Context

In terms of context, Lave and Wenger suggest that learning takes place within the context in which it will later be used. Beyond the immediate setting of “instructional environments”, Lave and Wenger expand on the notion of context to include the social and cultural structure and norms of the community in which the learning takes place.

The questionnaire respondents suggested the ‘instruction environments’ are like a typical studio, with some additional fieldwork. Furthermore, as discussed, 76% of LPs are run within the existing university framework and therefore maintain the student-teacher dynamic typical of other learning methods (such as studio).

When asked, “Does this environment change the student’s approach toward the project?”, most spoke of the social and cultural structure of the project as motivating or engaging.

*“Yes, it challenges their perception of the designing process, how different people understand, start or consider things. **It creates an environment where people can learn by trying and making mistakes. It is a supportive environment** where there is an objective for the community client and less about their grade/ performance.” Respondent 5*

Furthermore, the educators themselves can be viewed as authentic and, therefore, better placed to provide an authentic context. The results indicate LP educators have a high level of industry experience (42% had ten plus years of experience). This reflects the need for what Lave and Wenger called “old-timers”²¹ and likely increases the student's perceptions of the activity being authentic.

Interpreting these results suggests that the physical space or direct ‘instructional environment’ is not a primary consideration for LP educators. Instead, industry-engaged educators aim to create, and therefore value, a fertile social and cultural environment.

Active Participation

Lave and Wenger emphasise the importance of active participation within that context. In this way, learning is seen as a social process that involves active participation in a community of practice, where individuals share common goals, practices and ownership. Lave and Wenger describe this as *Legitimate Peripheral Participation*.

Therefore, the questionnaire results suggested that project ownership is typically shared, including intellectual property and formal acknowledgement. (Q59 ‘To what extent is the ownership shared between educators and students?’ Educator =0, Students =10 - Average Score 5.1). However, when

asked who bears responsibility, the responses suggested educators are. (Educator =0, Student =10 Average Score =1.1).

This aligns with responses to the question ‘How do you manage students and client/community interaction?’. Here, the results suggested that many educators still prefer to maintain a degree of client control.

“Carefully. Students need to be briefed and taught how to present and a dry run before presenting is essential.” Respondent 11

“I Mediate all of these” Respondent 7

“A lot of modelling of interactions, techniques and strategies” Respondent 3

These results suggest that, whilst ownership is shared, responsibility is not. Furthermore, educators still mediate much of the contact between students and clients. This points to another boundary of the teaching mode in which the student's interactions and subsequent liabilities are still carefully managed and modelled by educators. Whilst there is clearly more freedom and exposure to risk than a typical design studio, these risks are carefully managed by LP educators, who still bear the bulk of the responsibility.

Authentic Activity

Situated learning theory suggests learning is more effective when it is based on authentic, real-world situations that are relevant to the learner's experience and professional goals. Authentic activities allow learners to develop a deeper understanding of the culture and practices of the community and to see the relevance of new knowledge and skills.

In this regard, when LP educators were asked what motivated students to participate in LPs, ‘exposure to real clients’ rated highest. Unlike a typical studio where they work ostensibly for themselves, a real client shifts the focus of the activity into the real world, with all the challenges and learning that entails.

Furthermore, educators also saw interdisciplinary collaboration as a means of constructing professional practices and culture.

“Multi-disciplinarian is key to architectural education and mimicking practice and also enables better outcomes.” – Respondent 4

Meaningful Collaboration

Situated Learning theory notes that effective learning often involves meaningful collaboration with others, such as mentors, peers, and experts. These collaborations provide a steady stream of feedback, guidance, and support. According to Lave and Wenger, the community of practice self-governs the social and cultural norms by which it operates and, by collaboration in this community, novices learn to recognise what is valued.

The results of our questionnaire suggest that educators recognise this, with 60% of respondents noting interdisciplinary collaboration with urban planning, tourism, engineering, construction management, interior design, industrial design and other creative fields. Moreover, 50% of respondents regularly collaborate with external consultants (with a further 40% ‘sometimes’ collaborating). Consultants include local government, engineers, and external architectural firms.

Educators highlighted the value of teamwork. When asked “how do you assess the success of the live project”, 80% suggest ‘The Team dynamic’. Furthermore, when asked, “What role do you think LPs play in student employability”, many noted the acquisition of soft skills such as ‘the non-technical skills of collaboration, resilience, leadership and empathy’.

*“I think they might be one of the only opportunities to **feel like a professional**, as interactions with community members automatically put them in this role and there are **responsibilities that are associated to it**.” Respondent 1*

Beyond typical ‘group work’ practised in other teaching modes, the LP model places collaboration at the core of both its process and outcome. Furthermore, the depth and extent of collaboration expressed by LP educators demonstrate the value placed on this type of learning. Educators highlighted the authenticity of this approach and the valuable ‘soft’ employability skills it engendered.

Professional Identity

According to Lave and Wenger, identity is not a fixed or predetermined characteristic of an individual but rather an emergent property of their participation in social contexts. As individuals engage in and contribute to a community of practice, they develop a sense of belonging and identity that is shaped by their experiences and interactions within the community. In this sense, identity is seen as a dynamic and fluid aspect of social participation rather than a static characteristic of an individual.

As with authentic collaboration, educators expressed that the LP setting engenders a sense of professional identity amongst participants. Moreover, the social and multidisciplinary nature of these types of projects is the primary reason. In professional practice, architects tend not to work solely for individual outcomes; instead, they collaborate with teams of people on projects that ultimately benefit the client or community in which they are built. LPs help to highlight this new role for its participants. Moreover, this new role generates a sense of professional identity.

As discussed by multiple scholars, including Denise Jackson and Michael Thomlinson, professional identity is a key component in employability. It closely aligns with Lave and Wenger's assertion that collaboration facilitates this type of learning.

DISCUSSION

Our results demonstrated a diversity in many LP practices which contrasts strongly with the archetypal design studio. Stereotypically, a design studio fits neatly into a well-considered curriculum.²² (Table 1) Factors such as design brief, timescales and assessments are premeditated to suit predictable and repeatable learning outcomes. Furthermore, such teaching can be scaled to suit larger cohorts of students. However, it requires a certain level of inbuilt predictability and rigidity. By contrast, the LPs shared with us demonstrated a wide variety of outputs, time scales and budgets reported, thus indicating the flexibility inherent in this teaching mode. In this way, constraints such as time or budget are instead leveraged into meaningful learning opportunities.

CHARACTERISTIC	TRADITIONAL DESIGN STUDIO	LIVE PROJECT
Ownership	Student-centered, with grading that reflects individual effort. Considers the ‘architect’ as the only/primary decision maker.	Shared with team members / client / community and other project stakeholder. Considers clients / community / users in the decision-making process.
Client /community	Typically, a single client. Sets initial brief. Distant – not part of the design process itself.	Client refined to include community / users / other stakeholders. Central to ongoing the design process. Adjacent – works in conjunction with project team, often re-aligning goals.
Outcome	Student-centered, Success is based on desired pre-determined learning outcomes. Product orientated	Shared. Success is based on client / community use. Process and product orientated
Process	Pre-determined, with established milestones set against marking rubric. Scalable.	Continuous negotiation. Determined by unknowable project factors such as client/community feedback. Flexible.
Educator Role	Expert, judge, curriculum facilitator.	Expert, guide, intermediary, project facilitator

Table 1. Comparison of Traditional Design Studio and Live Project Characteristics.

Furthermore, when compared to a typical design studio, LPs, like real-life projects, tend to evolve with the changing need of the client or site or community in which it is situated. Continuous negotiation with the client and other stakeholders can change deliverables, goals and timelines. LPs are embedded with what Harris, Watt and Cottrell describe as the “liveness” of real-world engagement.²³ Consequently, there is always a level of uncertainty that requires both flexibility, adaptability and contemporaneity. This is a significant point of difference between the two teaching modes and worthy of further research.

One can also argue that LPs engender an ‘outcome reorientation’. In a classic design studio, a client brief is introduced at the beginning of the project. Using this, a student works on the project until, finally, an output is produced. This output normally represents the individual’s work and constitutes a significant portion of their grade. In this way, outcomes are orientated toward the student's singular efforts and judged by a predetermined marking rubric.

By contrast, LP outputs are ultimately judged by the client, community or user groups irrespective of predetermined institutional frameworks. This output reorientation directly challenges the individualistic student-as-consumer paradigm. Furthermore, the mode of operation is more akin to the professional realities of practising architecture.

However, many LP educators also cautioned against mimicking professional practice too closely. Furthermore, there was no indication that the educators used either the physical environment or relational hierarchies of commercial architectural firms. This result is surprising since so much of LP's success as an educational model rest on the authenticity of context.

Therefore, this may be a conflict with Lave and Wenger's notions of Legitimate Peripheral Participation and its foundation in the apprenticeship model. Instead, it seems educators take elements of professional practice to suit their learning objectives. One could therefore question the authenticity of this practice. If, in professional practice, there is, for example, an element of boredom or a different relationship dynamic between an employee and a boss – do these, too, not constitute genuine elements of legitimate peripheral participation?

There is room for further research into what elements are used or rejected and why.

CONCLUSION

The aim of this paper was to investigate the characteristics of and lessons from Australian LPs as a teaching model from an educator's perspective. The study gathered information regarding the extent, type and perspective of LP educators in Australia.

The study found that LPs are an instructional approach that enables students to engage with real-world challenges and contexts through hands-on project experience with considerable operational flexibility. The diversity in many LP practices contrasts strongly with the archetypal design studio and highlights the flexibility inherent in this teaching mode. The study also found that LPs engender a sense of professional identity amongst participants due to their social and multidisciplinary nature. This indicates that this pedagogical approach might address the job-ready governmental and institutional incentives.²⁴

However, this study also identified areas for future research. For example, whilst educators valued social elements of professional practice (such as collaboration), neither the physical space nor industry relational hierarchies were considered particularly significant. Further research into where and why these boundaries exist may help higher education institutions determine where in their existing programme.

This study also highlighted that this teaching mode attracts industry-grounded academics motivated by both student and project outcomes. Accordingly, LPs can facilitate educators with this sort of profile to excel, pass on knowledge traditional academics may not have, and retain industry ties and relevance. In a higher education climate in which students increasingly seek relevance, these types of academics, and the set of skills they bring, may be crucial in bridging the industry-academic divide. Further research into the extent, type, context and contemporaneity of previous industry experience and its pedagogical implications would help elucidate this finding (refer Figure 1).

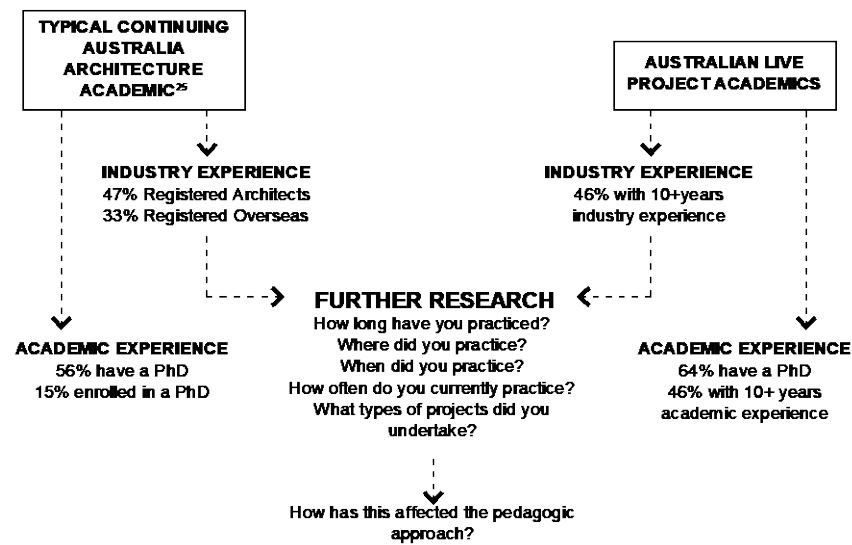


Figure 1. Future Research Regarding Industry Experience

NOTES

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THE BODY AS ‘SITE’: LOVE AND LEARNING IN THE INDUSTRIAL DESIGN STUDIO

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INTRODUCTION

The dominant model of the mechanistic body often prevails over experiential ways of knowing, and intuitive ways of being in, and with, our bodies. This paper presents a paradigm in which design addresses the body as a site for intellectual, material, and social inquiry to reveal and understand the “web of affordances”¹ that determine our approach to the body. It also discusses how learning itself happens naturally and meaningfully, when an emotional engagement is encouraged between a student, the studio environment and the subject.

The Industrial Designer

Industrial Design is characterized by the diversity of avenues that are exercised under its umbrella.² Most often it concerns itself with objects fashioned using post industrial revolution mechanisms, in replicable, small, or large numbers. It equally engages with artisanal practices of making, material immersions, contemporary or traditional crafts, in addition to, propositional, or artefactual practices. Increasingly however, industrial designers are designing experiences and services that are mediated by tangible, but often non-physical, products.³ Besides traditional materials, this approach extends to the capacity to manipulate the digital, or non-physical, and as an extension to the temporal, as in language or speech, or the ineffable—which might include tacit epistemes, or behaviors. This is a broad claim, but industrial designers have always been concerned with method over content, allowing them to learn the particulars on any project—they are in a sense the shapeshifters of the creative practice world designing across, systems, provocations or language with equal agency and facility.

The Industrial Design Studio

Every Industrial Design program has a unique approach fashioned in part by the people designing its curriculum. It is extraordinary however, to see the consonance in much of the approach, irrespective of place, culture, language of geography that exists despite the absence of specificity. Design offers the space for proposition, enquiry, enactment, and performance. The curriculum is bulwarked by skill courses on drawing, CAD, and various forms of material enquiry. In addition, there is the theoretical dimension that is contextually developed and curated, as there is no universal epistemic foundation for design. Within this, the design studio is the place where idea, imagination, inquiry, pragmatism, and realization are progressed. These are mediated through contemplation, exploration, conversation, and iteration. Projects are valued for the depth, and creative interpretation, as much as for material

outcomes, conceptual sophistication, and learning trajectories. It is the place for the *becoming* of a designer, hence its particular relevance to this paper.

THE BODY AS SITE

Design has always been exercised in service to the body in its physical, intellectual, or ethereal dimensions. However, design's own approach to understanding the body, is often fed by unexamined beliefs and ideas, or reiterated prejudices that present as truths. As a result, design has contributed as much to the compromising of inherent body capability, as it has offered comfort and agency to extended forms of need. The *Body as Site* is an investigative space, where I as a designer and educator offer projects to interrogate and re-think some of these issues and explore how we might mitigate their effects.

Language and Image: Concepts in relation to body

Our beliefs and concepts are expressed in image and in language, and these are relational, and metaphorical in nature. The language around the body, in descriptions of its conditions and values, in addition to its experiences are deeply impacted by the metaphors we use to communicate. The metaphors in turn are imbued with values that impact the ways in which we see them as positive, negative, shameful, or unimportant. Much of the experience of the body is constructed through discourse—visual and linguistic metaphors acting as tools to make sense of experiential conditions, and clarify feelings, and responses.⁴ This in turn is bidirectional and recursive—language in turn constructs our scientific, speculative and mythological epistemes⁵. Besides the scientific rationalization of the body, that has re-imagined the physiology as a system of parts and operations, literature offers an alternative phenomenology—one that expresses the experiences and contradictions of the body. Language as a cultural artefact, in its literary and poetic forms validates and makes accessible the nuanced and often inarticulate affects associated with the body in relation to itself and the other⁶. Traditionally, design has taken these and fashioned from them syncretic artefacts of image and concept, that have served as cosmological maps for navigating the self.

The Body Cosmology Studio

The body cosmology studio offered for third and fourth-year students of both Industrial and Communication design students examines how ideas about our bodies affect the ways we know and experience our physical selves. The studio explores the narratives and metaphors associated with the body through the following 3 avenues.

- the experiential body
- the cultural body
- the symbiotic body

To explore the idea of *the experiential body*, students create their own body-maps, to elicit and make coherent, aspects of their body they feel comfortable to share. Body-mapping is “a data generating research method used to tell a story that visually reflects social, political and economic processes, as well as individuals’ embodied experiences and meanings attributed to their life circumstances that shape who they have become”.⁷ In addition, body-mapping is a methodological technique that triggers the imagination of research participants—this in turn can be used as a form of qualitative research in social and behavioral studies.

The students’ body-maps shown here (fig. 2) offer a complex visual narrative. Many invested detailed material and process elements into their outcomes—embedding values of labor, and aesthetics in

addition to the fluency of visual language. These body-maps function as projective tools, externalizing each person's self-awareness.⁸



Figure 2. Body Maps 1-9 left to right: Student work by Eden Zinchik, Ryan Holloway, Ameya Shewak, Sid Watson, Daisy Kim, Alyssa Calvin, Danielle Morrison, Karla Erasmus, and Bianca Del Rio Kodato Melo. Body Cosmology Interdisciplinary Studio, Fall 2022, Emily Carr University of Art + Design.

The content that emerged from this exercise was based on experiences, and repeated or acute conditions that impacted how some of the students had experienced their own bodies. These were a few of the responses from the collection in fig 2.

1. **how the body is often standardized, reduced, or its experiences dismissed, in conversations with health practitioners. As a result, there is a disengagement from the body by the patient (student), in a clinical setting.** This opened a point of discussion as to how people often zone out of themselves in clinical settings, compromising the communication of symptoms between patients and clinicians. An awareness of this allows both patients and clinicians to work around more sensitive mechanisms.
2. **the body as something be concealed—conflicting relationships with one's own body.** This triggered discussions around body image, dysmorphia, and self-harm in relation to often destabilizing mental, and emotional health conditions.
3. **isolation and loneliness ravage the body and are felt as pain.** This was an opening to explore of larger coefficients of health—community, inclusion, and engagement. While this maybe seen as a social issue, psychobiologists can now show how loneliness corrupts hormonal signals, altering gene molecules that govern behaviour, and compromise other body systems.⁹ The narrative map opens inquiry into the links between isolation and health, and discussions on how design may address this.
4. **illustrating distortion of organs to communicate the felt condition that has no medical corollary—tiny lungs inhibit breathing, or a distorted stomach compromises the relationship with food.** This opens a point of discussion as to how the language around the body can be less deterministic and more 'poetic', to communicate a symptom more accessibly. This reinforces the idea that "medicine must include subjective accounting, even valuing the subjective as a measure of authentic feeling in the face of suffering".¹⁰

This body-map exercise exploring *the experienced body* triggers discussions and explorations around design projects that address inclusive and less medicalized mechanisms to promote health and wellbeing.

The second exercise looks at the body as a cultural construct, in addition to being a sensory-ontological being. Here, in a simple exercise, students look at the linkages between the body and cultural belief and practice. This reveals how the body responds to its own mythology of health, that is often informed in equal measure by medicine and culture. Cultural beliefs determine how we speak of the body, navigate allowances and transgressions, and impact wellbeing consequently.¹¹ Increasingly this is being valued as a critical competence for clinicians and health care professionals in the

management strategies for patients and/or carers. In amplifying this pathway, designers educate themselves in vectors of cultural literacy within any human system.

The final exercise addresses the idea of the symbiotic body through the simple act of naming and identification of some of the microbes within specific microbiomes within the body. “Naming enables us to talk or write about something in specific terms. If language is, as has been argued, a means of power—providing a “technique for knowing” places, people, animals, and things—then naming is at the very center of this power”.¹² In addition, naming something forges a relationship with that entity, inviting it into our networks of knowing. Besides being a simple census activity however, this learning addresses larger philosophical questions of individuality and connectedness. Recharacterizing ourselves as “holobionts” the multicellular eukaryote plus its colonies of persistent symbionts—as a critically important unit of anatomy, physiology, immunology, and evolution conceptually challenges the ways in which the biological subdisciplines have heretofore characterized living entities”.¹³ Additionally, once a recurring religious and cosmological proposition, this is now evidenced through observational scientific discovery. This allows us to accept ideas of a deeply interconnected life from both a factual, as well as a more intuitive, poetic, or metaphorical cognitive space. This knowledge then feeds the value systems that are so integral to a general system of bioethics, and more generally ecological-ethics for all people, not just designers.

The studio offered 3 ways to approach the body as a site for contemplation. Inviting the ‘person’ into this space as against simply the ‘objective observer’, allows for a noticing of vectors of information that may not necessarily sit within the dominant body narratives we inherit. It engages the designer into a granular, more nuanced conversation into the conditions and affordances of the body.

THE MAKING~BODY STUDIO

In addition to the Body Cosmology Studio, over three years, I have run a third year ID core studio. The intention is to introduce an approach to complex systems and wicked problems, and allow students to navigate through their many dimensions, based on their own areas of interest. The studio takes cue from the *Doctrine of Placements*,¹⁴ offered as a matrix for practice that over four orders, suggests a model of critical response to conditions. Within design, these may be loosely seen as each order introducing levels of complexity into response. The adapted matrix (fig 3) offers both a mechanism for the progression of a studio from 1st to 4th order of design response, as well as reveals the many ways designers might choose to position themselves within the orders of: 1. communication, 2. ‘artefaction’, 3. action, and 4. conception. The progression allows students to locate themselves in any of the areas they have the most resonance with—this intuitive selection is mediated by levels of comfort, agency, or the desire for a challenge.

	1 st Order Problems of Communication Signs	2 nd Order Problems of Construction Things	3 rd Order Problems of Action Actions	4 th Order Problems of Integration Thoughts
Signs	Words / Symbols / Images Narrating Story-telling	e.g. could include an exploration into semantics	e.g. could include an exploration of service design	e.g. could include an exploration of discursive design
Things	e.g. could include an exploration of material and process languages	Physical Artifacts Making Representing Models	e.g. could include an exploration of artifact and material agency	e.g. could include an exploration of product sustainability.
Actions	e.g. could include an exploration of social constructs and actions	e.g. could include an exploration of cultural objects and their use	Activities / Services / Processes Researching Formulating	e.g. could include an exploration of design activism
Thoughts	e.g. could include an exploration of philosophical constructs	e.g. could include an exploration of artifact, and ecological intersections	e.g. could include an exploration of transformational practices	Environments as Organisations & Systems Interventions Propositions

Figure 3. Matrix of Alignments, elaboration of Richard Buchanan's Doctrine of Placements Model.

Besides critical medical conditions, the complexities associated with pregnancy and birth, have their roots in narratives of gender, sexuality, cultural mores, religion, politics, race etc. to name a few. In addition to this, over-medicalization often distorts this natural process and creates an unquestioned uniform, normative pathway that serves the system, rather than individual. This studio examines some of the conditions associated with this normal life event, and through four stages of immersion, examines how design thinking and design propositions might mitigate some of the adverse associated conditions. This in turn offers students a glimpse into the complexity of human social systems. The design methods over the 4 embedded projects offer ways of penetrating systems, and making meaningful knowledge and response through engagement, rather than simply through macro-understandings of the mechanisms.

Project 1/ Narrating & story-telling

The first exercise is a story-telling one, where students use their own births stories as primary immersion and research. They are encouraged to use specific empathy tools, to be more intentional in their process. The value of this subjective autoethnographic research method lies in the allowance of researchers and designers to value personal subjective experiences and see them as having agency and truth¹⁵. It forges a relationship with the system, by exploring one's own often invisible relationships with the system.

The outcomes of this project are illustrated stories, recordings, and written or spoken accounts. For most students this is a revelatory exercise, highlighting episodes and emotions they may have missed in prior conversations. At all times, students are also encouraged to address and recognize aspects of these narratives that might trigger uncomfortable or dismantling conditions.

The reflections on the project emphasize the ways in which empathy is a both a human ability, as well as a trained and tutored muscle. Designers use their own responses as evidence to bring a ‘conscious empathy’ as to any design problem.

Project 2 / Researching & formulating

The combined generic, and bespoke nature of pregnancy offer an interesting challenge for research. At one level it can be explained as a sequence of biologically replicable events, yet hidden in this are the particular stories of individuals that reveal an explosive diversity and complexity. This offers a unique challenge as a journey mapping exercise—students work in groups of 3-4, and first develop a persona, with a brief narrative of their conditions. Below, is a list of a few personae students worked with, to illustrate how the narratives of each of these pregnancies is very different.

- a white, middle class, pregnant, married couple, in Vancouver, in their late early 30s
- a young 21-year-old pregnant, Vietnamese international student with no family support
- a surrogate pregnancy for a lesbian couple
- a surgical termination of a pregnancy at 21 weeks, post *Roe vs Wade*¹⁶
- a post breast-cancer pregnancy

Each of these personas is used as a guide to first mind map the complexity of the specific condition and to then frame narrative journey maps through the specific pregnancy, labor, and birth. Personal imaginations collaborate with specific gestational, legal, and medical specificities to draw out a nuanced understanding of the complex nature of the condition. The broad range of student presentations reveal and share the complexity of different narratives. This is also the time students begin to identify their own affinities—the areas that excite them, and possible responses, in terms of design projects and propositions they wish to address in their final project.

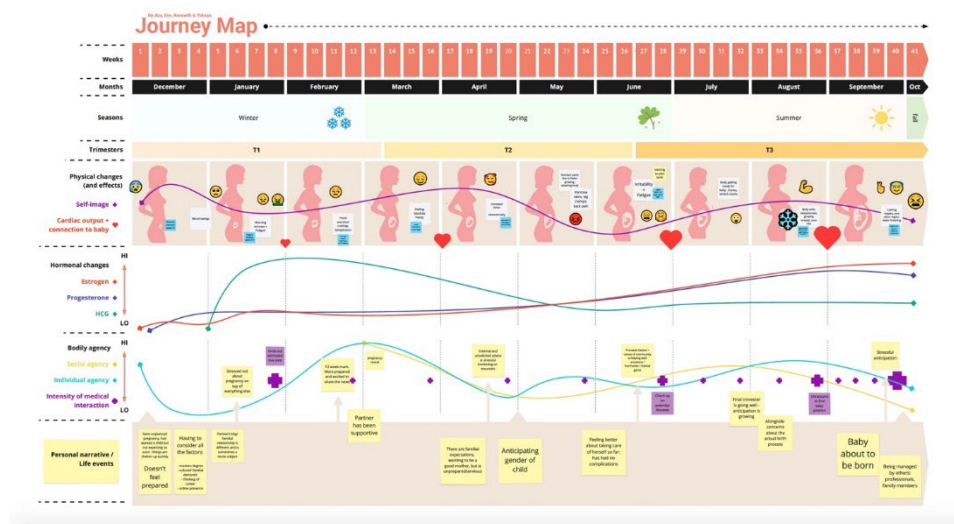


Figure 3. Journey Map. Andres Somasco, Aradhya Ratan, Ken Boediman, Yutaan Lin. Making~Body Studio, Fall 2020, Emily Carr University of Art + Design

Project 3 : Making and material immersion

Project 3 draws the student into the physical body over 3 weeks. Through a material, and representation exercise, students are asked to adopt a part of the reproductive body and explore how it might be accurately represented, in terms of scale and some detail in a material and process of their choosing. This project, while materially drawing students into their comfort zone, is often a

challenging one—looking at reproductive body parts can be transgressive, and disequilibrating. Moreover, these parts often are unstable, moist, messy, and a challenge to make sense of, in material. However, this exercise is where students seem to find a rhythm—one associated with material, and with the engrossment that brings the body into the collaboration of making. Making is a critical act of thinking, and this time allows students to create artifacts, whilst also considering the problems associated with pregnancy or motherhood, or the larger associated social entanglements. The outcomes of this exercise evidence a deep material and process journey, as well as often a changing relationship to the body itself.



Figure 4. The Anatomy Project outcomes (left to right): Labia Majora & Minora: hand-sewn felt, Yutaan Lin: Breast Anatomy, hand-sewn & beaded, Cassandra Matalas: Mammary vascular system: digital embroidery on water soluble interface, Adriana Sedman: The menstruating uterus: laser-cut and carved plywood: Victoria Kallergis: The dilating cervix: hand-sewn, Shelby Sixsmith: The expanding pelvis: CNC-cut & 3D printed, Joseph Zhou: The pregnant body: laser-cut and paper-mache, Kamil Kaptan: The birthed placenta, home-made biopolymer, Yu Mi Kim: Fetus at 22 weeks, subtractive digital sculpting, 3D printing, Ezra Baum.

Project 4 : Proposition and design interventions

For the final 6-week-project, students collate the exercises, readings, talks with experts over the first half of the semester and present a detailed project brief drawn from within their experiences. This is a deep dive into a complete design project with relevant research, sketches, and trials. The time frame creates a highly compressed project—with its own strategic research, alongside design options, learning of new skills and plausible, workable solutions. To illustrate some of this, the five projects below offer a few snapshots.

Project 1. Digital speculum and integrated mobile Application: Designed as a response to the invasive, and often distressing emotions people experience during vaginal examinations, the digital speculum has a camera and an associated App (fig. 5). The speculum can be used by in private, the images digitally shared with a clinician, to offer evidence of dilation, or disease, or to determine if more detailed cervical examinations are needed.

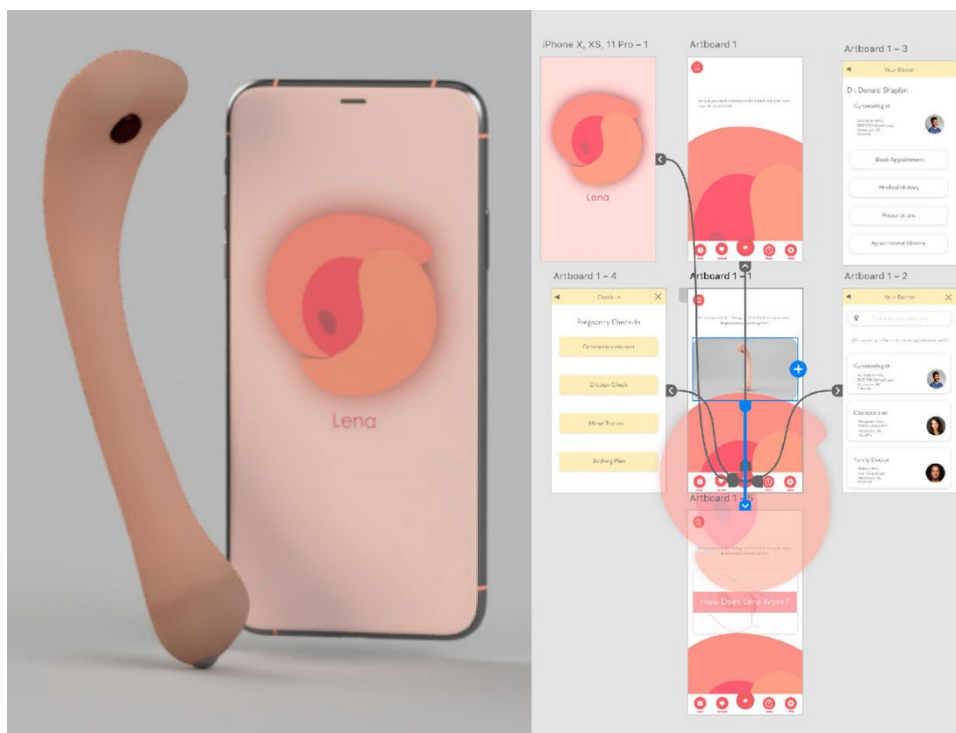


Figure 5. Lena: Digital Speculum with integrated mobile application, Shelby Sixsmith.

Project 2. Labor Pod: A propositional design for labor rooms within a designed garden for an existing site at the Women's Hospital Vancouver (fig. 6). The project was conceived after the student watched his sister walk up and down a concrete passage in the hospital while in labor. The project progressed in discussions with nurse practitioners and midwives, is based on studies that reveal how calming environments during labor assist the production of oxytocin in the mother. In contrast, labor is compromised by anxiety, as the production of adrenalin inhibits the effects of oxytocin.¹⁷ The high rates of cesarian sections in hospitals are in part due to maternal distress and anxiety during labor.¹⁸ These pods are designed through the lens of aesthetics and offer insights into how everyday aesthetic frameworks are critical determinants of health and wellbeing.



Figure 6. Cocoon: Labor pods for BC Women's Hospital, by Joseph Zhou and Robert Ou

Project 3. Post-partum breastfeeding assistive device: Mechanical articulating cradle and support arm, attached to hospital bed to position the baby to assist breast and other feeding to promote maternal and child proximity. This reduces the strain on abdominal muscles, especially after traumatic or cesarian births.



Figure 7. Cradle arm: Postpartum, device to assist breast feeding for new / post-surgery mothers in hospital. Kirby Mclean

Project 4. Exploring sex and sexuality through play: gender fluid dolls. A project designed for children to explore of sexuality, and conversation with parents or teachers. This project is aimed at fostering rather than stymying curiosity in children, and encouraging healthy conversations around the body, and sexuality, driven by an emerging acknowledgement of the problems faced by societies reluctance to engage in healthy sexual narratives from early childhood.¹⁹



Figure 8. Tools to explore the idea of body for children, Aradhya Rattan

Project 5. Nursing spaces: addressing the need for public breast-feeding spaces in Vancouver. A project that looks at space, and the social affordances given to breastfeeding women. It is driven by the research that highlights the benefits of and obstacles to promote breast feeding in society at large.²⁰



Figure 9. Nursing Room: aesthetically imbued, public spaces for breast-feeding mothers, by My Quyen Ong & Heli Shi

Project 6. Relief/ Grief : Abortion: addressing the emotional responses of men. A deeply personal project exploring the ways in which abortion alienates men²¹, as well as how it is often a journey of forgetting, rather than of honoring. The hand-carved crystal is created to honor and remember the pregnancy and lost child, rather than erase its existence. The project raises questions on social ideas of control, exclusion, grief, shame, and censure, with regards to abortion, and attempts of open

discussions around stigma, grief, agency, and the place for men in respectful discussions around pregnancy.



Figure 10. *Relief/ Grief addressing the emotional responses of men in response to abortion*, by Spence Taylor. <https://sites.google.com/view/project-11-11/home>

These projects offer a glimpse into how students chose to approach complex conditions as designers. Rather than systemic solutions, students weave their own deeply actuating research and experiences, to offer propositional ways of reframing extant narratives of personhood, place or culture.

The studio guides them through this journey, where it is not so much the outcomes in themselves, but the ways they are encouraged by the method and communication, to bring their whole selves to complex problems in design.

CONCLUSION: LOVE & LEARNING IN THE INDUSTRIAL DESIGN STUDIO

Identifying the body as ‘a site’ for design inquiry brings a visceral honesty and vulnerability to the discussion around the self as a specimen for all of humanity. The studios offer wayfinding through the body and offer its knowings as material for design thinking. The approach transforms tacit experiences into epistemic artefacts. This gives voice and value to the unseen and often acknowledged mechanisms of the self, in learning.

The cultivation of curiosity, the facility with material and its associated possesses, and the ability to process complexity, and recognize points of contention, are all learned skills. In a design studio, these are enabled through the acknowledgement of personhood—values, affinities, or passions. In this time of information density and contextual granularity, the journey to becoming an immersive and thoughtful designer is catalyzed by the capacity to comprehend wicked problems and offer ways to engage with them effectively. Teaching is an act of allowance—fostering the ‘becoming’ of a *design person*, with trust and with care. The studio is a place of love—where the nurturing of the whole person, is the primary mechanism of interaction. This does not imply a transgression of boundaries, but a joyous holding of individual desires and affinities, and allowing students to work in an affirmative relational space. In this assertion, the studio enacts a non-Cartesian approach to the human-being—one that welcomes the often-unreliable vectors of emotion as being amongst the most authentic determinants of creative and skilled capacity.

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‘LAYERING’ IN LIFE AND IN DESIGN: A LENS THROUGH WHICH TO LOOK AT, COPE WITH, AND CREATE COMPLEXITY

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INTRODUCTION

As designers, we are faced with the challenge of coping with the actual and/or perceived complexity of our world. The need to consciously examine the way this can happen becomes even more urgent and necessary when one does not only practice but teaches design as well. This paper proposes a new design methodology which uses a kind of layering that can be used to look at, cope with, or create complexity in a world that both space and time are increasingly more fragmented and at the same time more interconnected and fluid. It all started with the need to design a method for painting, teaching, writing about, as well as practicing architecture. Collage proved unsuitable for the challenge at hand, and a unique kind of layering technique was developed in painting which offered a way to indeed deal with fragmentation and continuity at the same time.

This artistic practice was then used in teaching architectural design and proved to offer an alternative and quite liberating method for coping creatively with complexity. In the meantime, it also offered a different format for academic writing since layers made out of texts or images started navigating between papers. The research, perhaps naturally, then started investigating the relationship between layering and the narratives generated architecture.

Like a setup of communicating vessels, this layering methodology also proved quite helpful as a common platform for materials from different fields or domains to coexist and thus be potentially related if not connected. It evokes the notion of transparency as the condition where elements may belong to more than one reference system. Complexity is here seen as a source for design parameters and ingredients rather than a difficulty to overcome.

The proposed design methodology may at first glance be misunderstood as one that, through formal maneuvers, mainly produces strange-looking forms and spaces. It could even be accused, as it indeed has been by a colleague after a conference presentation, of being postmodernist in nature, creating pastiches by putting heterogeneous elements together. What follows will hopefully show that this is not the case.

THE DEVELOPMENT OF THE METHODOLOGY THROUGH TIME

It all started about twenty years ago, with the need to paint while simultaneously being committed to a number of other activities. The narration at the beginning inevitably refers to the author’s personal experiences in order to eventually explain how these contributed to shaping a new approach in teaching and practicing architectural design.

A first lesson from painting

Drawing, sketching, and painting since early childhood without any formal training has both negative as well as positive effects. Particularly oil painting is a rather time-consuming activity, making things quite difficult when combined with practicing as well as teaching architecture. Finishing paintings required finding the time to paint while also keeping the interest on the subject and/or the technique used on works that were started time ago. The need to ‘design’ what could be characterized as an amateur’s engagement with painting thus arose.

In a first attempt to find a solution, the canvas was divided into smaller squares or rectangles that could each be painted and finished with in one session. This resulted in a mosaic or fragmented image that could indeed be seen as being postmodern. Each session and consequently its product could be totally indifferent to those spatially and temporally adjacent to it, something not necessarily inherently bad. Still, breaking down an entity into smaller more manageable parcels felt like a cop out. This could be since the new setup was different from the previous problematic situation only in extend and not in essence. Furthermore, such a process could mostly be applied when starting a new painting and less when dealing with a partially finished older work.

Rather than ‘erasing’ totally what already existed on an unfinished canvas by painting a new work over it, a layer was added that was completed in one painting session and which allowed its initial contents to be, in different degrees and ways, still visible. A new layer was thus potentially added on different paintings on each session. This idea was first tested on older, seemingly ‘finished’ paintings by adding a layer of red concentric circles to them. Unfinished pieces were enriched with brand new layers and new works were created by the superimposition of several layers. And while the main goal of the whole process was initially to manage to finish paintings, the very notion of the ‘finished work’ began to be challenged. Another significant development was an increased interest in ‘Layering’ as a concept as well as a process in different fields such as architecture and academic writing.¹

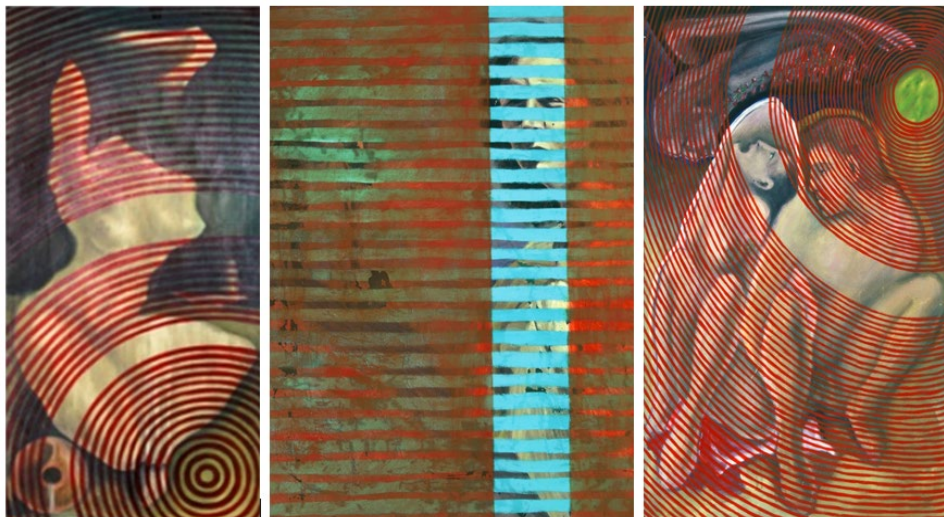


Figure 1. Adding a layer over older paintings.



Figure 2. Paintings created using Layering.

From Visual to Textual and Spatial Layering

The experimentation with layering was taking place while teaching design and while researching and writing about architecture. Naturally, the concept started navigating between domains, giving new insights on what such a tool for analyzing as well as composing can offer.

Textual Layering

Looking at the layered paintings and consciously examining, to the extent that was possible, the way the work was created as well as perceived, a first attempt was made to list some of the characteristics of visual layering. A version of that list eventually became a layer itself in the first of the layered academic papers published:

Layer 116: What if layers can...

The examination of different works from a variety of fields allows for a still far from comprehensive outline of the characteristics of Layering:

- layers are separated by an in-between space which allows for their co-presence
- each layer may be a pattern, or a composition made up of discrete entities
- each layer potentially extends indefinitely in its plane
- the sequence between layers is not fixed. The observer can bring forth one layer and make others recede.
- no one layer is privileged in any absolute fashion.
- layers can be opaque, translucent or transparent, or may be rendered so as desired
- the observer is not situated outside the setup but is immersed in it and is part of it. It could be said that the observer is part of the in-between space which partly defines spatially the foremost layer.
- time is part of the setup, not in any linear sense but in the fact that change is inherent in the setup
- elements from one layer can 'contaminate' other layers
- new layers can be created at will
- layering can be a physical arrangement available to vision, but is predominantly a conceptual frame of mind, an attitude.²

These layered papers allowed for layers to travel between them demonstrating some of the characteristics of layering mentioned above. Each of the papers is thus composed of layers from previous papers as well as new layers created specifically for it. The kind of cross-referencing created by this kind of layering proposes a new way of writing and may be seen as questioning the orthodox way of publishing and sharing academic research. It should thus come as no surprise that some hurried to see it as unprofessional, failing to appreciate its unique character which allows, as Francis Bacon's paintings to present the reader with the 'brutal fact': let the reader in during the creation process and give her the opportunity to contribute before things are 'completed'³. In that sense, things are left in a form of diagrammatic stage with the rich potentials allowed by such an open-ended state.

Furthermore, a kind of agency is acknowledged as carried by the layers themselves, reminding one of Latour's ANT.⁴

Spatial Layering

That architecture tends to vertically layer spaces is obvious to most. That it may also layer spaces horizontally is less thought of. This may be so due to the drawings we predominantly use such as the plan and the section. In an effort to correct that, a new way of looking at a spatial configuration is suggested which looks at how many spaces are horizontally layered in a specific direction one can look and move towards. These 'spatial skewers' reveal otherwise missed aspects of a design that are related to the actual spatial experience of the user much more than the conventional plan and section since, being specific to the direction one looks or moves, it helps one position herself much more into the space represented.⁵

Both vertical and horizontal layering were used in 'Disorienting before reorienting', a work presented at the Architecture Venice Biennale in 2006. The theme chosen by the curators of the Cyprus Pavilion was 'Porous Borders', asking architects to propose projects that dealt with the buffer zone dividing the island into two parts since the Turkish invasion in 1974.⁶ With the motto "Don't Erase, Layer", the project encouraged the dwellers of Nicosia not to navigate through the city by looking at the all too familiar buildings in the walled city which are loaded with a history that contributes in keeping the Turkish-Cypriot and Greek-Cypriot communities apart. Instead, it prompts them to refer to a grid of numbers on the ground, a new layer that itself does not claim space in an exclusive manner but manages to coexist with the existing urban fabric. The proposal was presented through a two-minute film which overlayed a video shot in the south half of Nicosia with a video shot in the north half of the city.



Figure 3. Disorienting before Reorienting.

A second lesson from painting

While investigating how layering could be used in the way we write and design, painting using this newly found method revealed more possibilities for innovation and originality. Initially, as described above, layers were added, and the final effect was this visual palimpsest composed of heterogeneous, and to some degree, discreet planes. In more recent explorations, a new entity is sort of woven by tracing a path that selectively travels between the different layers. Depending on the nature of the path chosen, a different entity or entities may emerge. This mainly visual process proved quite helpful in understanding the way architectural narratives are ‘read’ or perceived, and consequently, the way these can be offered through design.



Figure 4. Creating new worlds through Layering

Narratives ‘by’, ‘with’, ‘through’, ‘on’ and ‘despite’ architecture: the layered nature of architecture

It has long been clear that architecture is not a language. Still, it has also been made clear by many that it can tell narratives.⁷ This ability could be seen because architecture is a combinatorial art.⁸ If a narrative may emerge when not only words but any group of parts are arranged into a configuration, then any piece of architecture can offer not one but many narratives to the visitor simultaneously. This is because even the simplest architectural project is the product of many arrangements of different sets of parts. All these arrangements/narratives are layered and thus potentially simultaneously perceivable.⁹

The narrative told strictly ‘by’ architecture, at least according to Eisenman, is the one that emerges through the arrangement of spaces and forms before any other information regarding the parts or their uses is considered.¹⁰ The narrative told ‘with’ architecture is that which may emerge due to the arrangement of the materials used. The one told ‘through’ architecture emerges from what the senses experience and before any kind of interpretation is performed.¹¹ A fourth narrative is told ‘on’ architecture by the functions accommodated by the architecture. One last kind of narrative may emerge ‘despite’ the architecture when an incident or event, intended or accidental, is associated with it, without necessarily being related to it in any way.

It is practically impossible to perceive only one of these narratives in its entirety without simultaneously perceiving parts from some if not from all the other narratives. In fact, the narrative perceived is composed of the parts that interest the user or, for some reason or other, draws her

attention at that moment. Consequently, different narratives may be experienced at different times even by the same person. The figure below uses color to represent how the layered nature of architecture, Hagia Sophia in this specific case, makes practically impossible the emergence of only one narrative. The transfer from one narrative to the other is made possible by the phenomenal transparency between them since the same element may belong to more than one reference system.¹²

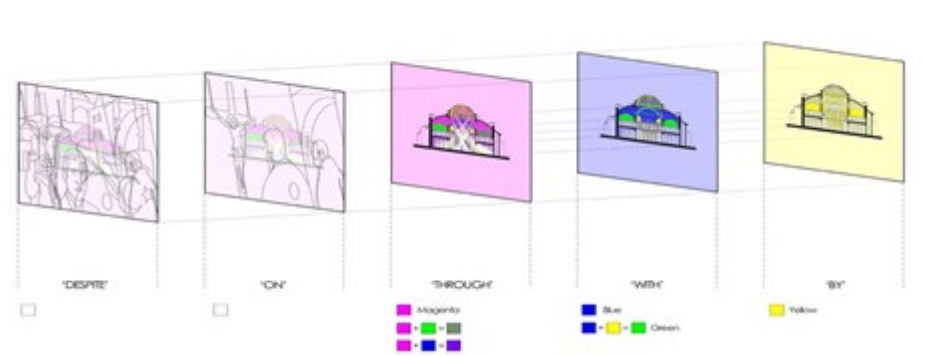


Figure 5. Transparency and the ability to ‘read’ the narrative told by one specific layer decreases with depth ¹³

A layered approach to teaching and practicing design.



Figure 6. Emilia Charilaou, 1st Semester, 1st Year, Fall semester, 2022

What has been learned regarding layering naturally had an impact on the pedagogy used for teaching design. As already mentioned, architecture is literally, physically that is, inherently layered. What is also painfully clear to any architect is that even the smallest and seemingly simplest project inevitably involves many fields or domains, each having its own peculiar nature and its own parameters. The task of the designer is to consider which of these heterogeneous parameters can be involved, in one way or other, in the design process. This is where the hints regarding the navigation between layers in

painting and the layered nature of architectural narratives could help in teaching both basic as well as advanced design.

Teaching first year studio is quite a challenge mainly because those to be initiated into the mysteries of design do not speak its language, making any communication quite difficult. What is therefore urgent is to create a common platform which will allow some form of communication between teacher and students to occur. Layering may indeed offer such a platform. What needs to happen first is create the layers. So, rather than starting with site analysis or talking directly about architecture, the students are first asked to select and transfer the main elements of an A3 print of an abstract painting onto an A3 tracing paper. A second layer is obtained by abstracting the main relationships from an A3 print of a representational painting, aiming at arriving at a totally abstract version of the work. The aim of a third exercise is to combine these two tracing papers into a new A3 tracing paper that selects which relationships to emphasize and which to play down. These first three exercises allow for a discussion that involves topics such as line weight, hatching, abstraction and of course how design may be subjective and yet validly subject to criticism.

So far, the layers obtained are purely visual and the layering literal. This is not necessarily the case with the rest of the process. The other layers to be included are obtained by different methods and may belong to different fields or domains. Site analysis, social phenomena, the history of the site as well as visions or plans regarding its future may be sources for coming up with layers that may be textual, photographic, and so on. The design evolves by encouraging the student to wonder between layers which are seen as communicating vessels. The possible paths are endless, and the student is asked to acknowledge that and ‘argue’ her way through the setup by transforming any point or element from any layer which is not necessarily architectural, into a form that can be used in architectural design. A similar design methodology has produced some quite original and intriguing Final Theses by fifth year students.

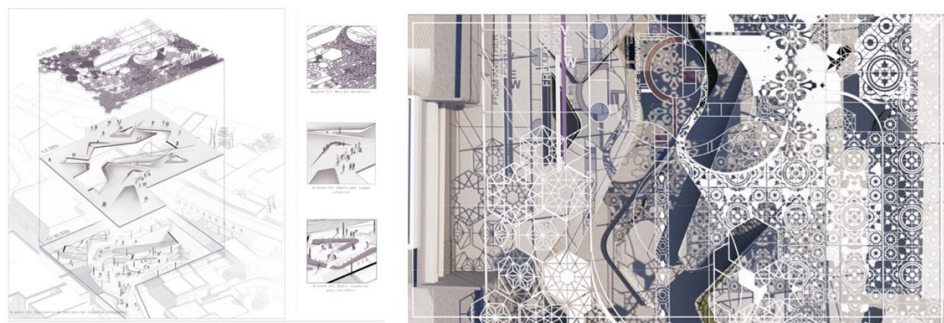


Figure 7. A Thesis proposal by Kalomira Xechilou that layers the functional (lower level), the social (ground level) and the symbolic (canopy).

CONCLUSION

Whether painting, writing, or teaching and practicing architecture, complexity is here seen not only as a challenge but also as a potential resource for inspiration and innovation. Layering as a dynamic arrangement of different configurations that interact with each other proves to be a teaching as well as design methodology that can be used to cope with, as well as create complex environments that may be such in order to themselves accommodate the richness of life. In other words, rather than reducing complexity what is more desirable is to learn how to turn it into an asset.

Our perception of any experience, architectural or other, is not composed of homogeneous elements that together reveal a pre-ordered world which we simply visit. Rather, we compose our experience by

combining, in different ways, heterogeneous elements which appear due to their materiality rather than physicality and for one reason or other, attract our attention.¹⁴ In that sense, it could be argued that, with the layering methodology, the need for extensive abstraction is reduced but not eliminated, while the presence of choice and the importance of selection is increased.

The control exercised by the designer over some of the parameters involved may misleadingly appear to reduce the complexity of the setup. Is control by anyone, let alone the designer, desirable though? Should reducing the complexity be a goal to be achieved through the design? Probably not. Still, we humans seem to need some form of order, perhaps some evidence that things are logical. The next question then is: does the appearance of order mean actual order in a dynamic system such as the one which includes society and the built environment? One could argue that perhaps the best arrangement would be one where things are or appear to be ordered to the extent where complexity is still enough to allow for different agencies to interact.

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SIMULATION AS A PEDAGOGICAL METHOD FOR DEVELOPING PRE-SERVICE TEACHERS' SUITABILITY – A COLLABORATIVE PILOT STUDY

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INTRODUCTION

In Norway, 28 higher education programmes continuously assess the suitability of their students. Suitability assessment is a stamp of quality in higher education, and an assurance that the students are qualified for professional practice.¹ The definition for the assessment is stated by national regulations, in which consist of eight criteria related to the students' abilities and willingness to practice a future professional role.²

In higher education, the use of simulation-based learning (SBL) is well documented in research related to nursing, nursing in social education, and several other social studies.³ To enhance the pre-service teachers' professional development, SBL is also being integrated into teacher education.⁴ This pilot study is based on a collaborative project between teacher education at one university and nursing in social education at a university college, where systematic simulation-based training was facilitated in a teacher education programme. The simulation exercise was developed and tailored to the pre-service teachers' needs involving the criteria related to suitability assessment and the learning outcomes. Additionally, authentic cases were created by mentor teachers, so the participants could practice professional skills, thus increasing the applicability of theoretical knowledge in practical situations. Furthermore, one of the researchers had competence and experience from nursing in social education including research simulation, whereas the other researcher had scientific and educational experience and competence from teacher education programmes. Bringing different skills, perspectives, and competence together cross-domain and cross-institution can be challenging when creating a common understanding of a phenomenon.⁵ However, complementarity is adding value to interdisciplinary research and teaching,⁶ and both the researchers were heads of suitability assessments in their institutions and shared similar attitudes and learning outcomes related to suitability assessments.

The data collection was conducted using a questionnaire to map the pre-service teachers' perceptions of self-awareness pre- and post-simulation. Furthermore, focus group discussions with the participants were performed after the simulation, and data of the pre-service teachers' immediate experiences from the activities were collected to highlight the research question: *How can simulation as a pedagogical method contribute to strengthen pre-service teachers' self-efficacy and suitability?*

PREVIOUS RESEARCH

Suitability assessment is a sensitive and abstract concept revealing whether the pre-service teachers have the prerequisites needed for being able to practice the profession. The criteria in the National Regulations are included in the learning outcomes and are related to the ability and willingness to communicate and collaborate, to care and facilitate learning for pupils, to create a positive learning environment, to take responsibility as a role model, to change unacceptable behaviour in accordance with the mentoring, and to show self-assessment related to a future professional role.⁷ However, the vulnerability related to each individual's suitability makes it difficult to create a clear construct needed for the assessment.⁸

There is limited published research connected to the processes of suitability assessments.⁹ Nevertheless, some studies have found that there is difficult for the actors to navigate in this landscape.¹⁰ Explicitly, this can be related to the use of the assessment criterion, which often becomes subjective and is based on professional judgement.¹¹ Furthermore, suitability assessment presents both professional and ethical challenges when professional development also includes suitable behaviour and attitude, which is measured in the students' abilities and willingness. Becoming suitable for the profession is a process, and the practices of suitability assessment require to be understood taking its context into consideration.¹²

SBL allows students to practice complex skills in higher education in a safe environment and has become an approved intervention to bring congruence between theory and practical learned skills.¹³ Furthermore, different frameworks can facilitate SBL during different phases of the development of knowledge and skills, and recent research shows that simulation as a pedagogical method can have an impact of initial emotional states and self-efficacy changes amongst Nurses (RNs) and Intellectual Disability Nurses (IDNs).¹⁴

THEORETICAL PERSPECTIVES

Metacognition in accordance with Deanna Kuhn¹⁵ is 'thinking about one's thought', which involves the perceptual process of being able to plan, monitor and access stored knowledge and use this when performing. Metacognition in a socio-cognitive framework includes that the person will be 'using regulative thoughts to guide action and self-reflective thoughts', which represents separable levels and cognitive control.¹⁶ Furthermore, reflection is the metacognitive thinking in- and on- action related to own practices, which involves the improvement of skills and professional development.¹⁷ A person mastering metacognition will have the prerequisite needed to perform critical thinking, referring to opinions and views not being indifferent, which involve testing by confronting these perspectives with counterarguments and alternative solutions.¹⁸

Albert Bandura¹⁹ claimed that 'self-efficacy is one's belief in how well they can deal with prospective situations, thus determining the efforts and persistence that an individual would exert when facing obstacles.' Further, a person's perceived self-efficacy refers to one's beliefs in their capabilities to organise and to execute the action required to manage a given situation.²⁰ There will always be implications that can affect the person's ability to execute actions, such as affective states that impact the motivation level at any given time, and low perceived self-efficacy can be related to emotional security and stress. Bandura²¹ referred to four main sources for enhancing a person's self-efficacy: 1) mastering experiences, which can be exemplified as achieving learning outcomes, 2) vicarious experiences, which may refer to observing peers achieving common learning outcomes, 3) social persuasion, that can involve being verbal persuaded by peers and teachers, and 4) a positive emotional and physiological state of mind.

Teacher self-efficacy for classroom management is a basic element of professional teacher identity, which affects the quality of teaching.²² Conflict management strategies contribute to developing self-

efficacy and are related to behaviour and attitude fostered in a conflict context.²³ The strategies involve how teachers can approach pupils using communication techniques and emotional skills. Simulations facilitate the context where cognitive knowledge can be transformed into operational knowledge²⁴ and provide opportunities for developing communication and emotional skills, in addition to behavioural and attitudinal changes.²⁵ In simulation, it is required that the participants engage in professional reflection related to teacher practice, which further can strengthen the perception of self-efficacy.²⁶

METHODOLOGY

The pilot study was designed with a mixed method approach involving both quantitative and qualitative data collection²⁷ to enable sufficient depth and breadth when answering how simulation as a pedagogical method can contribute to enhancing pre-service teachers' self-efficacy and suitability.

The Sample

To increase the credibility of the study, a detailed and transparent description of the research process is required. Criterion sampling²⁸ was conducted when an invitation with information was sent to all pre-service teachers studying in their first year at one university to become primary school teachers. 72 pre-service teachers mixed in gender, age, and experience in teaching accepted the request to participate in the research project and were randomly placed in 19 focus groups. Furthermore, these groups were constant during the simulation and the interviews. However, the participants responded individually to the surveys. The project was granted approval by The Norwegian Agency for Shared Services in Education and Research.

The Simulation activity

The simulation was designed and performed in agreement with the Standards of Best Practice: Simulation Standard IX: Simulation Design,²⁹ and consisted of the following 11 elements:

1. A needs assessment, which provided the evidence required for a well-designed simulation, and included an evaluation of knowledge and skills of pre-service teachers related to suitability assessment. The results addressed the identified needs to promote readiness for practice and for a future professional role.
2. Measurable objectives, which were related to both organizational goals and the performance of the participants. The eight criteria in the Suitability Regulations were made available to the pre-service teachers before the simulation. Furthermore, general information and context for the activities were revealed. The description of the simulation is illustrated in Table 1, whereas the eight criteria are showed in Table 2.

Situation	Required action	Expected outcome
Case 2 Pupil Andre, 5th class	Ask how the pupil is doing and maintain the conversation. Use techniques from classroom management theory. Round up the conversation when the pupil calms down or responds to the techniques.	Knowledge: Being able to identify the pupil's reactions Being able to identify professional ethical dilemmas Skills: Being able to use acquired skills in a classroom situation

Table 1. Description of simulation

3. The format of simulation, which had the purpose of providing a formative and summative encounter with the concept suitability assessment, was initiated by a scientific article about the topic. In addition, a lecture about suitability assessment in teacher education was conducted. The modalities included structured simulated cases with unfolding scenarios, designed for the pre-service teachers to engage. One of the cases are exemplified in Table 2.

4. The scenarios and cases were developed and provided the context for the simulation. Furthermore, the situation involved an authentic starting point in the classroom where the structured activity started. The time frame was 6 minutes, and one of the participants made sure time was kept. Furthermore, cues were delivered to the pre-service teachers verbally through the pupil and there was pointed out that too much improvisation from the planned dialogue could cause distraction which might have interfered with the learning objectives. Evidence-based performance measures were conducted by teacher educators, who were subject matter experts, to strengthen the validity. The template scenario is illustrated in Table 2.

Target group	Pre-service Teachers, first year in Teacher Education				
Theme	Suitability Assessment				
Learning outcomes	<p>a. The student demonstrates a lack of willingness or ability to care for and to lead learning processes for children, adolescents, and adults in accordance with goals and guidelines for kindergarten and school activities.</p> <p>b. The student demonstrates a lack of willingness or ability to have an overview of what is going on in a group of children or a class and from this create a learning environment that takes include the safety of children, adolescents and adults and their mental and physical health.</p> <p>c. The student fails to take responsibility as a role model for children, adolescents, and adults in accordance with the objectives and guidelines for kindergarten and school activities.</p> <p>d. The student demonstrates an unwillingness or ability to communicate and cooperate with children, adolescents, and adults.</p> <p>e. The student has problems of such a nature that they are unable to interact in relation to their surroundings.</p> <p>f. The student demonstrates inadequate self-awareness in connection to the tasks required within the educational program or in a future professional role.</p>				
Based upon	Lecture:		Literature:		
	What is Suitability Assessment and how are you as students in Teacher Education evaluated according to Suitability Assessments		National Regulation on Suitability Assessment in Higher Education. Article “Professional Judgement in Suitability Assessments” ³⁰		
Time frame	Briefing:	30 min	Simulation:	20 min x 4 scenarios	Debriefing: 5 min + 45 min
Case	How to communicate with and to reassure the quiet and underachieving pupil? Andre is a 10-year-old boy who is attending the 5 th class with 18 other pupils. In the past, you have noticed that he seems shy and a little insecure. In this lesson he sits and cries quietly at his desk. How can you get his attention, reassure, and show that you care? And what about the teaching of the rest of the class when you are preoccupied with one individual?				
Student roles	1 Teacher		2 observers		1 Teachers Assistant
Reflection	15 minutes after every scenario				
Designer scenarios	XXX				

Table 2. Template scenario

5. Physical, conceptual, and psychological fidelity involved factors that replicated the environment in which the situation would occur in real life, including an equipped classroom with related props and a pupil. To design the perception of authenticity, the scenarios were reviewed by subject matter experts and pilot tested before the simulation. Moreover, psychological fidelity promoted the pre-service teachers' engagement by adding distractions, addressing other pupils, and competing priorities in the simulation.
6. The facilitators approached the simulation based upon the objectives, the pre-service teachers' knowledge and level of experience, and the expected outcomes. The pre-service teachers played the key role, however, the facilitators also participated in the simulation transforming into the pupil in the activity. When managing the simulation, the facilitator met ethical challenges, and for maintaining appropriate standards formal training in simulation-based pedagogy should be required by all the facilitators involved.
7. Briefing is a structured fundamental part of the simulation, which involves founding of ground rules. First, a written briefing plan, which described the process and content for each scenario became available on the pre-service teachers' online learning platform the week prior to the simulation. Furthermore, briefing was conducted in a lecture including orientation of the classrooms, simulation as a pedagogical method, the objectives, the roles, time allotment, and evaluation method. In addition to the instruction, the pre-service teachers and the facilitators shared their expectations. Moreover, briefing was completed immediately before the scenarios emphasising the need of trust and respect in the activities.
8. The purpose of the planned debriefing session is to strengthen the learning, which is prepared by the facilitators, who use debriefing techniques. The pre-service teachers were asked to share their experiences before they were given structured and direct feedback that intended to contribute to development or confirmation of their practice. Furthermore, the pre-service teachers were asked to reflect upon and discuss their actions in the skill-based simulation. They were also encouraged to talk about their experiences of classroom management related to suitability, in addition to their perceptions about self-awareness.
9. Evaluation of the participants and the facilitators involves a valid tool, which measures outcomes to ensure quality in the simulation. Fellow students were peers and provided valuable input from the evaluation framework, measuring 25 statements on a seven-point Likert scale.
10. Participant preparation should include activities that address the knowledge, skills, attitudes, and behaviours that are expected of the participants during the simulation. Several activities related to the concept of suitability were included in the preparation, like reading assignments, didactic sessions, and answering suitability-specific questions. However, these activities were not related directly to the concept of simulation. Nevertheless, the pre-service teachers were informed concerning codes of conduct, confidentiality, and expectations.
11. Pilot Testing of the simulation-based experience ensure that the activity meets the objectives, and some underdeveloped elements were identified during this pilot including the use of the evaluation tool, and measures to assess for validity. Furthermore, the need for potential changes were discussed.

Data collection

The quantitative data collection consisted of four data sets, where three were used in the analysis, and one was excluded due to lack of validity.

The following three surveys were included in this pilot study:

1. Identifying stress. Prior to simulation a questionnaire was completed to identify psychological indicators of stress. The indicators in the questionnaire are identified in international literature.³¹ The

questionnaire consisted of 14 stress indicators presented to the respondents using a Likert scale 1–7, where 1 = totally disagree, 2 = disagree, 3 = partly disagree, 4 = neutral, 5 = partly agree, 6 = agree, and 7 = totally agree. The stress indicators were dry mouth, increased heartbeat, increased pulse, perception of non-existent noise, temporarily speechless, feeling of 'having' butterflies, nauseous, tunnel vision, lack of fine motor skills (movement in fingers and hands), experiencing time passed slowly, chills, lack of hearing, reduced capability of controlling movement, and muscle tension.

2. Identifying personal skills of de-escalating communication. The questionnaire consisted of 10 symptoms representing skills of de-escalating communication.³² The respondents were asked to score according to feedback from peer students and the experts (here pre-service teachers) presented to the respondents using a Likert scale 1–7. The scale where 1 = totally disagree, 2 = disagree, 3 = partly disagree, 4 = neutral, 5 = partly agree, 6 = agree, and 7 = totally agree.

The skills represented in the respect of distance and proximity, keeping same physical height as the other, do not 'corner' the other, positioning myself and making sure there are escape routes for both involved, avoiding unnecessary gesticulation, avoiding dominating body language, avoiding excessive eye contact, congruence in language, using an easy and informal language, giving the student time to comprehend the given information, and repeating important information.

3. Expert-rated performance, feedback from the 'experts' (here 4 mentor teachers holding the role of markers and facilitators in debriefing). This questionnaire was based upon the observation of the teacher role in simulation, regarding skills in de-escalating communication. Assessed post simulation on a 10-point Likert-scale ranging from 0% to 100% (in 10% increments). There were 4 scenarios with 4 presenting 'teachers', thus there was a total of 16 expert feedbacks.

To highlight the research question, the first survey had one open-ended question asking the respondents to describe their perception of self-awareness prior and post simulation. In addition, the data collection was based on 19 qualitative focus group discussions with pre-service teachers after the simulation to gain insight into their experiences related to how simulation as a pedagogical method can contribute to strengthen self-efficacy and suitability. The pre-service teachers were interviewed in the group in which they conducted the simulation. We chose to perform several focus group discussions with few participants rather than individual interviews, considering the purpose, which was to facilitate sharing of experience and exchange of opinions, as well as to enable a calibration of the participant's statements with a view to a common understanding.³³

The questioning route was semi-structured, and the pre-service teachers were asked questions related to their recent experiences in the simulation. Furthermore, they were encouraged to discuss their understanding and learning from the activities. Finally, the participants were asked questions involving suitability and self-awareness.

One of the data assessments, the 'Critical Thinking Disposition Scale' ³⁴ was discarded due to a conflict of validity. Some changes were tried, adjusting from a 7-point Likert scale to a 4-point Likert scale. We see that using the validated 7-point Likert-scale 'Critical Thinking Disposition Scale' would have provided more accurate and enabling necessary nuances in the respondents' perception. The evaluation of the pilot study requires some changes in the data collection, which will be developed and explored further in a larger scale research project.

Analysis surveys

Statistical analysis was conducted upon the quantitative data, using SPSS Version 28.0.1.0 (IBM Corp, 2023). Further, the study employed a descriptive statistic approach in analysing data presenting population (*N*), range, maximum- minimum, mean (*M*), median (*Mdn*) and standard deviation (*SD*).

The last question in the first survey was open-ended and requested the pre-service teachers to describe their perception of self-awareness. In the analysis, these qualitative data were openly coded, and the

findings were thematised in categories, which revealed differences in the data before and after the simulation. Overall, prior to the simulation the respondents' perception of self-awareness were descriptions of their shortcomings in the professional role. The term 'mistake' was most frequently used, and one respondent pointed out: "Self-awareness is when I discover my own mistakes in my doings." However, findings in the responds after the simulation showed the pre-service teachers' perception of developing self-awareness as a process involving reflection and critical thinking. This is illustrated in the following quote: "The ability to see myself in relation to others concerns self-awareness. This process involves being outside my comfort zone, reflecting, considering other perspectives, and being critical and open to change."

Analysis focus group discussions

This study applied Moser and Korstjens³⁵ approach to inductive thematic analysis of the transcriptions in three stages: 1) arranging the data and searching for codes, 2) finding themes and patterns, and 3) recognise major themes through interpreting the results. First, the participants' narratives were highlighted, including their descriptions of own experiences when conducting simulation. This involved the actual simulation settings, which indicated how the pre-service teachers experienced the exercise and what didactic choices they made in the communication. The participants' statements were openly coded.

Second, we explored the data from the focus group discussions organising a search for themes and patterns relevant for the research question. Third, an extensive approach was made, engaging a complete reading from the earlier stages of the analysis related to the data and the research question.

Furthermore, the analysis process was corresponding between the three stages comparing our interpretation to the responses from the survey and the focus group discussions, hence new knowledge was constructed. To perform triangulation,³⁶ key findings from all the data sets were sorted and similar main findings were grouped. The analysis indicated coherence among the pre-service teachers' responses in the surveys and in the focus group discussions, and the grouping of findings revealed three major themes: 1) stress management, 2) conflict management, and 3) *contextualization in teaching*.

Ethical considerations and trustworthiness

The ethical considerations of the study followed the principles of the National Committee for Research Ethics in the Social Sciences and the Humanities,³⁷ which related to consent, privacy, and confidentiality. The simulation was created to resemble authentic professional teacher practices, in which the pre-service teachers needed repeatedly practicing in how to handle and solve rapid and unpredictable situations. Some participants were uncomfortable and showed vulnerability in these situations, which required a safe environment where the pre-service teachers were assured that their boundaries would not be crossed. At the same time, it cannot be ruled out that some of the participants felt more challenged than others in these sensitive settings, depending on each pre-service teacher's prerequisites to become a teacher. Furthermore, the Head of suitability assessment's presence in facilitating some of the focus group interviews should be addressed. Even though there was a strive for trust, recognition, and reducing the imbalance in power, there is a possibility that some participants were influenced by the Head's attendance, which may have had an impact on their discussions. On the other hand, the presence of the Head may have provided a safe setting for learning and an arena where the pre-service teachers could communicate with the Head for guidance and advice related to suitability.

RESULTS SURVEYS

A total of 72 pre-service teachers participated, in which 39 contributed into this study (N=39), 9 men and 30 females. Of the respondents, 19 pre-service teachers were above 25 years, and 20 pre-service teachers were below 25 years of age. 13 respondents reported that they had experience from either working in or attending practicum studies at schools, none of these were registered as certified teachers. One third (13) of the pre-service teachers registered that they had previous experience with simulation as a pedagogical method.

1. Identifying psychological indicators of stress (N=36-39).

Analysing the data collected we found that most of the respondents did not experience indicators for stress during the given simulation intervention. Median (*Mdn*) in this data set overall being 4. Mean (*M*) ranging from 1,28 (indicator 'lack of hearing') to see a slight indication for the stress indicators such as present such as increased pulse (*M* 4,05) and experiencing time passed slowly (*M* 4,13), although neither with a significant number. The Standard Deviation (*SD*) being high indicates a large spread and variation in the registered data, meaning that respondents' registered data is greatly spread upon the Likert-Scale (see Table 3).

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
Dry mouth	39	6	1	7	2,56	1,744
Increased Heartbeat	39	6	1	7	2,97	1,678
Increased pulse	39	6	1	7	4,05	1,746
Perception of non-existent noise	36	6	1	7	1,42	1,156
Temporary speechless	38	6	1	7	3,05	1,754
Feeling of 'having butterflies'	38	6	1	7	2,50	1,767
Nauseous	39	6	1	7	1,41	1,292
Tunnel vision	39	6	1	7	1,54	1,374
Lack of fine motoric skills (movement in fingers and hands)	39	6	1	7	1,69	1,360
Experiencing time going by slower	39	6	1	7	4,13	1,922
Experiences Chills	39	6	1	7	1,46	1,189
Lack of hearing	39	6	1	7	1,28	1,146
Reduced capability of controlling movement	39	6	1	7	1,41	1,093
Experienced muscle tension(s)	39	6	1	7	2,41	1,817
Valid N (listwise)	34					

Table 3. Identifying psychological indicators of stress

2. Identifying personal skills of de-escalating communication (N=37-39).

Using a 7-point Likert-scale facilitated a potential Range of 6, a *Mdn* of 4, and the *M* of 4 for all questions. The data registered gives variation upon the *M* of in some of the variables. The variation in *M* ranging from 4,41 on the question where respondents self-reported if they were repeating message

to ensure confirmation upon the pupil understanding given information, to 5,79 on the question regarding the respondent's ability to respect distance and proximity in collaborating with the pupil. In general, all the variables in this assessment scored a high *M*. The two questions representing the highest *M* also had the lowest spread in Rang. The variable scoring the highest *M* had a range of 4, then the variable scoring second to the highest *M* had a range of 5. Furthermore, the data set provide a high *SD* on all the questions, showing a large spread amongst the selected variables, with each individual question and on a general level (see Table 4).

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
Respect of distance and proximity	39	5	2	7	5,79	1,321
Keeping same physical hight as the student	39	6	1	7	5,21	1,908
Positioning myself and making sure there are escape routes for both involved	39	6	1	7	5,49	1,636
Avoiding unnecessary gesticulation,	37	4	3	7	5,89	1,173
Avoiding dominating body language	39	6	1	7	5,74	1,860
Avoiding excessive eye contact	37	6	1	7	5,57	1,591
Congruence in language	39	6	1	7	5,49	1,502
Using an easy and unformal language	39	6	1	7	5,69	1,608
Giving the student time to comprehend the given information	39	6	1	7	5,10	1,729
Repeating important information	39	6	1	7	4,67	1,611
Repeated message to insure confirmation upon the student understanding of given informasjon	39	6	1	7	4,41	1,943
Valid N (listwise)	36					

Table 4. Descriptive statistics Identifying personal skills of de-escalating communication.

3. Expert feedback (N=16):

The Expert feedback assessment rating the 16 respondents who were given the teacher role in the simulation intervention had a potential *Mdn* of 5, and potential *M* of 5,5. The potential Range was 10 given that the assessment was presented on the 10-point Likert-scale. The assessment rating, however, scored no lower than 4 on the Likert-scale, giving a great reduction of the Range from 10 to 6. The adjusted *Mdn* for the assessment becoming 7, and the *M* becoming 7 for the two variables “To what level did the teacher identify the pupils needs?” and “To what level did the teacher practice skills in de-escalating communication?”. The *Mdn* for the last variable “How well did the teacher perform customized communication with the pupil” becoming 7,5 and the *M* becoming 7,5. There is no

discrepancy from the *Mdn* and the *M* indicating a symmetrical distribution of the scoring. Here a high *SD* shows a variation in range on the plotted of data on the individual scores on the Likert-Scale (see Table 5).

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
To what level did the teacher customize his/her communication towards the pupil?	16	5	5	10	7,75	1,342
To what level did the teacher identify the pupils needs?	16	6	4	10	7,25	1,612
To what level did the teacher practice skills in de-escalating communication?	16	6	4	10	7,25	1,915
Valid N (listwise)	16					

Table 5. Descriptive statistics Expert feedback

DISCUSSION

In this section, the qualitative findings of the analysis, illustrated in Table 6, are presented, and discussed in light of the quantitative results, and the theoretical perspectives related to teacher self-efficacy.



Table 6. The three major themes related to the pre-service teachers' process of developing teacher self-efficacy and suitability through simulation.

Stress management

The first major theme described the pre-service teachers' attitudes and behaviour when they practiced the professional role in the simulation. Several of the participants addressed realistic situations, where they had prepared for making different didactic choices during the exercise and most of the pre-service teachers identified stress-related symptoms like increased pulse and sensing that time passed slowly. Pre-service teacher 5 expressed: "It was a strange feeling to face stress, although I was aware this could happen." However, the findings in the focus group discussions revealed that although the

participants occasionally were out of their comfort zones, most of them did not become overwhelmed. Pre-service teacher 12 pointed out: “I think stress can have a positive side, keeping me on the alert.” There was coherence in the results from the survey identifying psychological indicators of stress, and these experiences of managing stress may have had positive impact on the pre-service teachers’ ability to enhance their self-awareness, because a positive emotional and physiological state of mind is a source for strengthening self-efficacy.³⁸ On the other hand, low perceived self-efficacy can be related to negative stress and emotional security, and for some of the participants the experience of stress-related behaviour appeared in the responses. Other issues in the findings were the differences among the participants concerning what role they simulated, whether it was the teacher or the assistant, and moreover, the impact of the peer-support in each team. Finally, knowledge of the exercise needs to be taken into consideration, hence enabling to judge self-efficacy to a related task requires to know what the task demands.³⁹ For the pre-service teachers to judge their capabilities required adequate knowledge of the simulation,⁴⁰ and one third of the participants had previous experience with similar settings. Additionally, by following the standards of best practice,⁴¹ it was facilitated for the participants to gain insight into the topic prior and during the simulation activities.

Conflict management

The second major theme involved handling tense situations using de-escalating communication skills, and the simulation intended to facilitate possibilities for developing techniques.⁴² Few of the pre-service teachers doubted their skills, and these participants’ perceptions of self-awareness prior to the simulation was related to failing in their professional action. Pre-service teacher 9 revealed: “It was difficult to face the pupil’s problem head-on and to solve it.”

Nevertheless, most of the participants expressed managing de-escalating communication and they achieved their learning outcomes. All the pre-service teachers experienced to get encouraging feedback from peer students and teachers and their self-doubt gradually decreased, hence, they started to emphasise on their capabilities. This is in line with social persuasion,⁴³ which in these situations involved receiving verbal support convincing the pre-service teachers to believe that they had the skills to succeed. In the debriefing phase after the simulation, the participants were actively engaged in professional reflection, which may have increased their self-efficacy.⁴⁴ Furthermore, they observed each other achieving learning outcomes, which also is a source for strengthening teacher self-efficacy.⁴⁵ The data showed a tendency of change in the pre-service teachers’ perception of self-awareness developing as a process involving their suitability, which underlines that simulation provides opportunities for behavioural and attitudinal changes,⁴⁶ in addition to contributing to growth in the professional identity.⁴⁷

When identifying pre-service teachers’ personal skills of de-escalating communication, there was low variation upon the questions mean. This was emphasised by limitation in spread because the respondents did not score the lowest values in two of the questions. A high mean indicated that most of the pre-service teachers shared the same personal skills in de-escalating communication, which was verified by feedback from both peers and experts. It cannot be ruled out whether this is a result of self-awareness of suitability for the future professional role due to critical thinking regarding the profession. Hence, the participants confronted each other’s perspectives with counterarguments and alternative solutions.⁴⁸

Contextualization in teaching

The third major theme emphasised the pre-service teachers' educational experiences and rapid shifts. *When the participants appeared in simulation, they experienced that the context in which they had planned for, changed. An example was a pre-service teacher, who intended to comfort a quiet pupil crying in the classroom. But when the pupil responded differently than anticipated, the context changed both in the situation and in the communication.* Pre-service teacher 1 highlighted this: "I found it challenging that the pupil responded different from what I had prepared for. I tried one strategi but felt lost when that didn't work."

Prior to simulation, most of the participants believed they could deal with the prospective situation, which involved their beliefs in their capabilities to execute the action required to manage the upcoming scenario. The pre-service teachers' feelings of confidence regarding their professional performance were related to self-efficacy.⁴⁹ However, when facing obstacles in the contextualization in teaching, some of the participants doubted their abilities in the professional role and related their low perceived self-efficacy to emotional security. Nevertheless, in the debriefing phase, the pre-service teachers recognised that they were reflecting in action,⁵⁰ thinking about what to do next. In the debriefing, the participants also processed their doings and reflected on their behaviour, ability to execute actions, and alternative approaches. The development of suitability was highlighted in the discussions, and pre-service teacher 11 stated: "The diversity in the classroom emphasises the importance of the teacher's suitability. I'm more aware of that after this experience."

Several pre-service teachers pointed out the excitement they felt when they overcame the challenge involving the pupil. In addition to achieving their learning outcomes, they also observed peers obtaining common learning outcomes, and these mastering and vicarious experiences became main sources to enhance self-efficacy.⁵¹

It should be addressed that the pre-service teachers had different starting points related to suitability and where they were in their professional development path. Additionally, the high score in the data is linked to various factors that need to be seen in context. First, the teams established trust, which was a prerequisite in the simulation.⁵² However, we have no insight into the dynamics of the groups or the chemistry between the individuals. Thus, we do not know how this may have affected the data.

Second, the performance measures were conducted by teacher educators to strengthen the validity. On the other hand, it cannot be excluded that the scorers were biased, because of their relations to the pre-service teachers. Third, the simulation was part of a varied suitability training program, which could impact the high score regarding awareness and knowledge of suitability for becoming teachers.

LIMITATIONS OF THE STUDY

This research project has some limitations. First, the data collection methods used, both the surveys and the focus group discussions, are subject to social desirability bias. However, to reduce this influence, three data sets from the same sample were collected to enable triangulation before and after the simulation. Consequently, there is a call for further studies with data from multiple samples to strengthen the validation. Second, the simulation activity had some pitfalls, where lack of structure may have influenced the data. Nevertheless, in most of the 11 elements,⁵³ the simulation was well structured, and this pilot study intended to detect weaknesses and limitations to develop a larger scale research project.

SCIENTIFIC SIGNIFICANCE AND IMPLICATIONS

This study provides research-based knowledge related to the development of teacher self-efficacy and awareness of suitability in teacher education. Furthermore, this involves practicing skills and the results show how simulation as a pedagogical method can increase the degree of student-active

learning and strengthen the applicability of theoretical knowledge in practical situations. Furthermore, an implication of the study is applying simulation as systematic and structured suitability training in teacher education nationally and internationally, which also may encourage to collaboration involving SBL for suitability in other education programmes and integrating simulation into the curriculum. Teachers at campus facilitated the simulation in this study, and a venue for further research includes exploring the facilitators' preparations and knowledge of simulation as a pedagogical method.

DECLARATIONS AND CONFLICT OF INTEREST

The authors declare no conflicts of interest with this work.

NOTES

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DEDICATED CHATBOT AS A TOOL FOR IMPROVING YOUNG LEARNERS' ATTAINMENT.

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INTRODUCTION

Machine Learning (ML) and Artificial Intelligence (AI) are essential drivers of innovation and growth in all sectors, including education. While AI-powered technologies have been around for a while in Education Technology (EdTech), the sector has been sluggish in their acceptance. The pandemic, on the other hand, radically altered the scene, pushing educators to rely on tech for virtual instructions. Now, many educators believe that technology should be an integral element of education. AI has the potential to improve both teaching and learning, assisting the education industry, simultaneously evolving to benefit both students and teachers. Young learners face constant challenges such as lack of engagement with learning materials, lack of personalised support or intervention, and unavailable 24/7 support from instructors. Educational institutions on the other hand, also want to cut down cost of hiring human instructors in addition to be able to gather real time data on students' performance. One of the key emerging areas in education is the use of chatbots. Aside being available 24/7 to students, chatbots can provide personalized learning experiences, instant feedback or response to students, enhanced accessibility for disabled students with alternative mode of communication and the ability to automate repetitive tasks making them cost effective. It can also offer institutions an alternative cost-effective solution to offering support and guidance to learners without hiring additional staff.

By leveraging the power of machine learning and natural language processing, AI can enable chatbots to better understand students' learning preferences and provide tailored content to improve their learning outcomes. AI can therefore help improve the efficiency of chatbots, allowing them to handle more complex tasks and freeing up teachers to focus on other aspects of teaching.

This paper focuses on a comprehensive literature review of Chatbots, their history, uses, designs and evaluations as well as how they can be used as a tool to boost attainment for secondary school students with a particular focus on making the underlining AI explainable and ethical.

LITERATURE REVIEW

Background

Even though the quest for being able to create something that can comprehend and interact with its creator has deep origins in human history, Alan Turing is thought to be the first person to have envisaged the idea of a chatbot in 1950, when he proposed the question: "Can machines think?".

Turing's description of an intelligent machine's behaviour evokes the commonly understood concept of a chatbot.¹ The development of ELIZA in 1966 resulted in the first implementation of a chatbot that relied heavily on linguistic rules and pattern matching techniques.² Through a keyword matching program, it could interact with the user. Nonetheless, the scope of ELIZA's knowledge was limited because it relied on minimal context identification, and pattern matching rules in general, which are not flexible enough to be easily implemented in new domains.³ The use of Artificial Intelligence was a notable evolution in chatbots in the 1980s. A.L.I.C.E (Artificial Intelligent Internet Computer Entity) is based on AIML, which is an extension of XML. It was created specifically so that knowledge of dialogue patterns could be added to A.L.I.C.E.'s software to expand its knowledge base.⁴ Furthermore, Chat Script, AIML's successor, served as the foundation for the rest of Loebner's award-winning chatbots.⁵ The main idea behind this innovative technology was to match user textual inputs to a topic, and each topic would have its own set of rules to generate an output. Chat Script heralded a new era in the evolution of chatbot technology. It began to shift the emphasis toward semantic analysis and comprehension. The main disadvantage of using rules and pattern matching in chatbots is that they are domain dependent, making them inflexible because they rely on manually written rules for specific domains. The use of machine learning algorithms in chatbots has been investigated, and new chatbot architectures have emerged. With the advent of Deep Learning algorithms, the use of chatbots has grown. The development of smart personal assistants (such as Amazon's Alexa, Apple's Siri, Google's Google Assistant, ChatGPT etc) is one of the most recent and intriguing applications. Personal assistants, chatbots, or conversational agents that can typically communicate with the user via voice are typically integrated into smartphones, smartwatches, dedicated home speakers and monitors, and even automobiles. In terms of technology, user interface, and functionalities, all smart personal assistants share the same core characteristics. Some chatbots, however, have a more developed personality than others, and the most advanced ones can also provide entertainment rather than just assistance with day-to-day tasks; these chatbots are known as social chatbots.

Uses of Chatbots in Education

Chatbots have been utilized for teaching and learning, administration, research and development and in aspects of assessment and advisory.⁶ For teaching and learning, chatbot systems are largely employed in educational settings. Chatbots can be used to deliver course material to students via an online platform as a conversational agent capable of giving users accurate information. Teachers are seeing the value of using chatbots in learning environments to give students an engaging experience.⁷ Students can utilize these bots to ask questions, receive responses, and receive individualized feedback.⁸

The advent of learning methodology in education, such as the Chatbot system, has individualised online learning and made learning resources available to students anywhere and at any time. Education is evolving in tandem with developments in the professional sector, necessitating the use of Artificial Intelligence (AI) in teaching and learning.⁹ During tutoring, a Chatbot can be utilized to foresee and personalize a student's learning session with enthusiasm by modelling their learning style using natural language discourse.¹⁰ Chatbots are good technological breakthroughs that boost student learning interest, cognitive skill acquisition, and achievement.

Research and Development

Some investigations have revealed the existence of chatbot systems that can assist students with research and development by effectively replying to chats about academic research concerns. The postgraduate program includes research, and Chatbot technology is being used to provide the essential

guidelines for a successful research output. A chatbot system that can teach students STEM-related research concepts¹¹ Furthermore, the literature review revealed a Chatbot that may help students retrieve information from many sources such as Wikipedia and support the training of students from diverse fields of expertise for them to develop practical understanding of their profession.¹²

Administration

Some studies presented Chatbots that can be used to deliver administrative tasks in educational institutions.¹³ For example, one study described a Chatbot system that automatically responds to a student question about how the education system is delivered in their studies on behalf of the academic faculty. The Chatbot will act as a digital assistant, advising universities on how to improve their current services, produce new inventive ideas, and save labour expenses. Another study looked at a conversational agent that can help students with things like orientation, recruitment, and retention¹⁴. Chatbot technology, which is used to help teaching and administrative chores, is one of the most recent AI applications presented to education. One of the important areas in education recognized as possibly impacted by Chatbot is the execution of various administrative duties in the education process, such as grading students' assignments, scoring, and delivering feedback to students.¹⁵

Design and evaluation

Rule based chatbot.

The first attempts at implementing chatbots were rule-based. Rule-based models are typically easier to design and implement, but their capabilities are limited because they have difficulty answering complex queries. Rule-based chatbots respond to user queries by looking for pattern matches; thus, they are likely to produce incorrect answers when they encounter a sentence that does not contain any known pattern.

Artificial intelligence chatbots

Unlike rule-based models, AI models are based on Machine Learning algorithms that allow them to learn from an existing database of human conversations. To accomplish this, they must be trained using Machine Learning algorithms that can train the model using a training dataset. The use of Machine Learning algorithms eliminates the need to manually define and code new pattern matching rules, allowing chatbots to be more flexible and less reliant on domain specific knowledge. As previously stated, AI models can be divided into two types: information retrieval-based models and generative models. Information retrieval models are created in such a way that, given a dataset of textual information, the algorithm can retrieve the information required based on the user's input. The algorithm used is typically a Shallow Learning algorithm; however, there are cases of Information Retrieval models that use Rule-based and Deep Learning algorithms. Information Retrieval-based models include a pre-defined set of possible answers; the chatbot processes the user query and selects one of the answers available in its set based on this input. A database of question-answer pairs is typically used to form the knowledge base for this type of model. This database is used to create a chat index, which lists all possible answers based on the message that prompted them. When a user enters an input into the chatbot, it is treated as a query, and an Information Retrieval model similar to those used for web queries is used to match the user's input to similar ones in the chat index. Thus, the output returned to the user is the answer paired with the selected question from the chat index.¹⁶ The main benefit of this model is that it guarantees the quality of the responses because they are not generated automatically. One of the major disadvantages of this approach is that developing the necessary knowledge base can be expensive, time-consuming, and tedious. Further to that, while the

large volume of data available allows for a larger training set and a larger knowledge base, it also implies that matching a user's input to the correct answer will be more difficult; a significant amount of time and resources must be implemented to train the system to select one of the correct answers available.¹⁷ Finally, since they do not generate answers but rather retrieve answers from a pre-defined set in their knowledge base, information retrieval systems are arguably less suitable as the underlying algorithm for conversational or chit-chat agents, the so-called social chatbots. In fact, information retrieval models are less suitable for developing personality, which is an important characteristic for this type of chatbot.³ Nonetheless, some progress has been made in recent years in developing new Information Retrieval algorithms, and it is worth noting which Machine Learning algorithms are currently being used as the underlying technology for this type of model. There has been a proposal of a new model for representing local textual co-occurrence and mapping hierarchical information across domains for terms that are more semantically distant.¹⁸ This model was built on the premise that the higher the co-occurrence of two terms across domains, the closer the two terms are related. As a result, a high co-occurrence within a specific domain may aid in the retrieval of information. Thus, this model was built in two steps: topic modelling for parallel text and obtaining the hierarchy architecture. The first step is to identify meaningful word co-occurrence patterns. The second step is to model the architecture of cross-topic co-occurrences. The neural network that will power this machine learning algorithm will be built using this architecture. The interesting advancement made by this model is thus its use of word co-occurrences to define a context. The overarching goal of this study was to improve matching performances for Information Retrieval models using contextual information.¹⁸ Another author proposes an interesting development that aims to take previous turns in the conversation into account¹⁷, thus obtaining more contextual information in order to improve the quality and correctness of the output. A Deep Neural Network is used in this model to rank not only the question/answer pair matched with the last user's input, but also those question/answer pairs that match with reformulated versions of previous conversation turns. The ranking lists for the various reformulations are then combined. Contextual information from the user's previous queries can thus be leveraged, and these pieces of information can be used to retrieve a better answer within the knowledge base models that are generated.¹⁷ These models can thus generate entirely new sentences in response to user queries; however, they must be trained in order to learn sentence structure and syntax, and the outputs can be inconsistent or of low quality.¹⁹ Typically, generative models are trained on a large dataset of natural phrases extracted from a conversation. The model learns sentence structure, syntax, and vocabulary from the data fed to it. The algorithm's overall goal is to be able to generate an appropriate, linguistically correct response based on the input sentence. This method is typically based on a Deep Learning Algorithm composed of an Encoder-Decoder Neural Network model with Long-Short-Term-Memory mechanisms to counteract the vanishing gradient effect found in vanilla Recurrent Neural Networks.²⁰

Sequence to Sequence models have become the industry standard for chatbot modelling among AI models. They were originally developed to solve Machine Translation problems, but the underlying principles appear to work well for Natural Language Generation as well. These models include two Recurrent Neural Networks (RNN), an encoder and a decoder. The overall goal of this probabilistic model is to learn to generate the most likely answer given the conversational context. This approach does not require domain-specific knowledge; rather, it is an end-to-end solution that can be trained on different datasets, and thus on different domains making it a general and flexible model that can be used to solve various NLP tasks.

DISCUSSION AND IMPLEMENTATION

Despite recent advances in Deep Learning and Natural Language Processing, the architectures of chatbots still have a few flaws. First and foremost, due to an incorrect approach to dialogue modelling, the various language models proposed as chatbot architecture are still unable to accurately mimic human conversation. The underlying issue is that these model approach conversational problems in a step-by-step manner: given an input, it attempts to predict the best-fitting output. This, however, is not the reasoning behind human conversation, which advances by taking into account a series of previous steps, the underlying context of the conversation, and the information being shared among the participants.²¹ Human conversation is not a step-by-step process, as modelled in chatbot architectures, but rather a continuous journey, a back-and-forth in which each step is dependent on the previous or subsequent ones. This dependency is the conversational context, and while some new models have attempted to capture it,²² more progress is needed. Another significant flaw in chatbot architecture is the apparent absence of a learned AI model for Information Retrieval chatbots. These chatbots are widely popular across industries (e.g., healthcare, e-commerce, customer service, and education), as evidenced by a literature review on chatbot applications, because they can provide coherent responses to a specific topic (e.g., booking an appointment, product specifics, returning an item, and finding learning materials), provided they can find a similar answer in their knowledge base. Currently, all learned models for Information Retrieval chatbots appear to be dependent on the dataset used to train them, and there appears to be no flexible learned model that can be applied to different datasets. Indeed, it appears that research is now focusing on large generative models rather than smaller, easily implemented, domain-independent models. A model like this could be used in a variety of industries. The lack of open access domain-specific linguistic data, as well as the highly diverse nature of industries and industry-specific topics where such models would be applied, pose challenges in developing such models. In terms of applications, there is still a gap to be bridged between industry models and recent advancements in the field. Chatbot models are trained on specific datasets to meet their purpose, and their applications rely on various, often complex frameworks that include dialogue managers and/or decision trees and are either knowledge-based or rule-based. Nonetheless, given the widespread adoption of such models, it appears clear that tailor-made solutions that ensure qualitative and precise answers to specific customer queries are preferred over larger models that require a large amount of data and perform better in open-domain conversations but may not perform as well in closed-domain conversations. There is clearly a distinction between open-domain (research-oriented models) and closed-domain models (industry-oriented applications). Smaller, more flexible, and less domain-dependent models would help bridge this gap. Although some metrics are widely used to assess the performance of chatbots, there is no single metric or set of metrics that is commonly referred to as the reference. The lack of a common frame of reference for evaluating chatbots limits accurate testing and comparison of different models.

CONCLUSION

This literature review revealed multiple gaps in chatbot research that must be filled. To begin, while many survey papers on chatbots provide a detailed explanation of chatbot technologies and implementations, recent surveys lack information on the most recent advances in language models that could be applied to chatbots, such as Transformers, which we have provided an overview of in this paper. However, a more in-depth examination of these models and their application to chatbots would be beneficial. Similarly, there is very little information and analysis on datasets. The type and quality of data used to train Deep Learning models is critical in determining the model's output and accuracy. This is especially true for language models because the model must learn the language task

based on the linguistic data available, and interpreting linguistic data is more difficult than interpreting numerical data. For these reasons, it is critical to debate and analyze the data used to train the various models. This type of analysis is also important because it allows for a more accurate comparison of various models and their performance. Additionally, a new, dependable automatic evaluation method should be proposed. A method that provides a qualitative estimate of chatbot conversational outputs based on the correctness, coherence, and cohesiveness of the dialogue across multiple turns. Such an evaluation method could be a significant step forward in improving the overall performance of chatbots.

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BRONWEN'S WISH: AN INTERDISCIPLINARY PROJECT TO BUILD AND PROMOTE A WELLNESS CENTRE

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INTRODUCTION

Bronwen's wish is a collaborative and interdisciplinary project between the two partner institutions, the University of Wales Trinity St David (UWTSD) and the University of South Wales (USW) and the Bronwen's Wish Foundation. The project aims to provide an architectural and graphic design project that combines sustainability with ideas of mental health and well-being. The BSc (Hons) Architecture students at UWTSD were tasked with designing a wellbeing center for Cardiff High School and USW's BA (Hons) Graphic Communication students were asked to design a campaign to promote the center to Cardiff High's pupils. The design of the project gives the students a chance to 'have their say'; to test their views and opinions on these key issues to plan and create a vision for something new. This paper discusses how the project was deployed and the students' outcomes.

Bronwen's Wish

Bronwen "... was an inspiration to many people and will always continue to be an inspiration with her legacy living on and hopefully helping many other children and young people" (BRONWEN'S WISH FOUNDATION 2021).¹ In the Summer of 2020, Bronwen tragically took her life, after struggling with her own mental health for several years. Bronwen was a student nurse based in Cardiff and worked extensively to support young children with emotional and mental health problems. A Trust Fund was started by her family, called "Bronwen's Wish". The Trust aims to deliver small, standalone 'sanctuary' spaces, classrooms for school children dealing with emotional and mental health issues.

Why this project is important.

The Covid 19 pandemic has hugely disrupted society and caused many people to suffer mental health issues for the first time in their lives or applied more stress to people already coping with mental illness. School children and university students alike have been greatly disrupted by the pandemic; they have had to adapt to online learning, had less contact with their peers and families, and had to cope with social distancing, wearing a mask and sanitizing their hands regularly. Children's well-being has suffered in consequence, therefore, there is a real necessity for a wellbeing center in schools. It was envisaged that the center should provide a *wellbeing hut* or *den*. It was felt that the notion of a "hut" was appropriate because huts are a small simple built house or shelter, and a "den" connotes a secret place, often made roughly with walls and a rough, where children play.

The architecture students were informed that the space should be able to accommodate up to eight students and one member of staff at the same time. In addition, the students were instructed to design

a space with a unique character, providing a safe, calm, relaxing environment apart from the surrounding academic buildings with a focus on well-being and learning. The environment inside the space should be comfortable and in use all year round, with attention to the natural world and using sustainable materials.

Mental Health Awareness

In recent years prolonged campaigning by professionals, charities and motivated individuals has raised awareness around mental health issues. Under the 2010 Equality Act, mental health is now a protected characteristic. In tandem with increased awareness there is now increased understanding that mental health problems are both widespread and complex. A survey conducted in 2014 by Mind (a mental health charity) estimated that one in four people in the UK experience a mental health problem each year, but only one in eight adults with a mental health problem are currently getting any kind of treatment.²

A UK Government green paper identified that half of all mental health conditions are established before the age of fourteen, and that early intervention can deliver significant personal and societal benefit. The paper also recognized the essential role that schools can play in identifying mental health needs at an early stage, providing support, and referring young people to specialist services.³

The Project Challenged the Current Educational Model and Response to the Pandemic

The Covid pandemic has further impacted on society that is wrestling with the challenges of climate change. The central idea around sustainability has been concerned with how to best use the planet's resources whilst maintaining a quality of life for people and cognizant of human actions on the natural environment. The pandemic added a further complication by enforcing restrictions on daily life which in turn impacted on peoples' mental health and well-being. People were unable to meet in person and teaching resorted to an online education model for students learning in isolation.

To respond post pandemic to this problem educationally an integrated and interdisciplinary approach was seen as appropriate. In this way bringing students together 'face-to-face' from different disciplines to solve shared problems would encourage dialogue and creativity in a meaningful holistic way. The process of integration in a multi-disciplinary setting has been subject to limited research in technology and sustainability. It is becoming increasingly evident that new ways of thinking with more integrated approaches are required. There appears to be a need for integration in response to the inadequacies of stand-alone approaches.

Sustainability and environmental education

When discussing the need for sustainability and new ways of thinking, Raymond Williams proposes: *"The process ... has to be seen as a whole but not in abstract or singular ways. We have to look at all our products good and bad, and to see the relationships between them which are our own real relationships ... But then of course to express this we should need not only a more sophisticated but a more radically honest accounting than we now have. It will be a sign that we are beginning to think in some necessary ways when we can conceive these becoming, as they ought to become, a single discipline ... as the changing conditions of a human world."*⁴

PROJECT DESIGN

The project was a collaboration between the architecture students at UWTSD and the Graphic Communication students at the University of South Wales. It sought to explore the key themes of sustainability, mental wellbeing, waste, and environmental protection. A detailed module-based

program with key milestones was made available by respective tutors for student meetings, reviews, and workshops over the project timeline.

The project aimed to encourage learning and creativity as an active process of construction rather than acquiring knowledge and to provide instruction as a supporting process of that construction rather than communicating knowledge. In other words, it advocated active learning – the students were encouraged to investigate and by discovery solve problems to provide meaningful solutions.

The project is aligned with both institutions' notions of future curriculum development. The *University of Wales Trinity Saint David Strategic Plan 2017-23 and 2023-25*⁵ is committed to the well-being and heritage of the Welsh nation embedding the ideas of inclusivity, sustainable development, employability and creative; guided by the Well-Being of Future Generations (Wales) Act 2015.⁶ Indeed, USW's *2030 Curriculum Principles, Assessment for Learning Principles*⁷ frameworks place emphasis on unsolved problem and challenge as central to learning, it is co-designed with stakeholders; it encourages active, collaborative, and interdisciplinary learning; it is informed by cutting edge research and practice; it sought to instigate a positive impact and transformation on society on completion and it was fully inclusive.

The Pedagogical Approach to the Project

How can these complex and often contradictory issues of sustainability and mental health awareness be conveyed to students in a meaningful way? By drawing on complimentary constructivist theories and approaches of Piaget, Halprin and Norman⁸ (Rumelhart & Norman, 1978) an architectural project based on studio pedagogy was considered as an appropriate starting point.

The goal was to emphasize that 'change' in the natural environment and architectural design is a process combining both heuristic and constructivist approaches to education. Precedence for this kind of approach is acknowledged in the work of such people as architect Lawrence Halprin⁹ and scientist H.E. Armstrong¹⁰ involving investigation and active learning by discovery. The Bauhaus method of teaching visual arts based on problem solving tasks is also relevant.¹¹ Halprin (1969) describes the RSVP cycles (Figure 1) as "a balanced scheme in which all the parts are mutually related and constantly interacting its purpose is to make procedures and processes visible, to allow for constant communication and ultimately to insure the diversity and pluralism necessary for change and growth."¹²

R - Resources which are what you must work with. These include human and physical resources and their motivation and aims.	S- Scores which describe the process leading to the performance.	Valuation which analyzes the results of action and possible selectivity and decisions. The term "valuation" is one coined to motivation and aims - suggest the action orientated as well as the decision-orientated aspects of V in the cycle.	P - Performance which is the resultant of scores and is the 'style' of the process
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Figure 1. RSVP Cycles (Halprin 1969).

The project encouraged learning and creativity as an active process of constructing rather than acquiring knowledge and provides instruction as a supporting process of that construction rather than communicating knowledge. It allows individual students the opportunity to explore their own vocabulary, with a focus on observation and contact with the natural environment.

Experiential learning offers “a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior.”¹³ that is to say, learning that is based on 'doing' and 'hands- - activity'.

Students address complex issues within the project such as sustainability, creativity, and mental health, which require mapping to a process of learning. According to the American constructivist psychologist, Donald Norman¹⁴, complex learning is organized into schemas (Figure 2) and structured by three processes: accretion, restructuring and tuning. These processes may not occur in a linear manner and could all occur at singular points in the learning process where one or other may be dominant. It was important time was allowed to the restructuring and enrichment stages of the project, in keeping with Norman’s ideas of the dominant processes interacting with the task stages. Periods of discovery, invention and finding patterns, shaped the restructuring phase whereas discovering new facts, skills and applying these strategically was evident in the enrichment phase.

In a project like this it is important to create a studio culture of creative thinking and invention. According to Weaver and Prince¹⁵ utilizing “synectics” by finding connections through synthesis and analysis is one of the tools for linking thinking to encourage students to look for relationships among ideas.

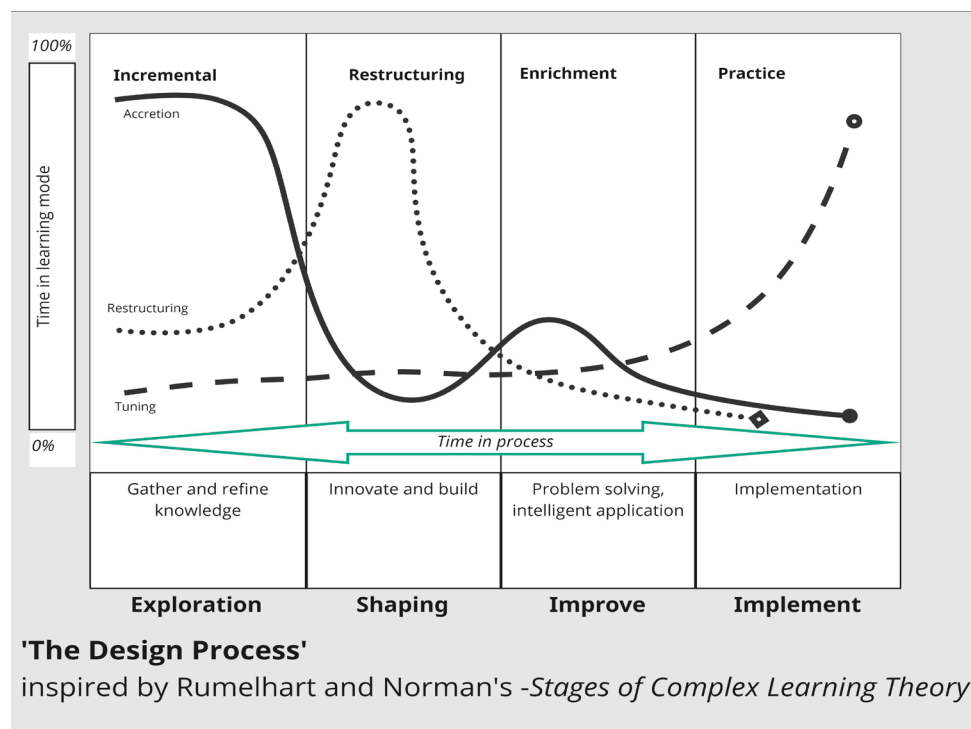


Figure 2. The Design Process, inspired by Rumelhart and Norman's Stages of Complex Learning Theory.

BA (Hons) Graphic Communication Design Process

The BA (Hons) Graphic Communication students followed a complementary design process to the above, for they followed design process inspired by IDEO's Design-Thinking approach¹⁶ and the Design Council's Double Diamond approach to Design, (Figure 3), which places emphasis on exploration, definition, development, and delivery.¹⁷

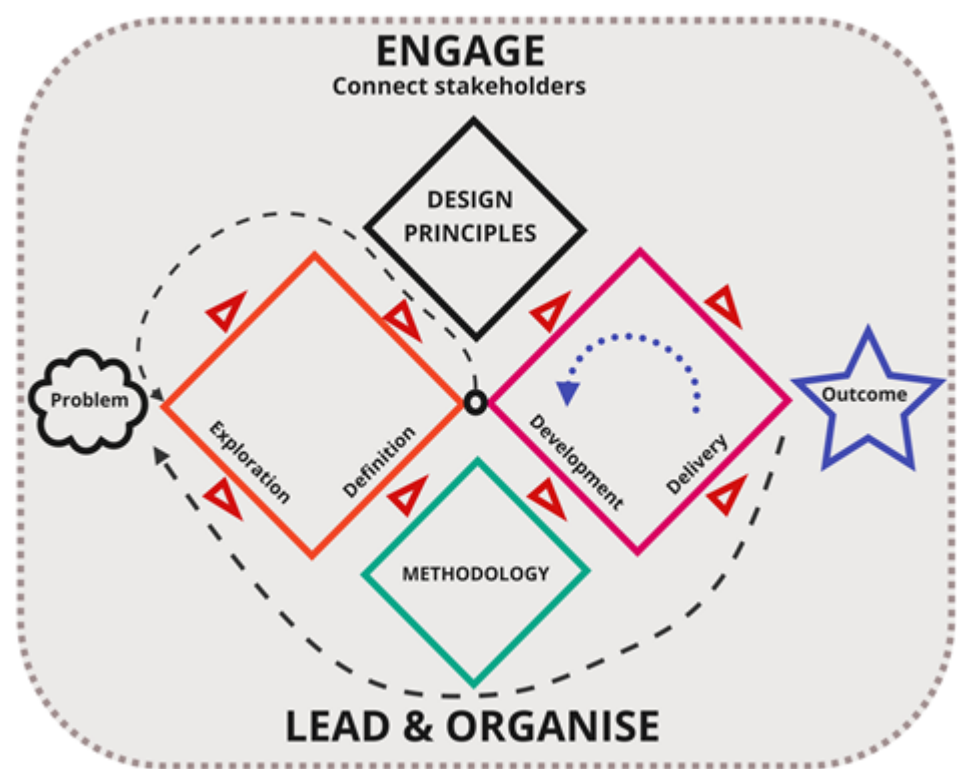


Figure 3. The Double Diamond Process

A detailed program was made available by respective tutors for student meetings and workshops over the project timeline. Key dates in which the two groups were brought together were:



Figure 4.

Interaction by both cohorts was further encouraged and facilitated by employing Miro. Staff and students from both academic institutions were able to share information, ideas, and their concepts on the interactive digital board.

The Brief: BSc (Hons) Architecture

The Bronwen's Wish Trust envisage that the wellness center should be designed to accommodate up to eight students plus a member of staff at the same time. The space should have a unique character, providing a safe, calm, relaxing environment apart from the surrounding academic buildings, with a focus on wellbeing and learning. The environment inside the space should be comfortable and in use all year round. Form and materiality should be designed to stimulate the senses. Connections with nature and the wider landscape should be promoted. The structure should be robust and durable. Acoustic properties should also be considered. Flexibility is a key characteristic. The space will be

used for numerous different (sometimes unanticipated) functions. It would be beneficial for the design to adapt to accommodate a range of different purposes. It should be possible to fabricate and use the space sustainably. Natural and recycled materials, regenerative design principles and renewable energy sources should all be explored. The space could be composed of a single structure or several smaller components. Extendibility and adaptability for other activities and uses could be beneficial. It may also be advantageous for the structure to be mobile, so that it can be relocated in the future. This project is intended to be possibly replicable on different school sites.

The Brief: BA (Hons) Graphic Communication at USW

The brief for the BA (Hons) Graphic Communication students tasked the students with designing a campaign for the center. The students were advised that they did not have to address the whole issue of well-being, but a key factor within it. They were also informed that the outcome might be an information campaign in the form of a website mock-up, a poster, a publication, or an app. In addition, it was stipulated that the outcome must be informed by human-centered design principles using research methodologies and design process techniques learned in prior modules.

The students were asked to produce a visual journal of the record of the project's journey from your initial ideas and research to the final presentation of ideas showing clear links to research and the use of design thinking techniques.

ARCHITECTURAL OUTCOMES

In February and March 2023, the architectural students visited the site contained within the grounds of Cardiff High School and then carried out a series of structured exercises. The site analysis data collected such as climate, aspect, size, accessibility, noise, wildlife, materiality, levels, and vegetation informed the design process.

A series of design workshops took place between the UWTSD and USW students to encourage dialogue and inspire creative ideas. (Figure 5) This 'pedagogy of freedom' (Freire, 1998)¹⁸ was encouraged so that nothing is rejected during this phase. This allowed the students to break out of existing patterns and normal studio conventions and respond to new conditions.



Ideation - student design workshop



Student team work building architectural structures

Figure 5. Student activities

Students undertook problem solving exercise of building geodesic structures within a time constraint, designed to foster and encourage teamwork. This was a precursor to the studio workshop design phase centered around understanding materials and the building process dealing with three dimensional forms and memory. A Miro board shared by all the students acted as a working repository for ideas,

sketches, photographs and articles, publications on mental health and the environmental impact of development.

Each architectural student recorded on a site plan (Figure 6) the key factors that would inform their design process. The teaching staff stressed the importance of considering the impact of development on plants, animals, and insects, whilst balancing the logistical needs of selecting appropriate construction materials, their transportation and carbon footprint.

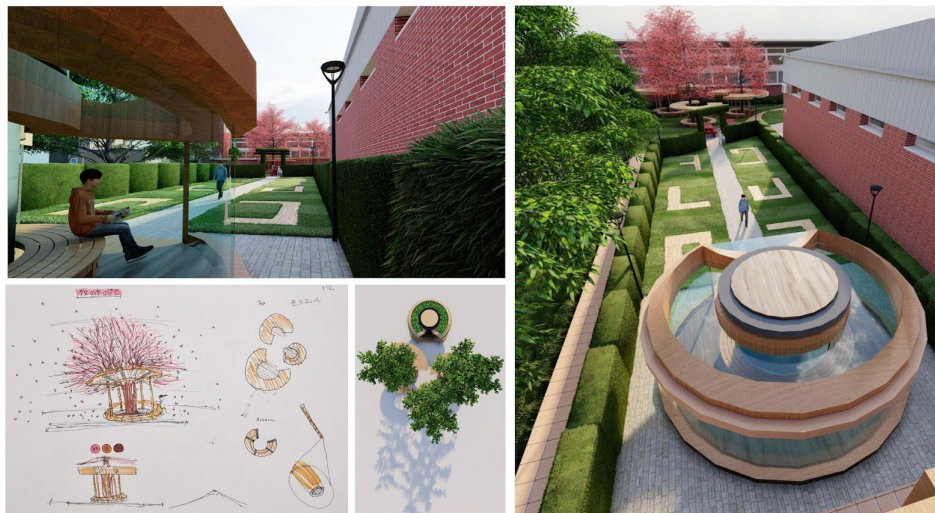


Figure 6. Site Plan Analysis

The final designs produced at the beginning of May 2023 showed a diversity of approach by each student. Each scheme embodied a sensitive approach to both the internal and external detail, height size, massing, and material use of their proposals. (Figures 7 and 8)



3D computer generated interior view of the Wellness Center by Jimmy Cho



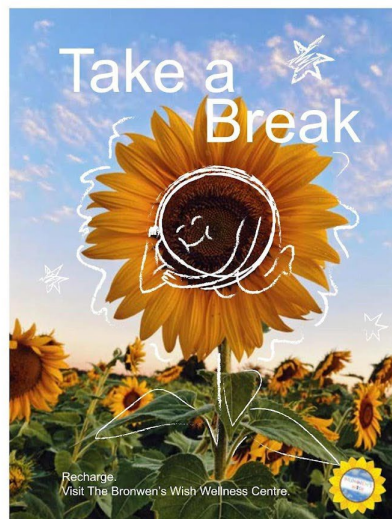
Concept sketches and 3D computer generated views of the Wellness Center by Hashim Izzidien

Figures 7 and 8. Architectural student work examples of the wellness centre by Jimmy Cho and Hashim Izzidien

BA (Hons) Graphic Communication Students' Outcomes

The Graphic Communication students were initially slow to begin the project; they found it difficult to deal with the fact that there was not already a Bronwen's Wish Centre at Cardiff High School. Staff industrial action and the Easter vacation period also stalled the students and allowed self-doubt and indecision to manifest. However, their enthusiasm was ignited after visiting Swansea, because they were able to see the near complete architectural students' schemes of work. The geodesic dome building exercise fostered healthy competition and allowed the two student cohorts to bond more cohesively. Therefore, students were able to engage in meaningful conversation with the architecture students about their schemes of work.

As the Graphic Communication students continued to find it difficult to propose a campaign for a center that had not been physically built, they chose to focus their designs around the Bronwen's Wish sunflower logo or chose to create schemes that connoted the mood within that the architectural students aimed to achieve with their schemes. (Figure 9)



For the final iteration I changed the smiley face in the centre of the sunflower into a character sleeping as this better reflects the "Take a Break" slogan.

I have also altered the slogan at the bottom to be more concise and impactful. It encourages people to have a balance of work and play.

The logo has been added in the bottom right corner.

This could be replaced to better fit poster and modernise however it doesn't look out of place.

Figure 9. Graphic Communication Student Outcome

CONCLUSION

This project allowed the BSc (Hons) Architecture at UWTSD and the BA (Hons) Graphic Communication students to tackle a real-world problem relating to wellbeing. They were required to draw upon all that they have learnt in their first-year studies and work with stakeholders in the local community to produce a meaningful project with a positive impact on others. The project afforded the students with an opportunity to practice and experiment with new techniques and concepts, this module rounds off your first year by seeing how they can be applied to a real situation. Overall, the combination of subject areas within a framework of experiential learning benefitted engagement, learning processes, information retention and analysis skills of the students in a way that mono thematic classroom-based teaching does not as suggested by Kolb.¹⁹ The coming back into the classroom 'face to face' following the Covid 19 pandemic has presented a set of new challenges that were not necessarily evident before. A prolonged period of isolation appeared initially to impact the social interaction between the students, which improved through the project timeline.

Limited access to the proposed site prevented a more in-depth interrogation of existing use patterns and seeking pupil buy-in within the school environment. However, the outputs in terms of creative ideas that may be utilized for the greater benefit is immeasurable. The student proposals will be presented to the Bronwen's Wish Trust and Cardiff High School for their review and feedback over the summer of 2023. It is hoped that Bronwen's Wish will be a springboard for similar design at other schools across Wales and thereby benefit each school community.

NOTES

- ¹ "Bronwen Grace Morgan", *Bronwen's W;sh*, accessed June 1, 2023, <https://www.bronwenswish.org/bronwen>.
- ² "Survey shows greatest improvement in public attitudes to mental health in 20 years," *MIND*, accessed March 25, 2023, <https://www.mind.org.uk/news-campaigns/news/survey-shows-greatest-improvement-in-public-attitudes-to-mental-health-in-20-years/>.
- ³ "Transforming children and young people's mental health provision: a green paper," *GOV.UK*, accessed March 25, 2023, <https://www.gov.uk/government/consultations/transforming-children-and-young-peoples-mental-health-provision-a-green-paper>.
- ⁴ Raymond Williams, *Problems in Materialism and Culture*, (London: Verso Editions and NLB, 1980) 83-4.
- ⁵ "University of Wales Trinity Saint David Strategic Plan 2023-25," University of Wales Trinity Saint David, accessed March 25, 2023 <https://uwtsd.ac.uk/about/strategies-and-policies/>.
- ⁶ "Well-being of future Generations (Wales) Act 2015," *Welsh Government*, accessed March 25, 2023, <https://www.futuregenerations.wales/wp-content/uploads/2017/02/150623-guide-to-the-fg-act-en.pdf>.
- ⁷ "USW's 2030 Curriculum Principles, Assessment for Learning Principles," University of South Wales, accessed March 1, 2023, <https://celt.southwales.ac.uk/usw-2030-curriculum/usw-2030-curriculum-principles/>.
- ⁸ Donald A. Norman, "Notes towards a complex theory of learning" in A. M. Lesgold *et al* (Eds.) *Cognitive Psychology and Instruction*, (New York: Plenum, 1978). Quoted in Neville Bennett, Charles Desforges, Anne Cockburn, and Betty Wilkinson, *Quality of Pupil Learning Experiences*, (Taylor & Francis Group, 2011), 23.
- ⁹ Lawrence Halprin, *The RSVP Cycles: Creative Processes in the Human Environment*, (George Braziller, Inc, 1969) 2
- ¹⁰ William Hodson Brock, (Ed) *H. E. Armstrong and the Teaching of Science 1880-1930*, (Cambridge University Press, 1973), 110-120.
- ¹¹ M. Droste, *Bauhaus, Bauhaus archive 1919-1933* (Taschen, 1998), 69-119.
- ¹² Lawrence Halprin, *The RSVP Cycles: Creative Processes in the Human Environment*. 2.
- ¹³ David. Allen Kolb, *Experiential Learning, Englewood Cliff* (New Jersey: Prentice Hall, 1984), 23-38.
- ¹⁴ Donald A. Norman, "Notes towards a complex theory of learning".
- ¹⁵ W. Timothy Weaver, and George M. Prince. "Synectics®: Its potential for education." *The Phi Delta Kappan* 71, no. 5 (1990): 378-388.
- ¹⁶ IDEO, "Design Thinking," accessed June 1, 2023, <https://www.ideo.com/pages/design-thinking>.
- ¹⁷ Design Council, "The Double Diamond Design Thinking Process and How to Use it," accessed June 1, 2023 <https://www.designorate.com/the-double-diamond-design-thinking-process-and-how-to-use-it/>.
- ¹⁸ Paulo Freire, *Pedagogy of Freedom*, (Maryland: Rowman and Littlefield Publishers Inc. Lanham, 1998), 1-160.
- ¹⁹ David. Allen Kolb, *Experiential Learning*, 23-38.

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PHD CRAFTING: INFUSING WELL-BEING THEORY INTO DOCTORAL PROGRAM ENVIRONMENTS TO CULTIVATE MOTIVATION, IMPACT, AND TRUST AND COMBAT TALL POPPY SYNDROME

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INTRODUCTION

University environments offer unique challenges for faculty and students, intermingling top-down bureaucracy with bottom-up workloads. Doctor of Philosophy (PhD or doctoral) candidates are especially impacted by push-pull dynamics, as they bridge student and staff association throughout their candidacy. Unfortunately, rather than benefitting from this dual categorization, candidates often encounter a double standard, being identified as neither group, resulting in well-being detriment and a lack of belonging that exacerbates loneliness. Pre-pandemic, postgraduate students were six times as likely to experience depression, resulting in a mental health crisis¹ and “PhDepression”.² It is imperative their well-being be prioritized to uplift that of themselves, the students they lead, the supervisors they follow, and the universities they inhabit.

Well-being science offers Self-Determination Theory (SDT)³ as a means of designing for flourishing. Doing so precipitates Ryan et al.’s “living well”⁴ in addition to intrinsic motivation,⁵ enhanced performance and work quality for impact, and trust.⁶ This paper furthers novel Eudaemonic Design scholarship for flourishing-supportive environmental curation and intentional praxis.⁷ By ensuring SDT’s three tenets are satisfied, it proposes PhD crafting as a take on job crafting scholarship⁸ to empower doctoral candidates to curate need-suiting environments. By presenting an Australian female-focused doctoral team perspective, the author proposes PhD crafting as a strategy to combat inequities, including Tall Poppy Syndrome⁹—when high-performing women such as PhD candidates are cut down rather than recognized for achievement—and enhance overall well-being.

Considering Environments for Flourishing Health and Well-being

Over the past three years, humans have experienced the significant impact of COVID-19 on our lives and the importance of environments on our health and well-being. These include both spatial as well as organizational environments. According to researchers out of Harvard, buildings can make you sick or they can keep you well.¹⁰ Further, according to researchers in Canada¹¹ and Oxford,¹² organizational environments play an integral role in worker well-being, especially when considering post-pandemic circumstances.

What if we considered designing environments for thriving health and overarching well-being from both a physical environment and organizational environment point of view? What would that look like in general and in a post-COVID-19 reality? And what would that look like when considering PhD candidate, particularly female PhD candidates—a demographic that has been impacted more extremely as a consequence of the pandemic?

This Architecture Media Politics Society (AMPS) Applying Education in a Complex World paper builds on scholarship that considers environmental design aiming for Aristotle's concept of eudaemonia (i.e., being one's **best self**),¹³ as introduced during an affiliated AMPS conference held in late 2021, entitled *Environments by Design: Health Wellbeing & Place*. Though the originating Eudaemonic Design research attended to a spatial environment focus, related scholarship¹⁴ explored in the context of the workplace attests to the value in applying Eudaemonic Design for architectural *and* organizational environments to promote optimal worker and workplace wellness. By interrogating the more organizational perspective of Eudaemonic Design, one that considers design that prompts inside-out behavioral change and outside-in organizational support in an academic context, this paper explores the transformation potential for female PhD candidates—a vulnerable and often forgotten group within academia.

ACADEMIA-RELATED CHALLENGES FOR FLOURISHING DESIGN

University environments, although similar to many industry workplaces, offer a panoply of challenges unique to the academic lifestyle. Four are considered of consequence to this paper.

The first challenge relates to the university environment itself, one that offers unique challenges for faculty, staff, and students. In 2019, a United Kingdom-focused study was featured in an article entitled, “the way universities are run is making us ill”¹⁵ attesting to the role of UK campuses in contributing to student anxiety and stress. Just as physical environments can improve or worsen sickness, organizational environments including those of universities can do the same.

The second challenge relates to the uniqueness of postgraduate students as a demographic. Since before the pandemic, both grey and academic scholarship warned of the mental health crisis within graduate education. For example, one study¹⁶ featured in a mainstream higher education article¹⁷ presented findings from a survey that included nearly 2300 respondents—90% of whom were PhD candidates—across 26 countries and 234 institutions. According to the study, 41% of those surveyed met moderate to severe anxiety levels, while 39% were within the moderate to severe depression range (a number particularly compelling when compared to the general population average of only 6%). Breaking these down by gender, transgender and gender-nonconforming graduate students experienced the highest anxiety and depression at 55% and 57%. Among cis students, 43% of women experienced anxiety and 41% depression (compared to only 34% and 35% for men, respectively). What were some of the causes of this stress and strife in the form of anxiety and depression? Over half of the students with high anxiety and depression were believed to have an unhealthy work-life balance with similarly high numbers attributed to poor mentorship and lack of support, accentuating the importance of organizational environmental factors.

These problems have been exacerbated by the pandemic—the third challenge. As of 2021, the term PhDepression was used for the first time in a paper,¹⁸ which cited studies like the UK-based one by Evans et al.¹⁹ and stressed how “graduate students are more than six times as likely to experience depression compared with the general population”.²⁰ However, the PhDepression study differed from the other in its methodology, inductive analysis of qualitative interviews with 50 PhD students from 28 institutions, its emphasis on life sciences PhD students, and its assessment of research versus teaching-stemming depression impacts. Findings included how research was more likely to negatively

affected depression, while teaching improved it. Most importantly, it identified four overarching aspects that influence student depression, namely:

1. Structure (lacking in research but present and therefore appreciated in teaching);
2. Reinforcement (felt to be negative for both research and teaching, but positive impact was only attributed to teaching, likely because constructive research-related feedback was rare);
3. Success and failure (primarily experienced for research due to existence of concrete metrics); and
4. Social support and isolation (felt more negatively for research but improved with the incorporation of research and teaching groups).

While the study states that “no theoretical model is widely accepted as an overarching framework for depression within the psychological and psychiatric communities,”²¹ cognitive,²² behavioral,²³ and psychodynamic²⁴ models were believed to have potential in addressing the 4 identified aspects. By targeting these four aspects with a model that balances the recognized psychology-centric viewpoints, it might be possible to counteract PhDepression.

The final challenge relates to burnout. It is believed that we spend a third of our lives at work.²⁵ And for PhD candidates who are deeply invested in their research, exploring personal passion interest areas while also often teaching and pursuing secondary jobs to pay the bills, this percentage of time spent working is believed to be higher. The Australian Human Resources Institute recently highlighted three types of burnout²⁶ in a 2023 report.²⁷ The first is Overload, which relates to being overscheduled; the second is Underchallenged or feeling under-stimulated; and the third is Neglect or experiencing agency loss-prompting exhaustion. Each of these is a type of burnout many PhD candidates have experienced first-hand and viscerally. However, by improving environments, it is possible to ameliorate circumstances and avoid each of these burnout types. As study co-author Chan states, “If we see a fish dying in the river, we don’t think about how we can make the fish stronger. We ask how we can clean up the pollution and fix its environment.”²⁸ While the onus should not fall upon individuals to act for their well-being alone, perhaps it is possible to consider an approach that facilitates support both from the outside and from within.

An Enhanced Need for Augmented Well-being for Women, Especially Academics

Women in the workplace are likely to need and benefit from buttressed health and well-being support to combat uneven gender expectations relating to responsiveness,²⁹ tidiness,³⁰ and civility.³¹ As organizational psychologist, Grant, recently stated, “We still live in a world that places unfair pressure on women to drop everything for others.”³² Female PhD candidates experience the negatives of workplace gender bias on top of academic work demand trials.

It is worth considering the unrealistic expectations of academic life, as outlined in a visual³³ depicting the complex and multifaceted teaching, research, and service academic obligations balanced by lecturers. The creator of the visual pursued a PhD on burnout³⁴ and, though the graphic was not intended to directly relate to her research, it intimates at potential causes for academic burnout. Indeed, when reflecting on this visual, it is difficult to believe that this depth and breadth of duties can be addressed in the same job description by only one person. Further, although meant to depict responsibilities of an established lecturer academic, it hints at similar burdens taken on by PhD candidates training for such a role while navigating the constant struggle for “publish and perish”³⁵ research or “pivot or perish”³⁶ teaching and service mentalities to prove ideas have merit and academics have marketability and agility, respectively.

These expectations on their own can prove tiring. However, when combined with care-taking demands of home life—demands that are often associated with and taken on by females—they can

take a toll. Women continue to be significantly burdened by pandemic-caused disruption and the shifting new normal, as identified in Deloitte’s *Women @ Work 2023: A Global Outlook* report.³⁷ Therefore, it is unsurprising that they are at “alarmingly high levels of burnout”.³⁸ Uneven home life responsibilities post-COVID-19 also played a role. According to a Persona Talent study comparing time allocation pre and post-pandemic,³⁹ it is clear how much more women were impacted by COVID-19 based on (a lack of) work-life balance. Three activities examined included housework, food preparation and clean-up, and caretaking. Both men and women spent more time on housework, though women spent more hours total and represented a larger percentage of the population engaged in the activity—more than twice that of men (at 48% rather than 21%). For food preparation and clean-up, though both men and women increased time spent on the activity, women again shouldered more of the burden, with 72% doing such activities compared to only 47% of men. Caretaking responsibilities increased for both genders overall, though more women engaged in caretaking activities overall than men.

According to The Policy Equity Group, it is of the utmost importance that these “wonder women”⁴⁰ be recognized for the invisible, invaluable work that mothers and caregivers offer. Some researchers and practitioners believe that remote work has the potential to level the playing field for work-life balance, marking a “watershed moment for employees...who have long carried the burden of balancing caregiving with their careers.”⁴¹ According to Carroll, an academic quoted in the article, this marks an “opportunity to reduce stress and burnout, thereby increasing gender equity and inclusion, but we must be intentional in how we design these policies or we risk importing old biases and barriers into our new hybrid work arrangements”.⁴² It is imperative that these hybrid environments are designed equitably, given how many others are working to countermand women’s accomplishments.

Tall Poppy Syndrome is known as the phenomenon when high-performing women such as PhD candidates are cut down rather than recognized for achievement. The two leading reports on this precedent originate with Billan and Humber in 2018⁴³ and Billan in 2023.⁴⁴ Each characterizes the pervasiveness of this international phenomenon, which has been quantified as impacting approximately 87% respondents, both in 2018 and now. According to findings, little has changed in the last five years, other than the offenders doing the cutting. In 2018, it was believed that jealous women were primarily to blame. However, the blame has now shifted to envious men. No matter who is at fault, women can have a better chance of thriving at work if they are in well-being cultivating environments that prevent harmful actions and proactively advocate for improved circumstances. Having a multipronged approach based on science is the most likely way of realizing this layered solution.

DESIGNING FOR POSITIVE PSYCHOLOGY, NOT TOXIC POSITIVITY

One approach that has been offered as a means of addressing concerns is a positive-focused approach. However, there is a significant difference between designing legitimately for positive psychology (also known as well-being science) and having a superficial and therefore detrimental impact via a toxic positivity approach.

Toxic positivity is defined as “the belief that people should maintain a positive mindset no matter how dire or difficult a situation”.⁴⁵ While people’s motivations might vary in degree of sincerity, this sort of positivity is often shared in the workplace as an obligatory recognition of personal tribulation—saying clichéd phrases, acting like a cheerleader, or dismissing feelings. It can serve as a slippery slope that often leads to gaslighting, “invalidat[ing] human experience [with the potential of leading]

to trauma, isolation or unhealthy coping mechanisms”.⁴⁶ A more empathic approach is needed to acknowledge and address the challenge.

PhD candidates, who are vulnerable to loneliness, self-consciousness, and PhDepression, are often eager for validation of work and ideas. If supervisors and universities miss the opportunity to legitimately recognize PhD candidates’ human needs, it can be damaging—challenging psychological trust. Candidate environments should instead “foster a sense of belonging, which means showing up as your whole self, even if...having a bad day”⁴⁷ while also ensuring experiences of autonomy and competency, thereby meeting SDT’s three psychological needs (autonomy, competence, and relatedness) and designing for positive psychology.

Positive psychology scholarship professes that, if these needs are met, people flourish.⁴⁸ If they are overlooked, people languish.⁴⁹ This correlates to a 2020 University of Helsinki study that cited how 60% of students felt burnt out or at risk of burning out.⁵⁰ According to the study, factors attributing to nearly 46% of the burnout reported aligned to autonomy, competence, and relatedness dissatisfaction.⁵¹ Designing for SDT has been proposed as a means not only of counteracting burnout but also of accomplishing what Ryan et al call “living well”,⁵² aligning with Aristotle’s eudaemonia or being one’s flourishing best self.

PROBLEMATIZING DOCTORAL PROGRAM ENVIRONMENTAL DESIGN

When considering how best to do such design and explore the question, “How can doctoral environments be curated to support optimal health and well-being of female PhD candidates?”, the author considered a problematized approach to the question, aiming to address three design shortcomings and identifying corresponding aims that relate to the underlying what, why, and how.

The what relates to designing for comprehensive elements of health and well-being rather than short-sighted health-only or tokenistic well-being washing⁵³ efforts of the past. While health-based design is a productive step, a legitimate well-being science approach to design provides the potential to not just improve elements of physical, mental, and social health individually but collectively, while also contributing to better life experiences.

The why activates the necessary connection between theory and practice—something that rarely happens, especially in architectural and organizational design. It is critical these become interlinked in solutions, both to allow historical and current research to inform practice and to close the feedback loop and allow practice to share real-world thoughts with theory-based researchers. There is much to be learned on both sides. And if these silos could be bridged, it may be possible to formulate theory-based design principles that are both innovative and pragmatic.

The third shortcoming builds on the theory with practice why and questions the how. In the past, the how of environmental design has revolved around math and science, rather than psychology or philosophy. Some of the more substantive problems facing PhD candidates today involve existential questions of self and purpose, examining what drives them to do what they do, unearthing a Simon Sinek-like vision of finding their personal why,⁵⁴ and determining how best to work toward that without being waylaid by feelings of depression, anxiety, or burnout or by gender-based inequities such as Tall Poppy Syndrome.⁵⁵ Qualitative studies that explore psychology-based approaches for philosophy-based design can provide tremendous insight into environments that make people feel supported on the outside and empowered from within.

In research⁵⁶ that established Eudaemonic Design as a means of curating environments for flourishing health and well-being, it was recognized that design done for SDT as well as the idealized notion of eudaemonia resulted in environments that were considered flourishing-supportive as well as individually empowering. Applying this Eudaemonic Design to the doctoral candidate context would

meet the health and well-being aim, provide a practical practice-appropriate yet theory-based approach to the work, and align with anti-burnout design suggestions as well as empower positive psychology ideals that support unexpected motivation, collaboration-building trust, and performance for impact.

Self-Determination Theory for Health and Well-being, Motivation, and Inclusivity

The proposed outside-in and inside-out dual approach originates both in SDT for comprehensive health and well-being scholarship⁵⁷ and applied research⁵⁸ as well as in related intrinsic motivation scholarship⁵⁹ and applied research.⁶⁰ As these attest, design aimed for SDT's competence, autonomy, and relatedness result in comprehensive benefits to physical, mental, and social health as well as enhanced feelings of meaning and motivation, together achieving an optimal flourishing state or eudaemonia.

Because of SDT's widespread applicability across a variety of personal circumstances,⁶¹ such as those identified within the Royal College of Art Helen Hamlyn Centre's Four Axes of Inclusive Design—Age, Race, Gender, and Ability⁶²—SDT-driven work can serve as an inclusive means of engagement. Eudaemonic Design's application as an inclusive design approach was put to the test during doctoral research conducted in 2021,⁶³ during which Australian older adults were co-designed with to interrogate Eudaemonic Design's application at home. While the creative methods-based approach resulted in the aimed-for model and principles, it also prompted an unexpected outcome of participant motivation. Participants found the process to be genuinely interesting and prompted desires for personal change—resulting in participants tidying up spaces, adding plants for biophilia, wishing to explore and take trips, desiring deeper connections with family and friends, and acting more altruistically.⁶⁴ One way this could be interpreted is as a form of empowered crafting.

PROPOSING PHD CRAFTING AS AN INCLUSIVE, EMPOWERING APPROACH

Crafting is a term that originated in 2001.⁶⁵ It involves curating one's circumstances into something they enjoy. The concept has primarily been explored in the context of work, being cited in well-being science scholarship as a means of combatting burnout.⁶⁶ With increasingly common work from home (wfh) tendencies, it has been explored in the form of home crafting,⁶⁷ though again in a wfh-centered context. Referencing this crafting scholarship, Eudaemonic Design was proposed means of “both crafting homes for health *and*, borrowing from job and life crafting scholarship, home crafting—empowering occupants to shape their homes into places in which they can thrive”⁶⁸ or as intentional praxis to precipitate empowerment.

According to Demerouti et al, 2020, home crafting involves “changes that [occupants] make to balance their home demands and home resources with their personal abilities and needs, in order to experience meaning and create or restore their person-environment fit”⁶⁹ (p. 1013) or as Bauer and Shorey⁷⁰ put it, “when people are empowered to proactively shape their meaningful roles in life”. Because the doctoral work was explored with and for older adults via co-design, accounting for their lived experiences at all ages (with 25% of the participants having been PhD candidates in the past), Design for All theory⁷¹ attests to how this Eudaemonic Design research that resulted in empowering home crafting might have validity and similar impact when applied for other demographics. By similar logic, eudaemonia-focused design can likely be applied to improve PhD candidate environments while also motivating the candidates themselves to curate conditions in which they can thrive.

Depicting a Layered Approach to Doctoral Program Well-being

When considered in the frame of work, Eudaemonic Design has been proposed hypothetically for workplace wellness, aiming for worker, workspace, and workplace design⁷² in which Self Determination Theory's resonance with certification models of architectural (referencing Harvard's 9 Foundations of a Healthy Building⁷³) and organizational wellness (referencing WELCOA's Elements of Wellness⁷⁴) was deemed a sound approach for meeting dual environment (architectural and organizational) wellness criteria.

Just as the layered approaches of worker, workspace, and workplace architectural wellness when considered across worker, team, and company organizational wellness results in "a multiplier effect...encouraging people to be intrinsically motivated to choose to act, to act effectively, and to relate to others while doing so",⁷⁵ PhD crafting could enable a strengthening symbiotic approach to benefitting candidates. The primary difference would be envisioning the PhD candidates on the inside of the model, supported by the research or supervisory team and ultimately the university on the outside. Some example architectural and organizational wellness strategies, broken out by interior to exterior focus (PhD Candidate, Team, and ultimately University) and aiming for SDT psychological need fulfillment, include:

- PhD Candidate
- Encouraging autonomy with targeted employee engagement⁷⁶
- Facilitating competence with flexible work schedules⁷⁷
- Providing a variety of social engagement options⁷⁸
- Team
- Ensuring university hierarchies support intrinsic, autonomous motivation⁷⁹
- Facilitating belonging with exercised competence in team workspace personalization,⁸⁰ joy-prompting styling,⁸¹ and access to nature⁸²
- Enabling physical and digital collaboration⁸³
- University
- Furthering autonomy by providing process structure yet allowing for agile systems and limiting administrative burdens to enable creativity⁸⁴
- Empowering workers through training opportunities and feedback loops,⁸⁵ not micromanaging⁸⁶
- Curating opportunities for meaning-making and connection⁸⁷

As noted with the dying fish analogy,⁸⁸ it is short-sighted to put the onus on the dying fish or in this case the burnt out PhD candidate. It is better to improve their environments. However, if we can improve their environments while also empowering the fish or PhD candidate fish to become more motivated and wish to improve their surroundings, perhaps that could result in a more realistic, collaborative, and effective solution.

CONCLUSION

The primary significance and contribution of this paper involves proposing Eudaemonic Design to promote PhD crafting as a means of supporting and empowering female doctoral candidates, while avoiding burnout and combatting Tall Poppy Syndrome. Through intrinsic motivation built into spatial and organizational environments, SDT encourages individuals "to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" so they innately and intrinsically wish to do more.⁸⁹ In this way, environments that support intrinsic motivation can be regarded as flourishing spaces, suggesting that SDT can significantly contribute to the intentional design of such environments.

By designing such environments for competence, autonomy, and relatedness while maintaining SDT-founded engagement protocols to facilitate PhD crafting, candidates are likely to experience the support they need from their teams and universities while also feeling individual motivation, legitimate trust with team members including supervisors, and purpose-driven impact to better their own lives and the well-being of their universities. Doing so can have circular benefits, improving the lives of these women and enabling them to be their best happy, healthy, and productive selves and therefore better teachers, researchers, colleagues, and humans.

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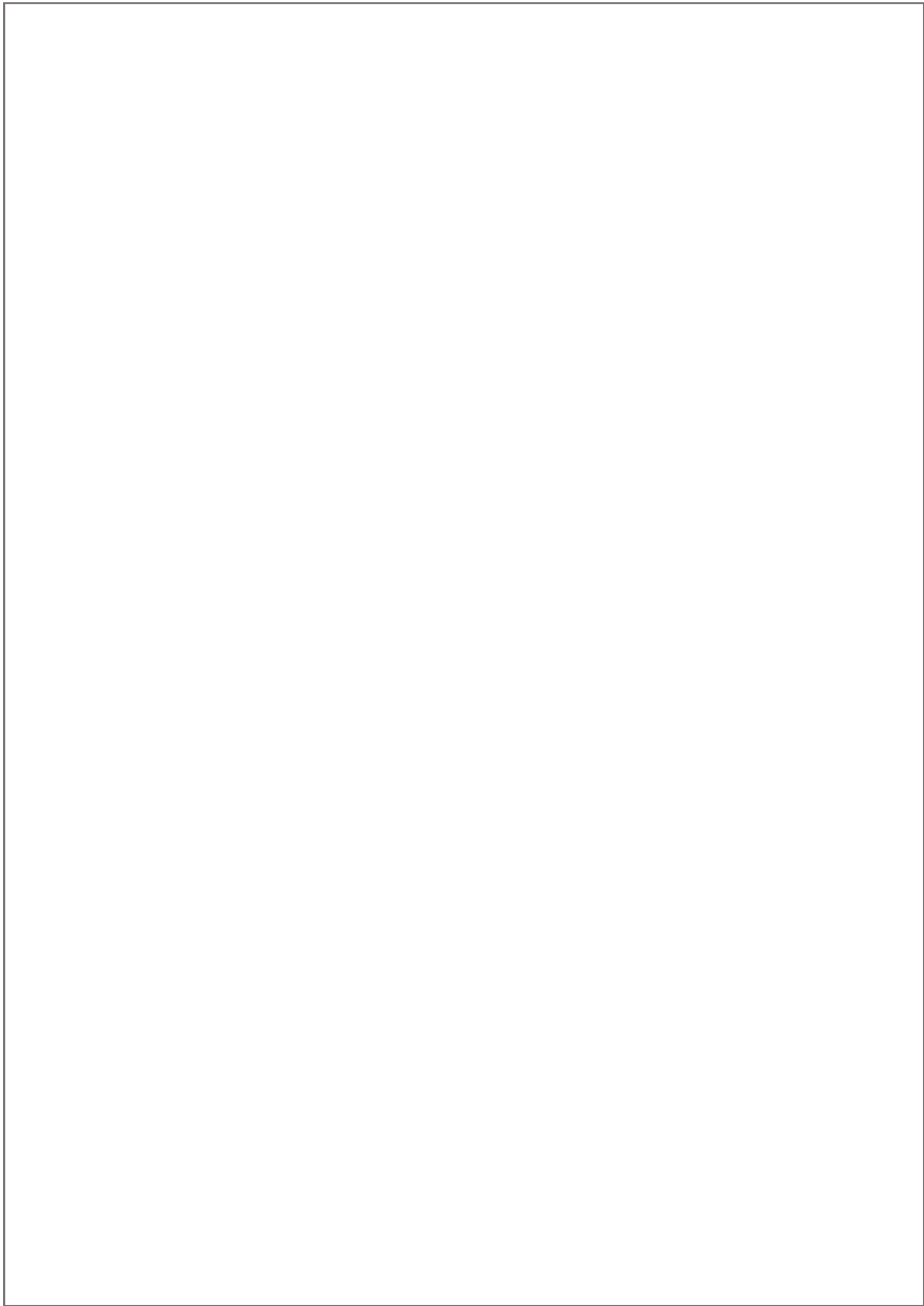
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