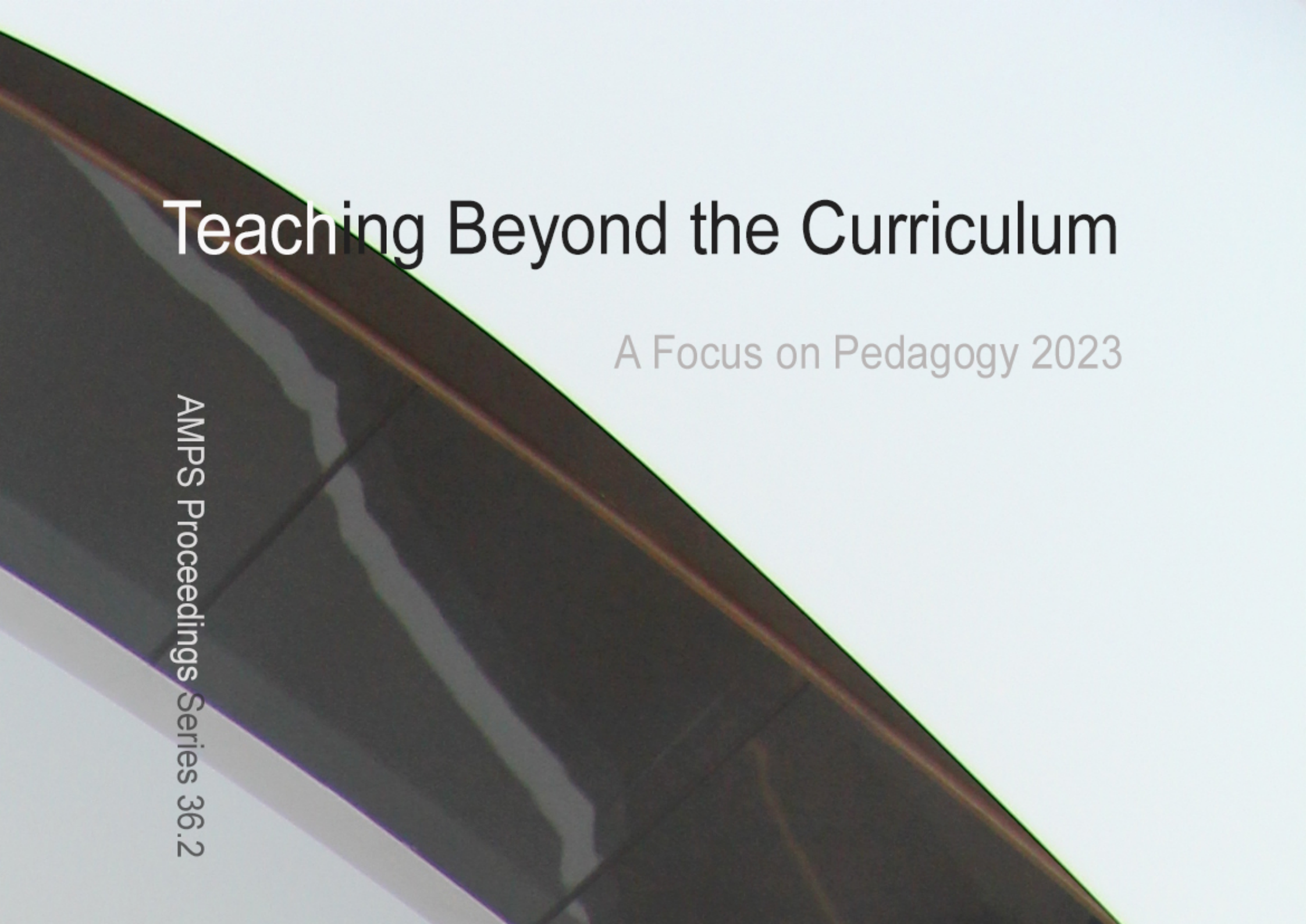

Teaching Beyond the Curriculum

A Focus on Pedagogy 2023

AMPS Proceedings Series 36.2

AMPS PROCEEDINGS SERIES 36.2

Glasgow School of Art, Louisiana State University, Wenzhou-Kean University.
15-17 November, 2023

Teaching Beyond the Curriculum

A Focus on Pedagogy 2023

ARCHITECTURE_MEDIA_POLITICS_SOCIETY
Amps

EDITORS:
Gregory Hurcomb, Eleanor Herring & Jake Jackson
Vincent Peu Duvallon

EXECUTIVE PRODUCTION EDITOR:
Amany Marey

AMPS PROCEEDINGS SERIES 36. ISSN 2398-9467

INTRODUCTION

Teaching Beyond the Curriculum

A Focus on Pedagogy 2023

This publication examines how our teaching has morphed in recent years. It is based on conference themes developed by the three institutions internationally at the 2023 AMPS coordinated conference, 'Teaching Beyond the Curriculum': Glasgow School of Art, UK – Critical Speculations on Art School Education | Louisiana State University USA – Creativity as an Experimental Agenda | Wenzhou-Kean University, China – Teaching Beyond Boundaries – Education Outside the Classroom. The papers presented at both the event and its proceedings publication were, in their various unique ways, a response to the call, a summary of which is presented here:

The number of ways we have thought about education over time is vast. From Socrates to John Dewey, and Jean Piaget to Paulo Freire, our understanding of learning has evolved and morphed. The concepts and theories we manage range from learning for learning's sake to vocational training; from a liberal arts education to on-the-job training; and from student-centered learning to research-informed teaching. Today then, our definitions and models of teaching are vast. In an age of ever faster change and innovation, this plethora of concepts expands incessantly. As we adapt to the radical disruptions of the technological turn post COVID, it can be overwhelming. What this all results in for teachers and learners alike, is an open, and sometimes contested, question.

In the built environment, architects, urbanists and planners operate in changed studio settings. In teacher training and education studies, modes of delivery have been radically altered. In the social sciences, how we teach subjects like anthropology, sociology and cultural theory is under constant critique. In the arts, media and design fields, the pressure on students to consider a 'job' informs what we teach, and how they learn. Whether approaching teaching from the perspective of STEM or the frameworks of the humanities, this is a complex time.

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MEASURING THE DESIGN THINKING MINDSET IN INTERIOR DESIGN STUDENTS: A CORRELATION STUDY

Author:
MARINA HENDRICKS

Affiliation:
UNIVERSITY OF LINCOLN, UK

INTRODUCTION

Design thinking frequently serves as a focal point in generalizations, descriptions, and theories within the realm of design. It is often acknowledged as a valuable resource for business and education.[1] This dynamic human centred approach to solving problems encompasses a spectrum of behaviours, characteristics, and cognitive mechanisms inherent in the design process.[2] Engineers, architects, and other professions have traditionally approached complicated problems in different ways.[3] As a result, a variety of design thinking methods, models and theories have emerged over the years.[4]

Although the term is a popular phrase in industry, it is still relatively new in academia.[5] Design thinking is currently taught in a range of disciplines and contexts by educators who engage with and apply the process through their own unique interpretations and applications.[6] Currently, design thinking is considered an ongoing process that is neither discrete nor logical, making it challenging to standardize.[7] Despite the increased inclusion of design thinking in education curricula, there is little systematic causal evidence that assesses the specific metacognitive mechanisms that underpin design thinking. A better understanding of the nature of design thinking is required so we can enable design educators to effectively nurture and develop it.

To understand how to foster and nurture design thinking, the nature of design ability needs to be defined. The conceptual underpinnings vary from a methodology to a philosophy or set of objects. Although design thinking appears to be growing in importance, there is little consensus among academics and practitioners regarding the term. The components that make up design thinking has evolved over time, and this has led to critiques of potential oversimplification.[8] Some academics, have criticized the definition of design thinking as too narrow, arguing that design thinking's distinctiveness comes from the multi-layered aspect as a 'bundle of attitudes, tools, and approaches.[9] Opinions on design thinking vastly vary.[10] Design thinking remains a multifaceted concept and there is no widely accepted definition, making the term more complex to understand. Ambiguity (misunderstanding or misinterpretation) of the term is a reoccurring problem.[11]

Evaluating the effectiveness of design thinking is a challenge. There is a lack of coherence around what constitutes design thinking.[12] Few studies on the personality, attitudes and cognitive ability required for design thinking exist making it difficult to understand. This highlights a gap in the knowledge and limits the industry and educational understanding of design thinking. Various assessments and speculation around what this kind of thinking requires exist but are not conclusive and no clear metric exists on how to measure design thinking. As educators, we should approach this critically and reflectively to continue

expanding the understanding. Therefore, it is important to examine design thinking more closely and thoroughly and to produce empirical research.

Defining design thinking

Design thinking became widely recognized in the later part of the 20th century.[13] The foundations can be traced back to architecture, engineering and industrial design principles that surfaced in the late 19th and early 20th centuries. The term 'design thinking' was coined by a professor at Harvard School of Design in 1987[14] and further developed by Buchanan[15] in 1992 to describe how design thinkers' approach complex problems. Around the same time, Cross (an influential design theorist) defined design thinking as inquiry about with how things should be, as opposed to the natural sciences, which focus on how things are.[16] In 1991, David and Tom Kelley from IDEO (a design and innovation consultancy) played a crucial role in popularizing design thinking and their model was introduced to Stanford University as a unique approach to strategy and innovative problem solving.[17] In 2005 Stanford University solidified its commitment to design thinking education by establishing the Hasso Plattner Institute of Design (d.school).[18] This further established design thinking principles across numerous industries including and not limited to the business and medical fields.

Today, ongoing academic discussions and critical reflections contribute to refining and enhancing design thinking as a framework for problem solving and shaping the landscape of innovation. Despite a growing interest in design thinking and efforts to uncover the characteristics of a design thinker in fields like arts, sciences, and more recently social sciences it remains resistant to being simplified and maintains its adaptable nature.[19] More recently, the range and volume of the studies on design thinking indicate that research is expanding.[20] This diversity of application has contributed to a multifaceted understanding of design thinking.[21] Consequently, the understanding remains intricate and diverse.[22]

The causes for this inconsistency may be traced to the fact that design thinking originated from practice, was adopted by businesses, schools (engineering, design, and most recently, management schools), and was afterwards examined by scientific communities.[23] The current understanding of design thinking theory falls short in capturing the range of ideas and methods associated with the term. As a result, there is no consensus leading to vast and varied perspectives. The variety of concepts, range of diverse ideas, different methods and techniques grouped under the umbrella term of 'design thinking' is not sufficiently covered by any one definition or branch of practice. As a result, there is no singular definition or agreement on what constitutes the term design thinking. Perhaps such a quest for unity is counterproductive for the academic development of the area.

Cognitive mechanisms required for design thinking

The most essential characteristic of a Design Thinker is how they 'think'. Design thinkers can switch between analytic and intuitive modes to achieve breakthroughs in strategy and are considered to have a competitive advantage.[24] Designers can solve these complex problems through innovative combinations of actions, activities and thinking skills to turn design challenges into opportunities. Lawson[25] and Cross[26] empirically supported studies that concentrate on the designer's unique awareness and skills, while Buchanan examines the nature of the problems themselves and the designer's use of placements as 'tools' to shape a design problem intuitively or consciously. Kelley,[27] who developed one of the most popular models, once observed that whenever someone asked him about design, he would always use the word 'thinking' to describe what designers did. Cross echoes this when he proposed that design ability "relies fundamentally on non-verbal media of thought and communication".[28] Cross[29] suggests that design ability constitutes a form of thinking intricately linked to the input and processing of basic mental information. He further proposes that there may even be distinct limits to the amount of

verbalizing that designers can productively engage in about design ability. Whether designers are aware consciously or unconsciously the literature acknowledges that certain information must be combined with the information the designer already has to come up with an innovative solution.[30]

The importance of 'intuition' in the development of solutions is emphasized by designers themselves, and 'creativity' is widely regarded as an important component of design thinking. Professional designers might naturally be expected to have highly developed design abilities, it is also clear that non-designers also possess at least some aspects, or lower levels of design ability. There are distinguishable differences between beginners and experts in design, as well as different developmental stages among students of design.[31] Thought leaders in design thinking emphasize the importance of individuals and the way nature and nurture interact to determine a good design thinker.[32] The nature and nurture aspect of design thinking lacks theory-driven empirical research.

To date there is little systematic causal evidence that examines the specific innate factors that underpin design thinking, which could provide insight. The cognitive functions upon which design ability depends has been learned from experiments and observations in the field of neuropsychology, particularly past research with 'split-brain' and brain-damaged patients, which demonstrates that skills like geometric reasoning, 3-dimensional problem solving, and visuo-spatial thinking are indeed localized brain centres and provides evidence for design ability. This kind of research will be valuable in pinpointing the cognitive mechanisms required for design thinking and could provide a compelling framework for comprehending and improving the nurture of design ability as well as help identify and clarify essential features of the nature of design ability. However, there is still considerable work to be done to establish a robust and reliable understanding of design cognition.

Fostering cognitive mechanisms through the design curriculum

The built environment is a multidisciplinary field requiring a mindset that can combine various actions, activities, characteristics, skills, and cognitive mechanisms that speak to the needs of people in different contexts. Students use sketches, drawings, and models as tools to explore problems and develop potentially innovative solutions. These tools enhance students design thinking and helps them process and progress through the complexities of the design process. This processing of information through trial-and-error aids in generating solutions and the very processes of thinking about the problem and its solution.[33] This is considered design cognition and is very similar across different spatial design professional practice domains.

Considering this, the Interior Design programme at the Greenside Design Center (GDC) was designed as an integrated curriculum to simulate industry practice. Various cognitive mechanisms are fostered through different learning activities where subject deliverables are developed a submitted on a project basis. The curriculum for undergraduate degree in interior design (first to third year) and the postgraduate degree (fourth year honours level) is mapped below:

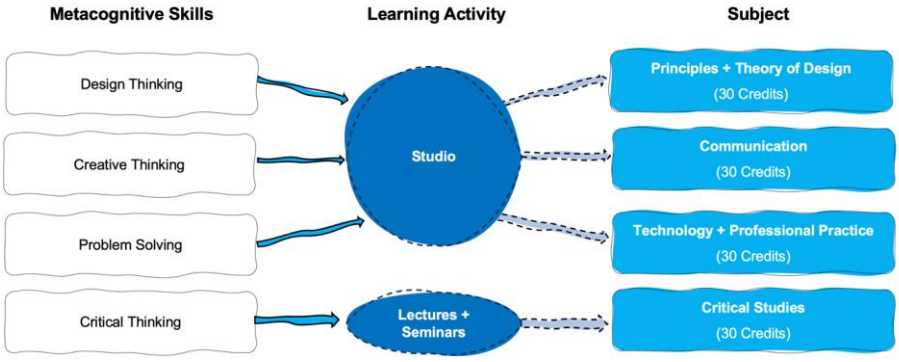

Figure 1. Greenside Design Center Interior Design curriculum mapping

These subjects and learning activities are mapped to specific cognitive mechanisms that are fostered in class.

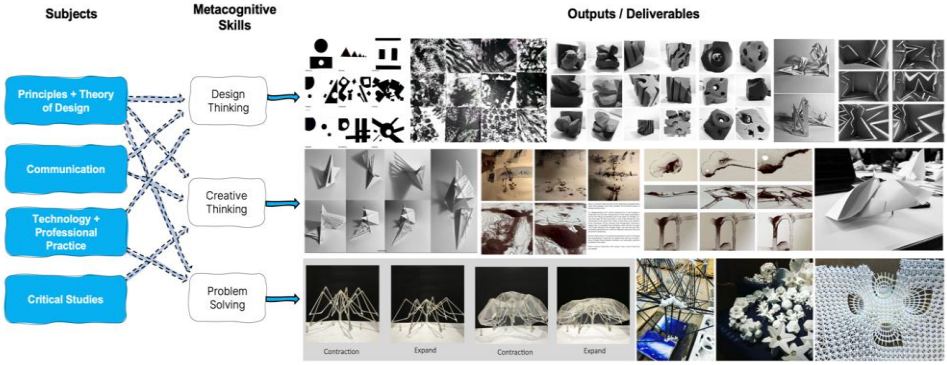

Figure 2. Examples of student outputs in relation to the cognitive mechanisms fostered in the principles and theory of design, communication, and technology and professional practice subjects

Literature verse practice

The literature on design thinking varies. Buchanan[34] emphasizes a designer's use of 'tools' to shape a design problem intuitively or consciously whereas academics like Cross [35] focus their research on the designer's unique skills and awareness. Academic literature is limited and discrepancies on what the core elements of a Design Thinking mindset consist of are limited. The literature contains numerous descriptions of aspects of the design thinking mindset, frequently using inference rather than concrete evidence.[36].= More recent academic literature refers to a design thinking mindset that encompasses both thinking and doing by unpacking what traits, attributes, attitudes, opinions, beliefs, and behaviours characterise are developed to make a good design thinker. Therefore, the theory around design thinking remains a multifaceted concept.[37]

The theoretical foundation of design thinking is predominantly found in the diversity of research presented in conference papers, journal articles, and books which, suggests that design continues to broaden in its connections and meanings, revealing unexpected dimensions in both practice and understanding.[38] Based on the literature, design thinking abilities range from empathy; embracing risk; experimenting; critical thinking; human-centeredness; mindfulness; ability to visualize; problem reframing or solving; ability to collaborate; openness to diversity; abductive thinking; creative and innovative thinking. What is evident from the literature is that design thinking ability requires a multi-

dimensional cognitive approach, yet the cognitive foundations of design thinking have been overlooked due to the multifaceted nature of the process and the complexity of assessing the outcomes it produces. To unravel and gain insight into the constitutive elements that characterize a design thinker, an extensive literature review was conducted. This comprehensive literature review encompassed an extensive collection of resources, including books, conference papers, and journal articles, totalling two hundred and fifty-six items. Thirty-seven of these references identified a clear set of constructs for design thinking and these were further compared and analysed to understand the commonalities and variances in the definitions. The comparison reveals common terms in defining design thinking, spanning behaviours, cognitive abilities, characteristics, and skills, introducing complexity in measurement.

Top five constructs identified from literature		**Type of construct**	**Frequency**	**%**
1	Human Centeredness	Characteristic	21	56,7%
2	Experimentation through testing or prototyping and learning from failures	Behaviour and skill	19	51,3%
3	Envisioning new things through ideation	Cognitive ability	19	51,3%
4	Empathy	Characteristic and cognitive ability	18	48,6%
5	Problem reframing and analysis	Cognitive ability, behaviour and skill	17	50%

Table 1. top five constructs identified from the literature review

Understanding and resolving problems through a design process involves coming up with original ideas, and iteratively creating and testing these ideas and are all components of the problem-solving strategy known in practice as 'design thinking'.[39] Practitioners have rationalized this thinking by developing a 'toolbox' containing ready-to-use resources to tackle more complex problems.[40] Numerous design thinking descriptions included a list of steps. But it is frequently noted that these steps or phases could be carried out in a different order, and they are not always undertaken sequentially and often loop back. Termed as design thinking models, these frameworks outline a series of steps or processes with associated tools aimed at facilitating design thinking within the process. Over the past three decades, various design-thinking models have garnered recognition in practice. Upon comparing these models to the top five constructs identified in the literature, a significant alignment emerges between the most prevalent constructs and the models utilized in practice. However, the nature of these constructs varies, spanning from innate traits to learned abilities. This underscores the importance of comprehensively understanding each construct within its respective mechanism, facilitating the accurate measurement of these qualities.

MODEL NAME	DESIGN THINKING PROCESS							
	1	2	3	4	5	6		7
LINK TO LITERATURE	**Mindfulness and the ability to observe with awareness of process**	**Empathy**	**Problem reframing and analysis**	**Questioning with curiosity**	**Envisioning new things through ideation**	**Experimentation through testing or prototyping and learning from failures**		**Work with people and communicate and network**
IDEO	discover		interpret		ideate		evolve	
DESIGN COUNCIL DOUBLE DIAMOND	discover		define		develop	deliver		
STANFORD 'D SCHOOL'		empathise	define		ideate	prototype	test	
EXPERIMENTAL LEARNING THEORY	reflective observation				abstract conceptualisation	actively experiment		concrete experience
ROTMAN BUSINESS SCHOOL			generalise (induction)		generate ideas (abduction)		test	predict consequences (deduction)
DESIGNING FOR GROWTH	ourney mapping		mind mapping and brainstorming		concept development	rapid prototyping	visual chain analysis and assumption testing	customer co-creation and learning launching
DARDEN BUSINESS SCHOOL	what is?			what if?	what wows?		what works?	
WITHELL AND HAIGH	initiate		investigate		ideate	generate	evaluate	communicate
GOOGLE DESIGN SPRINT	understand		decide		diverge	prototype	validate	
IBM DESIGN SCHOOL	observe			reflect		make		
OPPORTUNITY DESIGN FRAMEWORK		empathise	define		ideate	prototype	test	
ALIGNMENT BASED MODEL	user observation		problem framing and brainstorming		diversity of ideas and visualisation	experiment	rapid prototyping	
DESIGN THINKING, LEAN STARTUP AND AGILE		empathise	define		ideate	experiment	learn and measure	planning and execution
DESIGN THINKING 101		empathise	define		ideate	prototype	test	implement
DESIGN THINKING TOOLKIT FOR MANAGERS	ourney mapping	customer creation	value chain analysis		brainstorming and concept development	rapid prototyping	visual chain analysis and assumption testing	customer cocreation and learning launch
6C MODEL	collect			comprehend	conceptualise	create		collaborate and communicate

Table 2. Design thinking models and the link to literature

Research Design

The aim of this research study was to examine the connection between the performance of interior design students and their own reported mindset towards design thinking. Initially the study sought to determine how effective using a self-assessment survey could be in measuring a student's skill in design

thinking. Additionally, it aimed to offer quantifiable insights to support informed conversations, in higher education about the importance of a design thinking mindset.

After examining the literature, certain metrics emerged as dependable tools for assessing a design thinking mindset. These metrics included Likert scale questionnaires, which had undergone development and validation for measurement purposes. Seven constructs as determined from the literature were then developed into a ninety-four item Likert-type questionnaire. This questionnaire was developed from a combination of three existing questionnaires.[41] Participants were selected from the Interior Design program at Greenside Design Center. A total of eighty participants, including undergraduate and postgraduate students, from different academic years were asked to complete a questionnaire. These results were then correlated with the individual student academic results from their end of year summative portfolio review. This summative review was externally moderated, and the final moderated marks were used in the final dataset. Consent was obtained from each student before they participated, and confidentiality was guaranteed.

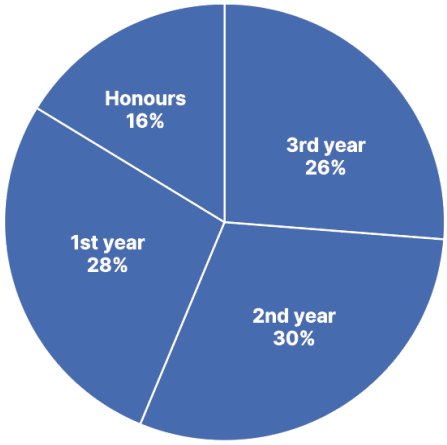

Figure 3. Percentage of students that comprise the sample

Findings

The subjects Critical Studies and Technology and Professional Practice were excluded as there was no significant findings. In instances of notable correlations, the identified relationships were characterized as exhibiting a degree of strength ranging from weak to moderate. The assessment of the reliability and consistency of the constituent Likert items forming the new variables was conducted using Cronbach's Alpha. Constructs demonstrating a significant relationship also demonstrated corresponding Cronbach Alpha scores indicative of appropriateness.

Constructs from literature and practice models		Design Mark	Communication Mark
1.	**Mindfulness and the ability to observe with awareness of process**		
	Ability to observe	-0.054	-0.047
	Be mindful and aware of the process of design	0.177	0.177
2.	**Empathy**		
	Understanding human factors (Human centeredness)	0.002	0.034
	Have empathy and be empathic	0.064	0.023
	Desire to make a difference	0.179	0.123
3.	**Problem reframing and analysis**		
	Capacity for holistic thinking	*0.242**	0.193
	Ability to reframe the problem	0.070	0.049
	Ability to problem solve	0.099	0.103
	Seeing challenges as opportunities	0.098	0.090
4.	**Questioning with curiosity**		
	Critical questioning	0.115	0.083
	Ability to question	0.141	0.151
	Abductive thinking	0.207	0.158
5.	**Envisioning new things through ideation**		
	Envisioning new things	0.106	0.149
	Ability to transform ideas into something tangible	*0.244**	*0.239**
	Having creative confidence	0.154	0.130
6.	**Experimentation through testing or prototyping and learning from failures**		
	Tolerance for ambiguity and uncertainty	0.109	0.140
	Ability to embrace risk	0.138	0.106
	Openness to experimenting and exploring	0.129	0.111
	Learning oriented	0.054	0.054
	Ability to adapt and learn from mistakes	0.006	0.023
	Action orientated / hands-on and prone to making	-0.038	-0.014
7.	**Work with people and communicate and network**		
	Comfortable interacting in teams	0.064	0.104
	Open to different perspectives and diversity	0.062	0.114
	Ability to collaborate	0.139	*0.141*
	Ability to network and work in teams	0.207	*0.221**
	The strength of the correlation is dependent on how close the value is to -1 or +1 * Correlation is significant at the 0.05 level (2-tailed)		

Table 3. Correlations between the constructs established from literature and practice models correlated with student academic results for design and communication subjects

The only two constructs exhibiting a moderate correlation with the design mark were the capacity for holistic thinking and the ability to transform ideas into tangible outcomes. Ability to network and work in teams; and ability to transform ideas into something tangible only moderately correlated with the communication results. Upon further analysis, relationships that were notably and positively correlated were observed with the mean score, student age, and level of study.

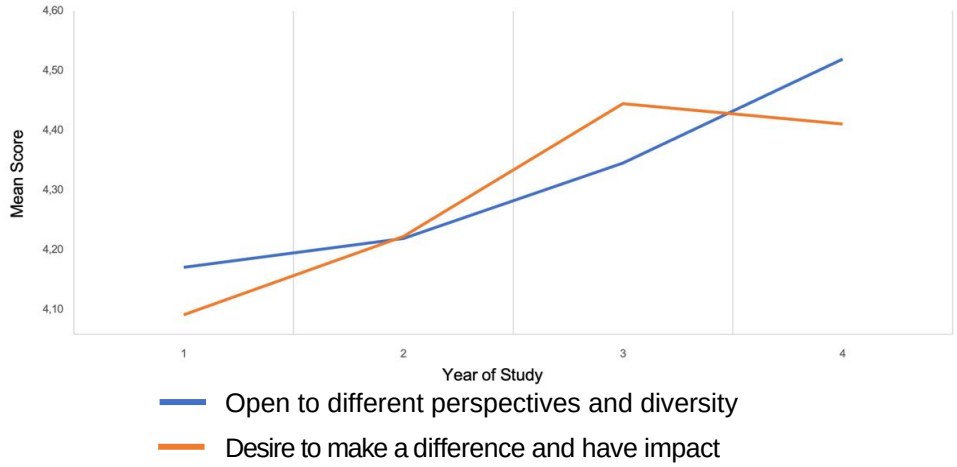

Figure 4. Statistically significant correlations for year of study by mean score

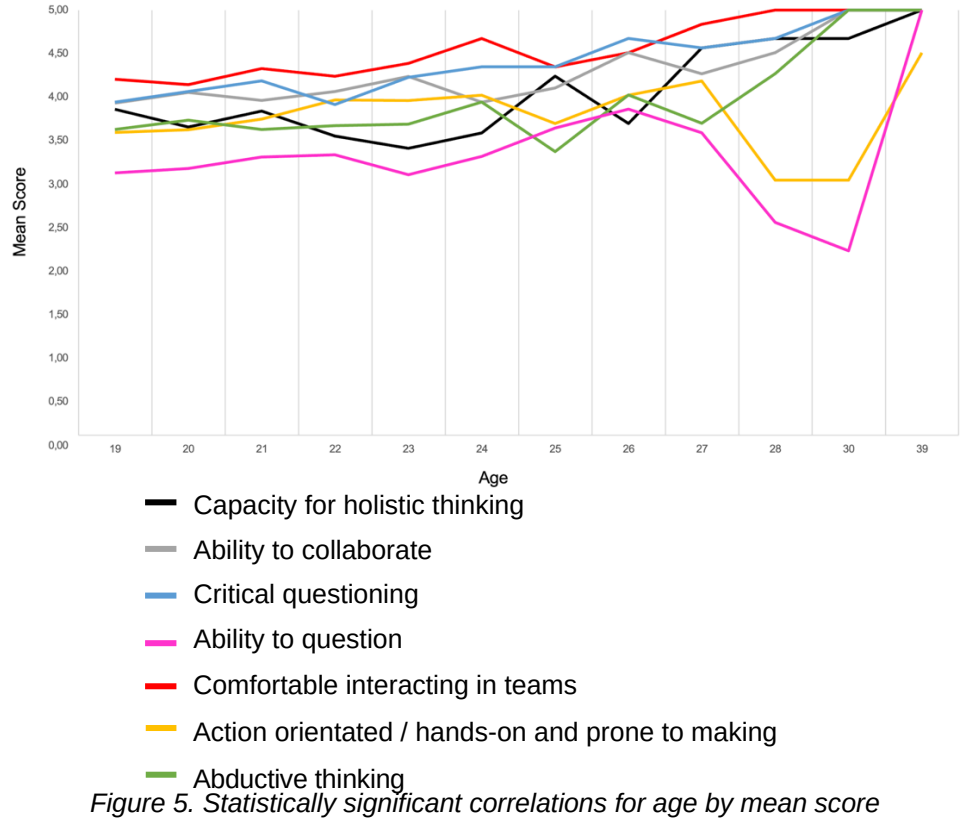

Figure 5. Statistically significant correlations for age by mean score

CONCLUSION

An excessive emphasis on qualitative research in design thinking often neglects quantitative analysis, highlighting the need for a more comprehensive understanding. As a result this research aimed to develop an approach to evaluate design thinking. Various factors could account for the lack of connections in the study. To begin with the selected statistical analysis may have its limitations. Utilizing the Linear Mixed Effects Model could lead to a thorough examination of variability across different data levels. Additionally depending on Likert type surveys for self-assessment might not produce precise objective outcomes. The lack of conclusive findings indicates several promising directions for further investigation.

The next phase of this research involves identifying key constructs measurable by established tools. Established psychological measures offer insights into design thinking, potentially yielding quantifiable data on cognition and processing. Cognitive thinking experiments prioritize 'thinking' over design, facilitating unbiased evaluations and interventions. This research method is valuable for systematically exploring and accurately measuring various aspects of human cognition. These experiments provide controlled environments for isolating variables, enhancing our understanding of cognition. For instance, EEG (electroencephalography) can precisely identify cognitive processes' brain origins, aiding research significantly. This could inform objective assessments and interventions, shaping strategies to enhance cognitive aspects of design thinking. Such a rigorous approach could unveil design process intricacies and cognitive processes, potentially catalysing breakthroughs in research and educational applications.

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IMPLEMENTING UNIVERSAL DESIGN FOR LEARNING IN ARCHITECTURAL DESIGN STUDIO

Author:
MARTIN MEJIA

Affiliation:
LOUGHBOROUGH UNIVERSITY, UK

INTRODUCTION

This paper delves into the challenges faced by students with Learning disabilities (LD) in Higher education, with the specific focus on Design Studio, part of the Architecture course. LD, encompassing conditions such as dyslexia, dyscalculia, and attention-deficit/hyperactivity disorder (ADHD), present a spectrum of cognitive impairments that impact information processing. In Design Studio, the convergence of visual-spatial elements, theoretical content, technical precision, and intense studio work exacerbates the difficulties for students with LD. Traditional pedagogical approaches, which rely heavily on visual presentations and hands-on activities, may inadvertently marginalize students with diverse learning needs. This recognition necessitates a shift towards more inclusive educational practices. The Universal Design for Learning framework (UDL), rooted in principles of Universal Design, advocates for educational environments that cater to a wide spectrum of abilities and learning styles.[1] It emphasizes flexibility in teaching and assessment methods, leveraging technology and diverse instructional strategies to create an inclusive learning environment. This approach appears not only beneficial for students with LD but also enhances the learning experience of all students. This approach is also vital in nurturing architects who are academically proficient and sensible to human needs in spatial design.[2] This paper includes the case study of the first year Design Studio at Loughborough University, providing practical insights into the implementation of UDL to make improvements.

Overview of Learning Disabilities in Higher Education

Learning disabilities (LD) represent a diverse group of cognitive impairments that affect the way individuals process information.[3] These disabilities are often invisible, making them challenging to recognize and accommodate in educational settings.[4] In higher education, students with LD encounter various challenges that impact their academic success and overall experience.[5] These challenges include difficulties in reading, writing, and organizing thoughts, as well as navigating traditional learning environments that are not tailored or inflexible to accommodate to their unique learning styles.[6] One clear indicator of student's learning difficulties in the classroom is the lack of attendance. The prevalence of LD in higher education, therefore, needs an inclusive approach to teaching and learning, ensuring that all students have equivalent learning opportunities and resources.[7]

Specific Challenges in Design Studio

Design Studio, with its blend of theoretical knowledge and practical skill development, poses unique challenges for students with LD.[8] The visual-spatial nature of Architectural studies, coupled with the need for precise calculations and technical understanding, can be particularly daunting for those with processing issues or dyscalculia.[9] Furthermore, the studio-based learning environment, which is central to architectural education, often demands long hours of intensive work, which can be overwhelming for students with attention and organizational difficulties.[10] The traditional teaching methodologies, heavily reliant on visual presentations and hands-on activities, may not always accommodate the diverse learning needs of students with LD, potentially hindering their ability to fully engage with the curriculum and express their creativity.[11]

Introduction to Universal Design for Learning (UDL)

UDL is an educational approach that aims to maximize the learning experience for all students by providing multiple means of representation, expression, and engagement. This approach is rooted in the principles of Universal Design, which advocates for creating products and environments accessible to people with a wide range of abilities. In the context of Design Studio, UDL involves designing curriculum and teaching methods that are flexible and adaptable, catering to the varied learning styles and abilities of all students. By incorporating digital technologies and diverse teaching strategies, UDL creates a more inclusive and responsive educational environment.[12] This approach not only benefits students with LD by addressing their specific learning needs but also enriches the learning experience for the entire student body, fostering a more inclusive and dynamic academic community.[13]

Universal Design for Learning (UDL) Framework

UDL consists of three primary principles.[14]

1. Multiple Means of Representation - Providing diverse ways of presenting information and content. This principle acknowledges that learners process information differently and therefore needs various methods of accessing knowledge, such as visual aids, recorded materials, and hands-on experiences.
2. Multiple Means of Action and Expression - Offering a range of ways for students to demonstrate their knowledge. Recognizing that individuals express understanding differently, UDL encourages alternative ways to assess students, using written works, drawings, posters, models, oral presentations, etc.
3. Multiple Means of Engagement - Creating opportunities for different types of engagement to motivate students. This principle is based on the understanding that students have varied interests and motivations for learning, necessitating diverse ways to capture their attention and sustain their interest.

STRATEGIES AND APPLICATIONS

The integration of Universal Design for Learning (UDL) involves a blend of innovative strategies aimed at accommodating the diverse learning needs of students. Is important the creation of flexible learning environments that cater to various learning styles and needs. As highlighted in the integrative literature review commissioned by the New Zealand Ministry of Education,[15] this can be achieved by incorporating multi-modal teaching methods, including visual, verbal, tactile, and kinesthetic modes of instruction. The review emphasizes the importance of adapting teaching instructions and curricula to engage neurodiverse students actively, by keeping instructions simple, breaking tasks into smaller steps, and providing extra time for processing information. Furthermore, questioning the effectiveness of long, uninterrupted in-person lectures and exploring alternatives such as the flexible use of lecture recordings, which allow students to engage with material at their own pace. This approach not only fosters

inclusivity but also challenges the notion of performative learning, as discussed in a study exploring the impact of lecture recordings on disabled and neurodivergent students.[16]

Examples of Successful Applications

An example of this is the 'Teachability' project, which began in Scotland in the mid-1990s. This project aimed to make academic staff in higher education institutions more cognizant of how their classroom practices could facilitate or hinder the participation of students with impairments. The initiative underscored the necessity of making learning environments as accessible as possible, drawing insights from the field of architecture and planning.[17]Additionally, the implementation of UDL is demonstrated in the inclusive practices adopted in the construction of the revised Education Studies module at De Montfort University. This module integrates a variety of media for completing assessed and in-class work, catering to learners with diverse needs and preferences. The module's design and assessment structure are informed by pertinent research findings and emerged from discussions aimed at evaluating students' understanding of content in non-restrictive ways.[18]

Discussion on Adaptability and Flexibility in Teaching Methods

Adaptability and flexibility in teaching methods are essential components in Design Studio to cater to a diverse student population. In the context of UDL, this means designing courses and learning activities that are accessible and engaging for all students. A significant development in this aspect is the emphasis on creating adaptable learning environments that can accommodate a range of learning needs and styles.[19] For instance, the 'Teachability' project highlighted the need for academic staff to consider the accessibility of the teaching room itself, thereby promoting a more inclusive learning environment for students with various impairments. This approach acknowledges that some barriers in education stem from the rigid nature of traditional teaching methods and curricula, necessitating a shift towards more adaptable and inclusive practices.[20] Overall adapting flexible teaching methods not only enhances learning experiences for neurodiverse students but also contributes to the overall effectiveness of the educational process.

UDL for Design Studio

Suggestions about content delivery:

- For students with dyslexia, the use of text-to-speech technology and visual representations.[21]
- For students with ADHD, structured step-by-step instructions, and kinesthetic learning opportunities, such as displaying physical models to students, or printing technical drawings to show them.[22]
- For students with ASD, straightforward instructions on project briefs and sensory-friendly learning environments, which consider the best visual setup, comfortable seating, and noise reduction.[23]

Suggestions about content structure:

- Using a blend of lectures, interactive sessions, and digital resources to accommodate diverse learning preferences.[24]
- Allowing students to choose from different types of assessments, such as written essays, oral presentations, or practical projects.[25]
- Integrating real-world projects and case studies to provide practical, hands-on learning experiences.[26]

Suggestions about the content delivery space:

- Designing classroom spaces that are flexible and can be rearranged to suit different teaching methods and student needs.[27]
- Employing various teaching tools, from physical models and sketches to digital simulations and virtual reality, to cater to diverse learning styles.[28]

CASE STUDY: FIRST YEAR DESIGN STUDIO AT LOUGHBOROUGH UNIVERSITY

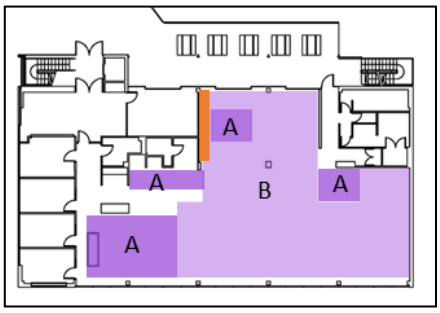

Figure 1. Design Studio A teaching room original layout by Martin Mejia.

Description of the Studio

Design Studio A is on the Keith Green building ground floor, which is also shared with the administrative and staff offices, meeting room, and a kitchenette. Design Studio A takes on a T shaped space, see Figure 1. It includes a main central corridor used for access but also for evacuation, a washing area, gendered and accessible toilets at both extremes, and storage lockers. Each student has one desk with wheels for easy movement and plastic chairs, selected for ease of cleaning and storage. Additional swivel chairs and circular tables for tutors are also present. The original distribution of the room had student's desks in area B, and tutor's meeting tables in area A. There is one projector in the room which projects on the orange wall. Every time that a projection was going to be displayed, the students in that area were affected, as they would have to accommodate more students at their desks. The projector in the studio, crucial for presentations, lacks video and audio recording capabilities. The studio would normally be messy days before the Review Day and have limitations on the possible uses. One critical aspect of this room is the bad acoustics, which means that on busy days, noise reverberance can make it difficult to hear at a normal conversation voice volume. Additional challenges include that student's chairs are mostly stationary, and the furniture, like the pin-up boards or shelves are heavy to move.

Implementation of Universal Design for Learning (UDL)

In response to these challenges, the room was divided into two halves, A and B. The students' desks would all be in halve B and halve A would have circular tables for meetings with the tutors, only one tutor is isolated as we did not have sufficient tables. The lack of appropriate recording in the room projector encouraged the use of room C nearby, which has better audio-visual equipment and staggering seating. However, this room is connected to the studio by a corridor (Corridor D) with platform steps and a ramp, making this not the most accessible connection between rooms. See Figure 2.

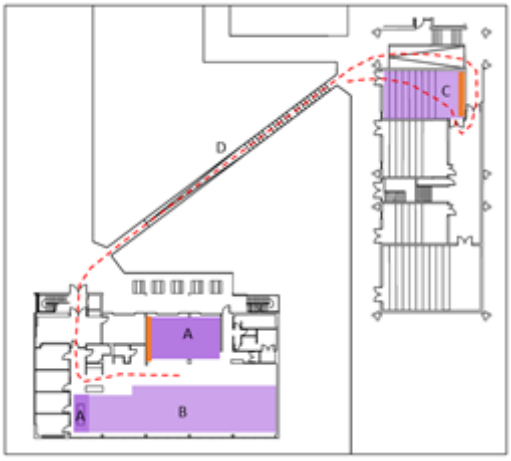

Figure 2. Design Studio A teaching room current organization by Martin Mejia.

Analysis of Current Teaching Methods

Design Studio A is a module structured around meetings with a tutor and dedicated time for students to work on their individual projects. The course schedule includes two days per week with contact hours on Monday afternoons and full-day Thursdays. On Thursday mornings, the schedule typically involves introductions to project briefs, along with other lecture-style sessions, usually held in the same Studio room or occasionally in room C. Generally, those sessions are packed with theoretical ideas and content that would need longer time to be processed. The current pedagogy comprises the submission of two portfolios, one for semester one and another for semester two. There are three projects per academic year, having portfolio one, two projects and portfolio two, one project. The scope and length of the projects is exponential, gradually increasing from project one to project three. One consideration with this submission format is that, despite the student's production of multiple means of representation, such as physical models, hand sketches, and hand drawings, the format would only allow digital representations of these.

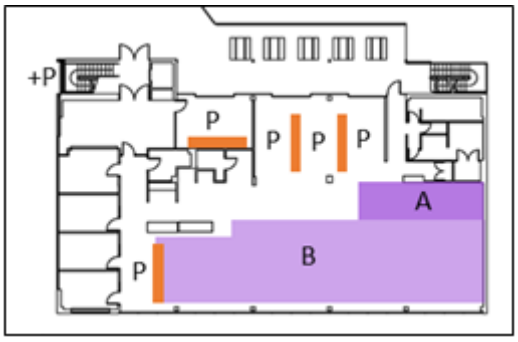

Figure 3. Design Studio A teaching room during Review Day by Martin Mejia.

One of the main challenges that persist is around Review Day, when students must print pages of their work, and do a pin-up live presentation in front of their group peers. The problem is the lack of capacity, as two tutors must find a place outside, for example, in the meeting room, or upstairs. The other issue is the bad acoustics, because of the large, glass sliding doors, and the number of people speaking at the same time. Students would have to raise the voice to be heard and get closer to the speaker to listen and take feedback notes.

Further recommendations for the Studio space

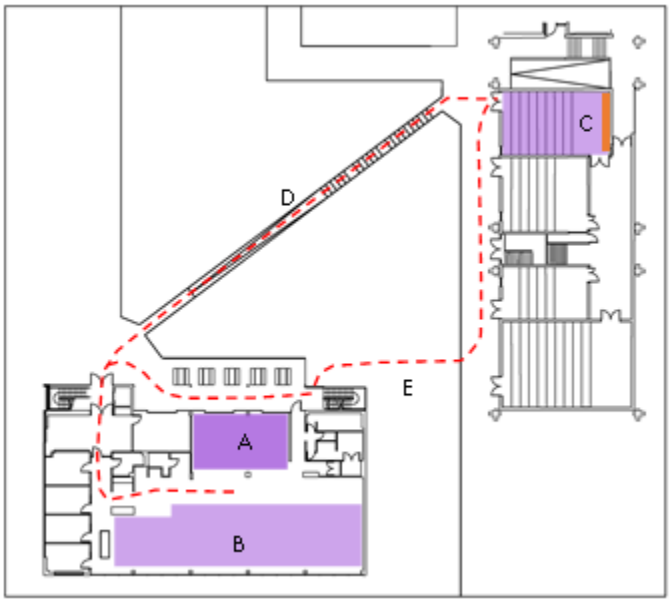

Figure 4. Design Studio A teaching room, further improvements suggested by Martin Mejia.

The main suggestion is to reorganize all the tutors in area A, and improve accessibility and mobility within the studio, including the addition of an outdoor lift or accessible ramp in area E. During non-Studio days, the students should have area A available, either as an extra desk, or for example to meet with their groups for other module's coursework, or socialize with their peers, etc. see Figure 4. All the students should be provided with swivel chairs, which would make it easier for them to use their desks. However, as the space is limited, this allows little flexibility and stresses the fact that they are seating there for longer than four hours.

To optimize the use of space and resources, room C should be used for every session that involves having the full cohort looking at projected slides, like lectures. Additionally, to enhance accessibility and security, the current emergency exit should be transformed into a card-controlled entrance specifically for Room C, see Figure 4. One major consideration is that Review Days are long, generally taking the full day. Students must be fully ready early in the morning, normally facing queues to print the pages with the submission requirements. Generally, the module leader and the tutors expect the students to stay for the whole Review Day. This is very difficult considering that first year students are learning to manage their timetable, many times this means that students had done an all-nighter, had no time to prepare a meal, or skip breakfast, and then must present and stay the full day looking at their peers' presentations. Generally, by the lunch break, half of the cohort would disappear, for evident reasons.

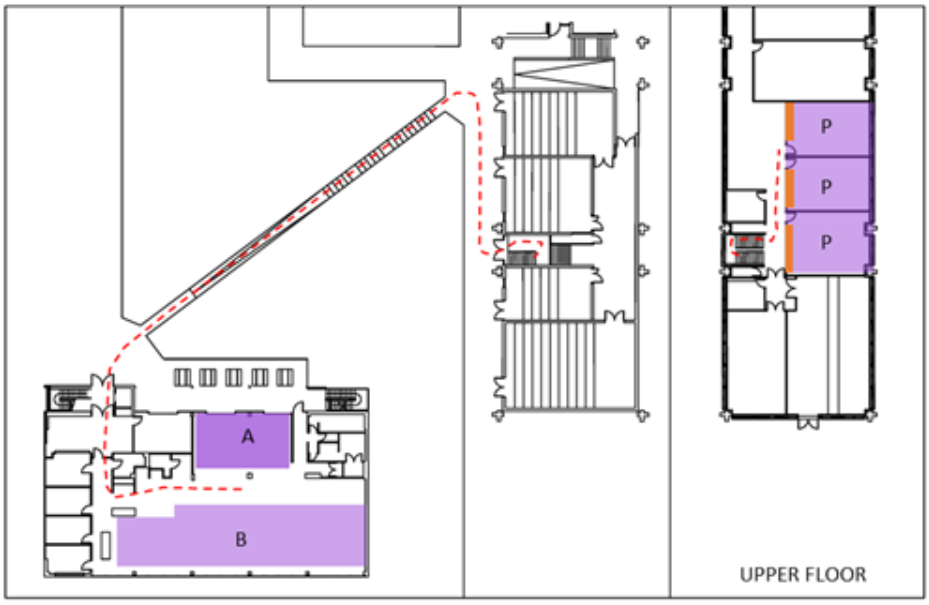

Figure 5. Design Studio A teaching room, proposed changes for Review Day by Martin Mejia.

Regarding Review Days, it would be more effective to conduct the Reviews in smaller rooms equipped with audio and video recording facilities. Then we suggest the booking of the teaching rooms located on the upper floor of the adjacent building for the Review Days, as detailed in Figure 5. These rooms are already equipped with audio-video recording capabilities and have been designed with acoustics in mind. This setup allows two groups to simultaneously conduct a Review in each room, effectively accommodating the total of six groups. The advantage of this arrangement is that the Review Days can be comprehensively recorded. This is particularly beneficial for students who might not fully grasp the feedback notes or remember everything that was said during the verbal feedback. Additionally, this recorded material will be invaluable for students who were unable to attend the full Review Day, as they will have the opportunity to learn from the feedback provided to their peers.

Recommendations for the Teaching methods

In terms of teaching methods there are two aspects that can significantly improve the learning experience of students. The first is to dedicate in-person sessions to interactive sessions, like model-making tutorials and hand-drawing tutorials, which would serve as step-by-step guides on practical skills, those should be delivered in the same Studio room. In contrast, theoretical content could be more effectively delivered through pre-recorded materials, accessible in advance. This approach would allow time for questions during the sessions and cater to various learning styles. Additionally, it ensures that students who need extra time to understand complex topics can access theoretical knowledge more easily. The second is to reevaluate the project submission deliverables, allowing multiple submission formats, making those not only a digital portfolio, but also including physical components, for example percentages allocated exclusively to the oral presentation of the work, and physical models displayed during that presentation.

The student cohort in Design Studio A is diverse, comprising individuals from different educational backgrounds, some students exhibit a more technical approach to design, whereas other students are typically more versed in theoretical and critical content. This diversity poses a challenge in the Interpretation assessment criteria,[29] particularly for neurodiverse students who might struggle with critical thinking from a conventional perspective. Adapting teaching methods to accommodate these

diverse learning needs is crucial. This could involve providing multiple examples, simplified language in briefs, and explicit explanations of tasks to ensure all students can engage effectively with the coursework. The current studio-based teaching pedagogy suggests that most of the activities should be carried out in the Studio room. In contrast UDL appears as a de-centralized approach that aims to expand the physical limits of the Studio space, advocating for a more holistic and flexible approach that prioritizes the student's learning experience.

CONCLUSION

In conclusion, this paper underscores the transformative potential benefits of embracing Universal Design for Learning principles such as allowing different means of engagement. Educational environments become more inclusive and adaptable, catering to the diverse learning styles and needs of all students. Improvements in pedagogy should develop accounting for multiples factors, such as room distribution, coursework brief, content delivered and assessment criteria. Only by embracing those aspects education can be inclusive. The case study from Loughborough University's First Year Architecture Design Studio exemplifies the practical application of UDL, demonstrating that there are always possible improvements. In terms of accessibility, engagement, and understanding of students with diverse learning backgrounds, this approach aligns with the professional ethos of architecture, which inherently values diversity and inclusivity in designing spaces for varied user experiences. Adopting UDL in Design Studio, therefore, not only enhances the student's learning experience but also prepares them to be more empathetic classmates, and then professionals equipped to recreate those values in our society.

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CREATIVE CIVIC ENGAGEMENT: A CASE STUDY FROM GREECE

Author:
CASEY BECK

Affiliation:
TULANE UNIVERSITY, USA

INTRODUCTION

In the Summer of 2023, Tulane University launched an inaugural faculty-led study abroad program, "Environmental Media Production Abroad," in Athens and Dorida, Greece. The program centered on the four-credit Digital Media Practices course, Producing Media for Social Change, which supported the production of six visual media stories (short documentaries, PSAs, photo essays, and social media campaigns). These group projects were developed, produced, and published in extensive collaboration with Ecogenia, a new, community-based organization that aims to educate young Greeks about environmental sustainability and to foster a culture of civic engagement. Students became active learners through this reciprocal process, integrating the skills and information from community work with the theory of the classroom to understand tangible ways in which visual storytelling can create change. Making this process as seamless as possible, i.e., allowing the students to enjoy and think creatively about the work itself while in country, required detailed logistic and contingency planning. How would students respond to the limitations demanded by the course, namely producing media in collaboration with a community partner? How would this affect them as engaged citizens? This article explores these questions while underscoring the demands placed on faculty, students, and community partners for effective and creative community-engaged media production.

Structure

Two classes comprised the month-long, intensive program: DMPC 3990 Producing Media for Social Change (an elective in the Digital Media Practices program at Tulane) and ENVR 353 Landscapes and the Natural Environment in Greece (an environmental studies course co-taught by two Greek professors at College Year Athens, our provider in Athens). As the focus of Ecogenia's work in Greece is largely environmental sustainability and climate change mitigation, we selected this second course to thematically support and contextualize our video production work. Based on student feedback, we will not offer this class in the future; instead, beginning in 2024, a second Tulane course will be offered, currently titled Storytelling and Civic Engagement, which will focus on producing, while analyzing the current media landscape in Greece and beyond.

Ecogenia is a new sustainable development training/service organization in Greece, inspired by the Americorps and Uniscite models, which "couples unemployed young Greeks with partner organisations to advance sustainable development initiatives in Greece through a paid service model."[1] We joined

their second cohort for five days in the mountainous region of Dorida to document and promote their work revitalizing an ancient trail network connecting thirteen historic villages.

PRE-PRODUCTION (One year)

- Development trip to meet organizational partner and scout production location (2022)
- Zoom meetings with Ecogenia leadership over the course of a year to confirm logistics and create production plan
- Recruitment of students and Tulane-mandated pre-departure orientations
- Synchronous Zoom before departure with asynchronous assignments
- In-country orientations, tours, and classes before traveling to location for production

Relationship Building: Context and Process

Tulane University is one of a handful of higher-education institutions that requires all undergraduate students to complete two service-learning courses.[2] Academic Service Learning is based upon a collaborative partnership between the university and the wider community and is integral to the Tulane mission. Bringle and Hatcher describe service learning as "a credit-bearing, educational experience in which students participate in organized service activity that meets identified community needs and reflects on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility."[3]

Taking inspiration from John Saltmarsh, who seeks to transform service learning from a "commercialized, credentialized, commodified end in itself" into the "means to the larger end of active participation in a diverse democratic society," the goal of the study-abroad program was not merely for students to check a box on their graduation requirements, but rather to take a step toward becoming active citizens.[4] For media production to be effective as "service," the program needed grounding in reciprocity, experiential learning and teaching, self-reflection, self-realization, and civic engagement.

With Tania Mitchell's model of critical service learning in mind, I created a course that would develop authentic relationships in the classroom and in the community, based a social change perspective. This democratic framework sought to develop a "true partnership," in which both sides would bring their "own expertise and experience to the project."[5]

The goal, as defined in meetings with Ecogenia leadership was two-fold:

1. The creation of six short videos to be produced by the Ecogenia cohort while being shot, directed, and edited by Tulane student teams.
2. Cross-cultural exchange between the Ecogenia cohort and Tulane University undergraduate students while working together for five days in the field (a tiny mountain village in the region of Dorida, four hours north of Athens).

The articulation of this second goal was of particular importance. Student films are amateur by definition. They are created by filmmakers who are learning how to navigate the client-filmmaker relationship and who may only have an elementary knowledge of filmmaking equipment and techniques. After establishing the goals, I was heartened to learn that cultural exchange was as important to our collaboration as the more tangible video-based outcome. The cultural exchange was mutually beneficial and greatly impacted the Tulane students, with one student writing in their course evaluation: "The cultural exchange has been my favorite part of the course."[6] Defining goals and sharing concerns were critical to a successful community partner-university relationship.

We decided that we would choose the video concepts before the program began, thus removing a major stressor for the students while positioning Ecogenia staff and cohort members as the experts. The

Ecogenia leadership and I determined the video topics over the course of several months of Zoom meetings, bolstered by shared Google Drive documents.

Course Design

The course was based on Eric Hartman's model, which encourages the completion of the heavy academic work before departure. At the same time, students must be encouraged to reflect on the structural causes and concerns that necessitate their service.[7] The program began with two university-mandated Pre-Departure Orientations, followed by two weeks of program-specific synchronous meetings and asynchronous academic work focusing on the history of documentation, discussions around the desire of young Americans to travel abroad and "help," and the role of tourism in Greece's push for de-growth.

During these class meetings, in addition to preparatory discussion and exercises, I pitched the six videos to the students, and they voted (using ranked-choice voting) for their preferred video project.

Once in country, we shifted gears from the academic into the more practical.

In-Country

Mitchell suggests "incorporating community knowledge through, for example, including presentations or co-teaching by community members involved in the service-learning partnership, [who] can provide 'insider' information about community needs and concerns and make linkages to root causes that may be more difficult for faculty and students who enjoy a more privileged status."[8] In this way, critical service-learning pedagogy aims to confront and rectify the unequal power dynamics inherent to the service relationship: in part by incorporating the perspectives of community members *into* the curriculum.[9]

We were fortunate that several key Ecogenia staff live and work in Athens. Damianos Chrysochoidis was working as Ecogenia's Media Producer. Like the Tulane students, Damianos was a film student, living and working in Athens (he has since graduated), and he had recently returned from producing a cross-cultural video for the World Bank. He was able to share first-hand the challenges of producing media in another country. His presentation offered actionable tips for the students and de-centralized the challenges of cross-cultural media production away from a strictly American perspective.

Erika Spagakou, the co-founder of Ecogenia, came to class to walk the students through the goal of each individual video and to clarify the audience for the videos: the Greek-American diaspora, who comprise a significant base of Ecogenia's fundraising efforts. She was able to answer student questions about the purpose of each video and assuage some of their concerns.

Moreover, Ecogenia's Development Manager, Melina Dunham, traveled with us from Athens to Dorida and became the mentor for one group of students focused specifically on marketing.

PRODUCTION (5 Days)

- Traveled by bus and car to Dorida, Greece; staying in the tiny mountain village of Alpochori (population: 2)
- Each Tulane team was assigned an Ecogenia "producer," an Ecogenia cohort member. Eight of the nine cohort members spoke English; most were in their mid to late twenties.
- The Tulane groups decided their own schedules, managed their media each night (at least one team member needed to bring a laptop and external hard drive), and prepared for the next day

The key to creative non-fiction filmmaking is to successfully balance the rigors and stressors of managing a production and the desire to capture compelling images that tell a full, rich story. The

balance was acutely difficult for filmmaking students, many of whom were attempting it for the first time.

Service Learning beyond Filmmaking: Trail Work

Students were also required to participate in one day of trail clearing and building, working alongside the Ecogenia cohort. Working on the trails in Dorida helped the Tulane students build authentic relationships with their Greek counterparts and gain a deeper understanding of the Ecogenia's mission and the historic and cultural importance of this trail network to the region. This trail work complimented the media production to satisfy the university's requirement of twenty hours of "service." One group of students chose to work on the trails multiple days and even said they wished they could have stayed longer to work on the trails.

Additionally, Ecogenia leadership tasked their cohort with organizing a "Volunteer Day" for Tulane students. This was the first time the organization had hosted a large group of foreigners, allowing them to pilot a volunteer day of this size and scope. While the day was cut short by a thunderstorm, the students, locals, and Ecogenia cohort members were still able to clear 500 meters of trail in the nearby town of Krokilio.

Figure 1. Screenshot from student film "Volunteer Day." Students working on a trail in the rain.

Creative Video Capture

Like Forbes, we wanted "to empower students to see themselves as agents capable of acting together with others to build coalitions, foster public awareness, and create social change."[10] We aimed to support student creativity by allowing them to execute their own distinct vision. They would work in collaboration with their Ecogenia producer, but none of the Tulane faculty nor the Ecogenia leadership would tell them *how* to do so. For the most part, students relished this independence; they decided their production schedules, and worked tirelessly to capture the desired scenes, imagery, and interviews. They could walk most places in the village, which made most of this possible. However, we also rented one vehicle that we used to shuttle students around the collection of mountain villages and to and from the trail. We also relied on the Ecogenia van for transportation. Certainly, at times the students wrestled with not knowing what to film or were stymied by changes in schedule, location, or weather, but overall, they captured what was necessary to execute their vision for their films. As one student explained in

their evaluation, “Professor Beck gave us guidance, but when it came to our own films, she let us figure it out and let us make our own mistakes, which is the best way to learn.”[11]

Figure 2. Screenshot from student film “The Abandonment of an Abundant Culture.”

Takeaways

Equipment management was the greatest production challenge. To keep costs low and because I knew not all teams would need to film all day every day, I decided to only rent four camera packages for six teams. My hope was that students would coordinate camera handoffs and learn how to manage a shared resource. This was a mistake. Batteries were left charging in locked rooms in the guest house. Small pieces of crucial equipment, such as the clip on a lav mic, went missing. I spent hours each day in Dorida troubleshooting equipment management issues. Next year, each group will be given a complete camera package, and a grade will be assigned for the maintenance and care of this camera package (including timely communication concerning any equipment issues, or lost or broken pieces).

Nearly half of the respondents in the student evaluations suggested allowing more time for production, a sentiment which the Tulane faculty and Ecogenia leadership echoed. We plan to add an extra day at the beginning of production to allow students to get oriented and better conceptualize the demands of production. Additionally, we will carve out specific class time to review the equipment in the field, and to practice filming and receive feedback before officially commencing “production.” Through the new producing class, students will be required to meet with their teams (and report back on these meetings for a grade), so that we can more quickly catch and thoroughly address issues as they arise.

Students consistently described their production time in Dorida as their favorite part of the program. They relished the focused time to work on their films outside of the bustle of city life and enjoyed getting to know their Greek counterparts at Ecogenia. One student respondent wrote, “Even though it was at times stressful, we were actively learning not just about the filming but also our partners.”[12]

POST-PRODUCTION (Three Weeks)

- Effectively used Adobe Premiere Pro Teams
- Rough cut screenings in class
- Film screening hosted by our academic partner in Athens, College Year Athens (CYA)

There is a common saying in the film industry that documentaries are made in post-production.[13] Editing a non-fiction film is a complex and time-consuming task, which was complicated for us by the fact that

students only had two and a half weeks in post-production in country, their desire to travel on the weekends, a few technical issues, and (for some groups) the language barrier. Nonetheless, every team created a polished, final video that was edited effectively with balanced audio levels, light and color correction, titles, and credits.

Post-production Process

Premiere Pro Teams was an excellent tool for editing in groups. The program now allows editors to work simultaneously in a project on different computers connected to the internet (the major current limitation is that two people cannot work on the same timeline at the same time). To edit effectively, regardless of operating system, we ensured that each student had a full copy of the raw files on a properly formatted hard drive before editing. I also assigned a grade for project organization to try and mitigate potential editing issues stemming from disorganization. The biggest issue students encountered was that the program struggled to differentiate between similarly named audio files within distinct folders and would sometimes relink the incorrect audio upon logging into the project a second or third time. The best practice would be to rename all audio files *before* creating the project, but several students had to do this after creating the project and then resync certain files.

Rough cut viewings were incorporated into class time, as were long stretches of independent editing time, during which the faculty could give individualized feedback.

The program concluded with a public screening of the student films, hosted by CYA. The Athens-based Ecogenia staff, as well as their guests, and several CYA staff members joined. The students were asked to introduce their films, and we enjoyed a celebratory good-bye dinner after the screening.

Takeaways

Because we believed all of the videos would be in English, as they were meant for a Greek-American audience, we did not budget for translation. However, during production, several groups decided to record interviews in Greek with the assistance of their Greek Ecogenia producer. This proved quite difficult in post-production. An AI-based software (Veed) that we were advised to use was completely ineffectual, and students ended up cobbling together translations from generous CYA and Ecogenia staff. Future iterations of the program should budget for translation during production and post-production. Publishing the videos in Greek has the added benefit of expanding the reach of the films, making them more relevant and accessible to a Greek audience. This is particularly important as Ecogenia becomes more established in Greece.

Moreover, I would like to incorporate input from Ecogenia leadership into post-production, particularly at the rough cut stage. Some students struggled to stay focused on the goal of their film – to be used by Ecogenia – and a few of the films became more about the student experience or even their challenge making the film.

CONCLUSION

Overall, the program Environmental Media Production Abroad was extremely successful and achieved the two goals determined with our community partner at the outset of the program. The program effectively blended in-person service-learning (working on trails) and production-based service-learning (creating compelling videos for an organizational partner). Reflecting on the production course, more discussion about how to craft a compelling story could have resulted in even more focused films. And while the students had all taken the introductory digital filmmaking course at Tulane, they would have benefitted from more instruction and practice with the rented camera packages.

More time and thought should be spent discussing how students can maintain a connection to Ecogenia. One group went on to run a small crowdfunding campaign for the organization, earning Internship credit for their time spent marketing and managing this extracurricular project. But maintaining this connection should not be left up to individual students. In the future, I plan to integrate more follow-up and post-trip debriefs into the syllabus.

Promoting engaged citizenship was the defining objective of this program. To this end, the Civic Engagement Value Rubric for analyzing the effectiveness of learning outcomes stipulates that students should "demonstrate evidence of adjustment in own attitudes and beliefs because of working within and learning from diversity of communities and cultures."[14] The overwhelming feeling at the end of the program was one of elation and self-satisfaction at completing such a difficult and meaningful project. Students were inspired, with many of them now seeing new potential career paths in media production. As one student elucidated, "This course really ignited a passion to use my digital media and film production skills for good."[15]

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REFLECTIVE REELS-STUDENT PERSPECTIVES OF USING REFLECTION. THE IMPACT OF EMBEDDING REFLECTION INTO FILM AND TELEVISION PRODUCTION MANAGEMENT TRAINING

Author:
PERELANDRA BEEDLES

Affiliation:
UNIVERSITY OF SALFORD, UK

INTRODUCTION

Encouraging students to become 'reflective practitioners' [1] is a key component of the Creative Arts Higher Education (HE) experience. Reflection regularly features in assessment criteria for written assignments; however, it is typically not included in schemes of work for formative technical training within film and television production degrees, an omission which misunderstands the growing demand for reflective workers in the media industries.

The activities outlined in this paper sought to address this with the inclusion of an educational toolkit which imbedded reflexive breakout sessions, production journals and video diaries into training. Created to encourage a pragmatic approach emphasising the value of reflection that can be directly linked with action, it approached training as an intellectually agile process rooted in technical knowledge.

The educational toolkit was called ‘Reflective reels’-the name a nod to the film and television industry and the aim was that each step of knowledge retention and reflection would thread seamlessly together, like reels of film, resulting in learners creating new processes and ways to interpret training actions.

THE CONTEXT

While the origins of training for the creative industries are grounded in work-based apprenticeships, entry-level knowledge about television production is increasingly delivered in a university setting. This study asserts that what is often missing from industry attentive educational courses are explicit opportunities to reflect during formative training activities in technical environments such as Television studios or edit suites, an omission which is both educationally reductive, but which also misunderstands the growing demand for reflective workers in the media industries.

While an emphasis on reflection is embedded within many, HE television modules, it is often positioned within summative pieces of written coursework, with all the academic requirements this suggests. In contrast, technical media training is delivered as a separate instructional strand without any explicit opportunities for reflection, an approach which arguably undervalues it as an educational activity, and limits learning opportunities for students. This study explored how a reflective toolkit could be incorporated into the delivery of studio technical training and is based on the principle that the true

nature of television production education is a collaborative one; so, the training of craft skills should be positioned as a social situation. A key component of creative arts practice is taking a questioning and reflective approach to the artistic process to generate new ideas and stimulate 'creative thought processes'[2] and the study sought to discover whether explicitly including opportunities for reflection was considered beneficial by both the learners and the tutor taking part.

Research Questions

Three initial questions helped focus the study, these were:
How can technical training in the Television studio act as a site to generate learner reflection?
Can the use of reflection support Production Management students to strengthen their professional identity?
Does sharing learner reflections generated during technical training contribute to a community of practice (CoP)?
While the examination considered how certain reflective focused theoretical models, including Schön's[3] 'reflection-in-action' and Moons'[4] 5 Stages of learning, might enhance the delivery of practice-led pedagogy, there was also an opportunity to consider how a deeper understanding of these might impact the experience of teaching, notably facilitating reflective opportunities for educators, who began as industry practitioners and had now moved into full-time teaching.

Data Collection

Data collection methods for the study included focus groups, student journals, observations from training sessions and a video diary, gathering both student and lecturer perspectives in a variety of settings. These methods sought to identify if the overt inclusion of time for reflection enriched technical training, and whether the subsequent sharing of knowledge from this activity generated new approaches to television production pedagogy.

The knowledge of how to do things

In a discussion on the value of practice as a research method within universities, Nelson[5] asserts that, alongside the traditional type of knowledge encountered in educational institutions, there is another equally valuable kind of knowledge: the knowledge of 'how to do things'[6] Arguing that there remains 'an important sense in which the embodied knowledge of the practice is both prior to, and distinct from, the written (symbolic) account after the event'[7] Nelson asserts that 'doing' activities can also function as a key method of intellectual inquiry, as legitimate in terms of findings and outputs as any other types of academic endeavor, when viewed this way practice functions as both a method to produce knowledge while simultaneously being the outcome of such knowledge. Supporting Nelsons' assessment that practice is already an intellectually rich environment, Caldwell,[8] in his analysis of industrial reflexivity in film and television, urges both industry and education providers to look past the theory/practice divide and acknowledge the requirement inherent in production, for theoretical engagement, analysis and 'aesthetic sense making' [9] building on the model of information transmission and finding opportunities for a deeper engagement.
Three key themes triangulated this research study, Reflection[10] Communities of Practice [11] and Practice Theory [12] as illustrated in Figure 1.

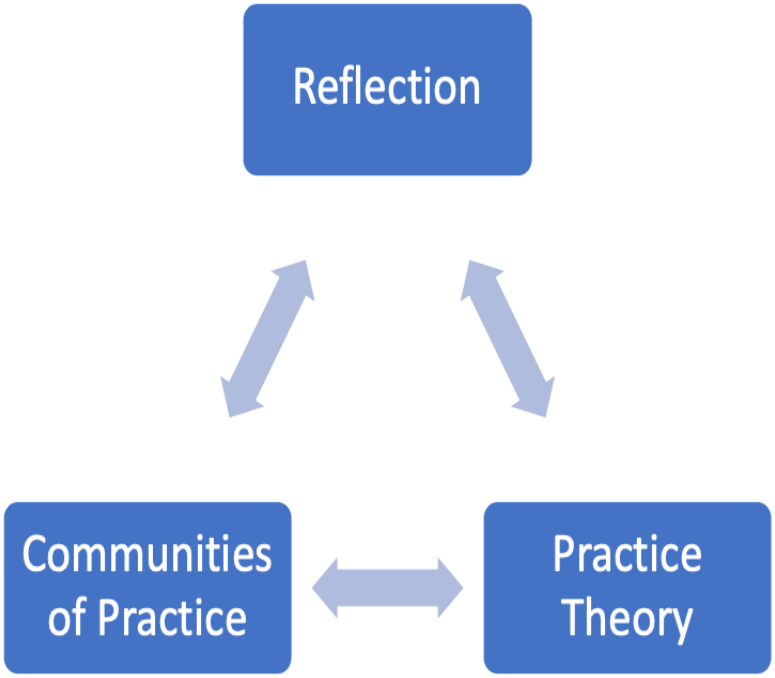

Figure 1. Three key themes triangulated

When synthesized, these created a framework by which the use of reflection in a Production Management educational setting could be explored.

- The lens of Practice Theory encouraged a view of technical training as a site from which much meaning could be derived.
- Reflection was the tool or process by which technical training experience could be understood more profoundly, including a closer examination of personal identity, and meaning making.
- Communities of Practice (CoP) encouraged a sharing of the individual knowledge gained through training and reflection to creating new knowledge.

The Concept of Reflection

The concept of reflection as applied to this study, draws much from action research[13] a process whereby practitioners seek to improve the understanding and application of their artistry or craft through self-reflection. One of the earliest articulations of reflection is summarised elegantly by Dewey.[14]

Reflection involves not simply a sequence of ideas but a consequence — a consecutive ordering in such a way that each determines the next as its proper outcome, while each, in turn, leans back on its predecessors.

Dewey[15] takes a pragmatic approach emphasising the value of reflection that can be directly linked with action claiming ‘the need of thinking to accomplish something beyond thinking is more potent than thinking for its own sake',[16] Production Managers are nothing if not pragmatists' often having to balance the editorial vision of directors and writers with the rigid demands of a pre-agreed budget; so a philosophy which situates reflection as a form of theoretical reasoning to scaffold practical activities, offered a fitting model on which to build a research design. Dewey describes reflection as an organic process with strands of reflective thought growing out of each other and supporting each other. When characterised this way, reflection creates pathways woven from experience 'the stream or flow becomes a train, chain, or thread’.[17] As an analogy, this aligns well when considering the process of creating television with its work pattern of pre-production, leading into filming and ending with postproduction, indeed, production departments on a TV show are structured much like carriages of a train, all

interlocked, each serving different functions, yet ultimately leading to the same destination of the completed production as illustrated in figure 2:

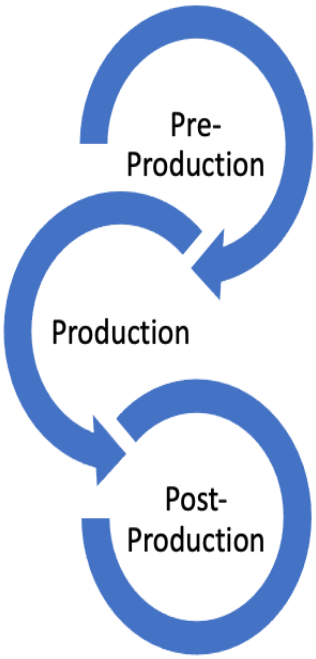

Figure 2. The work pattern of creating television

Reflection as Reframing

Production Management on a film or TV set, requires an unceasing vigilance to the present situation (regardless of the production stage being worked upon) and a constant process of future scaping, as even the most minor change can affect the delivery date of productions. When unexpected problems occur on filming projects, Production Managers must swiftly draw on their practice knowledge while also constructing a new approach, reflecting on what has led to the issue and creating solutions that will not impact the fragile balance of time, budget, and editorial vision. Schön refers to this as a reframing or 'frame experiment',[18] a process that occurs when the usual knowledge of practice is no longer enough and Production Management with its requirement for attentiveness, to reflect live and in real-time, arguably demands a heightened reflexivity[19] something this study hoped to develop in student Production Managers preparing to join the media industries. Aligning with the aim to develop students' reflective practice, encouraging learners to incorporate this increased awareness as part of a learning community was also threaded into the exercises and activities.

Communities of Practice and the Tribalism of Television Production

With its reliance on teamwork and creative collaboration, the true nature of the television industry is a participatory one; thus, when considering how groups of TV production learners might come together to consider the progress of their training, Situated Learning Theory[20] notably the concept of Communities of Practice[21] (CoP) lent itself well to Production Management education. CoPs are described as 'groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly'[22] for the purpose of this study, it was a model which encouraged Production Management students to reach a deeper understanding of their practice, in a manner which mirrored the professional expectations of the television industry and share this wisdom with their peers.

CoP asserts that when learners have a common interest, sharing ideas and approaches, it facilitates the spreading of existing tacit knowledge and the creation of social capital. As a methodological lens, it was an important addition to this research, suggesting that the sharing of students' perspectives and reflections during training had the potential to not only provide insights into the complexities of the learners' experience[23] but also improve the way technical tuition was integrated into television production modules. Three characteristics of the relationship by which practice is the source of a community's coherence are identified by Wenger[24] which were applied to the Production Management training model and research toolkit activities:

- Members first engage with one another, building connections and norms through mutual involvement-this was facilitated by studio training involving group tasks.
- A shared understanding of collaborative activity ties members together-Students worked on activities, problem solving and completing a risk assessment as part of a group.
- Over time, members create a shared repertoire of communal resources, such as language, customs, objects, and stories. Reflexive breakout sessions during training and focus groups encouraged this.

DESIGNING THE STUDY-MOON'S (2000) FIVE STAGES OF LEARNING

When designing the practical applications of this study Moon's[25] Five Stages of Learning which expands on the foundations offered by Schön[26] provided a theoretical approach which identified five key learning stages

1.Noticing
2.Making Sense
3.Making Meaning
4.Working with Meaning
5.Transformative Learning

These stages were adapted for Production Management training sessions using the following modalities:

Stage 1: Noticing

Moon[27] refers to 'Noticing' as a 'gate-keeping' phase where learners approach the material based on expectations, past experiences, and personal preferences. Having already spent time discussing how to write technical studio risk assessments in class, students were taken to the studio environment to try out equipment. The aim was to contextualise the organisation of this equipment and its operators and better inform the writing of technical risk assessments. The Five Stages of learning model suggests that what is 'noticed' is determined by four factors: What the student already knows (so, in this instance, they had some familiarity with the studio setting, but for many, this was purely hypothetical).The second factor is the perceived purpose of the task, so for the learners taking part in the exercise, this was having an assessment based on understanding the television studio and how it works. The third factor is self-esteem, including 'emotions associated with the material or situation, such as fear, excitement or boredom'[28] Some learners might be keen to be surrounded by so much technical equipment; others could be intimidated or disinterested.

The last factor of 'noticing; was reaching the learners' attention; students may not engage with topics which do not interest them; hence studio sessions were designed to be as engaging as possible.

Stage 2: Making sense

This stage does not require the student to recall previous experiences but instead invites them to organise and rearrange the information they are offered in a coherent way [29]. To encourage this sense making, training sessions created an environment for the learner to explore the different pieces of equipment

within a studio. For this scenario, instructions were given for a simple 3-point lighting exercise that encouraged familiarity with the camera and lighting equipment; it is a 'reproduction of ideas' [30] that does not rely on the students' reasoning.

Stage 3: Making Meaning

This was the stage at which 'the new material of learning is assimilated into the cognitive structure'.[31] Working in groups, students were asked to consider the risk assessment they would write for the 3-point lighting exercise activity and, drawing on their existing knowledge, begin to assemble all the pieces. This understanding of their discipline might be accompanied by a sense of 'emotional 'rightness'.[32]

Stage 4: Working with Meaning.

Working with meaning is often characterised as an independent pursuit because it no longer requires the learner to work with the materials set actively. However, as Moon[33] suggests, tutors can encourage the process by 'generating ideas, setting work, giving guidance, or asking questions that provoke.[34] For this aspect, students were encouraged to share their thoughts with the group, on setting up equipment for the TV studio exercise, considering what the Production Management considerations might be. This participation in reflexive breakout sessions, unpacking the theoretical and practical knowledge they have gained during training, and co-creating new knowledge as a learning community helped to forge a greater confidence in their ability as a team and as aspiring Production Managers.

Stage 5: Transformative Learning

Transformative learning happens when a learner can demonstrate not only the knowledge, they have gained within their frame of reference but also how this knowledge compares with the knowledge of others. Testing out this new understanding against the experience of their peers can be intellectually fulfilling as the confidence to assert a position (while also accommodating the thoughts of others) emerges. During this stage, the student demonstrates that they are 'capable of evaluating their frames of references, the nature of their own and others' knowledge and the process of knowing itself'.[35] Using the Reflective Reels toolkit, students applied new ways of learning and working in a studio environment, using information gained by reflection and discussion during sessions. Students also shared further observations during focus groups and reflected on their progress using production journals.

The Production Journals

After each studio training session, students completed individual production journals which were emailed to the tutor weekly. The design of these journals was purposely simple with only a few prompts asking for a description of what had been covered in the training and an assessment of the teamwork taking place. What was interesting was how quickly these journals became a confessional, space where students could share their anxieties, triumphs and allow themselves to be to be quite vulnerable. There was also an authenticity in evidence which presented quite different versions of themselves compared to the personas they presented in training. Topics emerging were:

Compare and Despair-Privately many of them felt they were behind their peers despite publicly presenting a confident front as this journal extract illustrates:

'I tend to compare myself with others, and I am deleting LinkedIn from my phone for this reason because people are posting their results which for me is difficult to look at when I don't feel as good'. Student A[37]

Self-Knowledge-On the flip side of this (and often within the same entries) they were also able to delight in their emerging knowledge, the use of reflection encouraging the students to see how much they already know-drawing on their own knowledge and feeling more confident in their ability

'I am really enjoying my time with the group (hopefully it's the same group next module!). We constantly have healthy debates among us and come up with proper solutions after. It helps me understand the various components there is to create a schedule, budget, and so on. Everyone in the group is also actively learning from each other and it gives us ideas on how to problem solve when in a crisis'[38] Student B

Communities of Practice-This regular practice of reflecting on their educational training in a journal, also helped students see value in a community of practice and to recognise how their actions could impact this, as this journal entry illustrates:

'The studio exercises are a great way to gain knowledge from others and a way to get to know each other's strengths as a group. I do feel sometimes that the group think that I take over, but I'm used to working in an environment where if women don't speak loudly, they are largely ignored but sometimes I think it does ruffle feathers it is an element I'm trying to work on'[39] Student E

CONCLUSION

Moons[40] five-stage framework fostered a systematic engagement with reflection in Production Management education. Students were encouraged to reflect on their training from industrial and learner perspectives and to recognise that they were also wisdom keepers who could share knowledge and even influence training approaches.

While there is an extensive body of research focusing on the use of technical applications and equipment in education, much of the research data so far focuses on the effectiveness of technology as a tool, instead of providing an understanding of the 'interrelations between technology practice, students, their relationships, histories and surroundings'[41] it is hoped this project will offer a closer study of the interconnections that occur in technical training and add valuable data to these subjects.

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WHAT IS DIFFERENT ABOUT SPECIAL EDUCATION: MOVING TOWARDS A HEURISTIC MODEL OF TEACHING AND LEARNING

Author:
THOMAS KNESTRICT

Affiliation:
XAVIER UNIVERSITY, USA

INTRODUCTION

Fewer people are choosing special education as a career.[1] Many general educators feel overwhelmed and under qualified to teach "special needs students". There is often a rush to identify these students with a special education label to access the expertise of the Intervention Specialist. This thinking is perpetuated by the Special Education Industrial Complex, with false notions of what special education is and what it does. The dependance of special education is created when we are tied to an algorhythmic, standardized curriculum that is more concerned with "covering" objectives than "uncovering" deep learning.[2] This fundamental difference in understanding teaching and learning perpetuates the reliance on the "special edufication" of all public schools.

Algorhythmic learning is mapped out and the learner learns the steps to one conclusion. This approach emphasizes product and it has been suggested, limits creativity and a deeper learning that connects to prior learning.[3] This is contrasted with learning that is heuristic. Heuristic learning emphasizes the process of learning and the construction of understanding. It is correlated with creativity, collaboration, engagement, and deeper understanding because it is linked to prior learning.

Constance Kami[4] offers a descriptive example of heuristic outcomes compared to algorhythmic outcomes. Algorhythmic outcomes can be measured by completing a page of equations correctly. Heuristic outcomes result in the student not just getting the correct answer but also being able to defend and explain their thinking on solving the equation. This reflects depth of understanding, connection to prior learning and intellectual autonomy,[5] Thomas Knestrict. Historically, individuals with disabilities have been shunned. It wasn't until the 19th century that a broad humanistic perspective was applied to the care of others with differences. However, people with severe disabilities were still put aside, hidden, and sent away for care. In the 20th century many of the physical and neurological issues were diagnosed by medical personnel. Learning and cognitive disabilities were typically assessed by psychoeducational diagnosticians. These diagnosticians in general were steeped in pragmatism. At the turn of the 19th century there was a similar set of themes being debated as today. The standardization of curriculum, education focused on objectives and measurable observable assessments and the seeking of verifiable, empirically determined learning. The motivations were the same then as now. There was a dissatisfaction with achievement and a desire to find a curriculum that would once and for all find a solution to teaching and learning.

Teaching is as much "art" as it is science. Forcing teaching and learning into a strict 'scientific" perspective creates a very linear, standards-based curriculum. The development of special education practice was heavily influenced by this way of thinking. This, along with the dramatic influence of the medical model on special education practice created the illusion that there is a specialized knowledge base in special education that is radically different than that of general education.[6]

This narrative created a separate silo that has been called "Special Education" or the "Special Education Industrial Complex".[7] Funneling billions of dollars to school districts so they can "treat" students with special needs.[8] Identification rates have skyrocketed, and general education teachers have bought into the myth that they do not have the capacity or the skills necessary to teach children with special needs. The rates of identification are as high as 25% in some districts while the research states the rates should be more like 3%-5%.[9] These rates have dramatically increased since 2010. Rising from 11.2 % to over 20% in most states.[10] This inflation of identification affects poor brown skinned boys most dramatically. Some scholars call special education the "School to Prison Pipeline" [11]

The purpose of this article is to deconstruct this perceived difference between special education its heritage of empirical verification and pseudo medical pragmatism compared to that of general education and to re-imagine a model of education that serves all children in the general classroom. This will be discussed within the framework of a burgeoning tendency for teacher education programs to require special education course emphasis and dual licensure for all teacher education students.[12]

PEDAGOGY AND CURRICULUM

E.W. Eisner,[13] defines curriculum as follows:

1.A curriculum is a series of planned events.

2.A curriculum is systematic and works towards a goal or goals even though it may be diffuse or general.

3.A curriculum is educational in nature.

4.A curriculum should do much more than meet single objectives. It should influence students in a broad number of ways and assist in the assimilating and accommodating and construction of deep, integrated learning.

This working definition of curriculum is broad and constructivist in nature. It assumes that learning is a passive activity and is not contextual and unique to the student. Limiting learning to only a targeted objective assumes that curriculum is linear, and incremental, algorhythmic. Making teaching merely a matter of 'task analyzing" and breaking the objective down to its smaller parts (See Ohio Content standards extended).

If we use this as an operating definition what "curriculum" does special education offer? Specific observable targets, measured by quantitative assessments, measured against normative achievement standards. If the child is unable to attain the grade level objective, then we break down the target to its parts. This way the student is still working on "grade level" standards but his curriculum has been accommodated.

This very linear way of teaching assumes that the special education child is unable to construct understanding beyond that of the targeted objective. It often devalues the assimilation and accommodation in lieu of moving on to the next objective or sub objective. It does, however, provide a clear, quantitative measure of what has been assessed and "learned", it provides parents and teachers hard data of the work completed and "progress" made. How can we reconcile this way of teaching with the promotion of creativity in teaching and learning measured against the almost obsessive need for accountability? This type of fine-grained analysis of teaching and learning is reflected in Eisner's vision of a "connoisseurship.[14] When we deconstruct the idea of special education pedagogy, we identify these differences:

The I.E.P.- Using the data gained in this assessment an Individualized Education Plan (IEP) is developed. Individualized targets in the form of instructional objectives for each student are formed. Assessments and criteria determined. Placement is also determined using the "Least Restrictive Environment (LRE).[15]

- S.D.I.- From the IEP and ETR data Specially Designed Instructional Plan (SDI) is created.
- Modified or accommodated instructional strategies. Accommodation is a rational and practical adaptation of teaching practices. Modification is adjusting the targets to be less complex or broken down to preliminary steps.[16]
- Location of services- location the identified student being taught.[17]
- Direct Instruction- This is act of breaking the task or objective down to its basic parts[18]

It can be suggested that all but one of these "differences" can be provided without identifying the student and offering menu of "location of services.

Having individualized targets is a skill regular educators acquire as well. Differentiating instruction, integrated curriculum, project-based learning are all examples of regular education pedagogy and models that allow for the targeting of individual needs of students. In fact, when measured against individualized plans project-based learning was more engaging even for identified students.[19] The same is true for modified and accommodated assignments. Strategies for differentiating instruction are attempting to find that one, correct, method of engaging students in learning. These strategies are well researched and emphasized in preservice certification programs everywhere. The location of where the services are delivered has also received decades of research.

Outdoor education, play based pedagogy, alternative classroom design, open classrooms, center-based instruction all emphasize the location of the "most appropriate" environment for the student to maximize engagement in learning. In fact, research suggests that when regular educators seek alternative environments to maximize engagement, we include a far more diverse group of learners and engage them to a higher degree.[20]

Special Education is an assessment heavy process that leans upon quantitative data and normed assessments which are products of the logical positivist, "Thorndike like" algorhythmic way of thinking about teaching and learning. They often emphasize the attainment of a target at the expense of broader and deeper learning. Perhaps advocates of this way of teaching and learning feel these students are not capable of the assimilation and accommodation of a broader deeper learning?". Advocates of Special Education and Dual Licensure, obviously feel the regular classroom educator needs the skills to provide SDI to diverse students and they require specially designed pedagogical training.[21]

Direct and Explicit Instruction are broadly used terms and a technique in special education. In the field of education direct instruction refers to teacher centered instruction that is focused on clear behavioral and cognitive goals and outcomes.[22]

Since it is a behavioral approach, it is only concerned about the single target or objective, measured by a quantitative measure, showing attainment of that single target and objective. Learning is a heuristic process.

Direct Instruction is an algorhythmic process. This issue lies at the heart of my argument. There is no behavioral approach that will accurately measure the assimilation and accommodation of new learning and the broader, deeper attainment of connections to prior learning. That breadth and depth is the short coming of direct or explicit instruction. While there is no doubt the research shows that direct instruction works at attaining the single target there is no evidence that it connects this learning to prior learning or integrates it into a more complex neural network of understanding.[23]

For example, if the specific target is stated to be: "Student will demonstrate mastery of the multiplication facts to 9 with 100% accuracy when given a sheet of multiplication facts." It would be easy to measure

the success at the completion of this assessment. However, it does nothing to show that he understands the connection between multiplication and addition, or that the reverse of multiplication is division and is also related to subtraction. Or that the student understands what 7X8=56 means in a global sense or that the student understands how to apply these skills to other types of problems. It measures only the product. General educators are not only concerned about the learning of the multiplication facts but all the assimilated and accommodated information that connects to them.[24] This type of learning is not broad or deep and it does not seem to develop what Piaget and Kami call "intellectual autonomy".[25] This is the confident ability to explain and defend your answer to questions of new learning. They insist that "intellectual autonomy" is the goal of all education.[26]

When there is a largely behaviorist framework that is embraced by special education then assessment is often an issue. The ease and supposed empirically verified answer of algorhythmic assessment is what is attractive to positivist.[27] If I state a target and I can prove it is mastered, then I can 'prove' the student has learned. This is also why many teachers reject this as a method. The art of teaching is the connections students make while learning. It is not always a measurable, linear process and is often different for each child. But these connections are the key to deep learning.[28]

There is separate training and licensure to teach special education. This creates a separate lane, and the appearance of a separate body of pedagogical knowledge. It also introduces millions of dollars of federal money to the equation. This is the difference between general education and special education! Teaching the "whole" child is a fundamental tenet of effective pedagogy.[29] There are exceptional teachers, creative, talented, and excited about finding the channel that students require to experience learning and they do not wish to be limited to a behavioral, explicit instruction model.

Labeling students, requiring SDI for them also assumes that SDI is not needed for typical students. This is simply not true. The goal of all teachers is to locate and identify the "channel" or "channels" that each student needs to engage and succeed.[30]

Does special education pedagogy engage and teach the child what you want them to know, and does it allow for assimilation and accommodation and the integrating of deep learning? Dual licensure programs, indeed, special education in general creates a discourse that supports this differentiation between special education and general education. All the so called "differences" in special education curriculum and pedagogy can be provided without labeling, measuring, comparing children to the "norm". If we simply taught children the way they need to learn, provide support and personnel to support this teaching and learning, assess children from where they started not from where they should be and focus on engagement and broad deep learning, then "special education" and dual licensure or any segregating of students would not be needed.

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A NOVEL INCLUSIVE DESIGN FRAMEWORK FOR CONTRIBUTING TO AN INCLUSIVE, OPEN PEDAGOGY

Author:
JESS MITCHELL

Affiliation:
INCLUSIVE DESIGN RESEARCH CENTRE, OCAD UNIVERSITY, CANADA

INTRODUCTION

There have been attempts to challenge the design of education: they range from tweaks to radical redesigns. In the 70s at my institution, Roy Ascott took a radical approach that divided the campus between those who applauded him and those who reviled him, and he was quickly removed. When tarot cards replaced the academic calendar and departments, grades, exams, and more were done away with, the institution decided it was too much. In part, Ascott had found a tipping point where his inattention to the political, administrative, and diplomatic aspects of leading a campus proved too much. His focus on creating radical openness, and with it ambiguity, worked for only some. At the heart of this imbalance seems to be an inherent tension between an organization that needs to operate efficiently and an open space for teaching and learning in novel ways: business versus pedagogy.

Universities now are far from the radical spaces envisioned by Roy Ascott during his short tenure at OCAD University.[1] Ascott's goals of creating a "place to think…before learning technique"[2] would not be realized and OCAD would fall back into more stability and more traditional pedagogy. Many institutions have tried to rattle the grip of orthodoxies in academia and failed. That does not prevent us educators from trying to poke holes in the dominant design of education where institutions expand offerings to achieve 'scale', institutions "commit" to inclusive education, and instructors feel under pressure to perform without controversy. Within this convergence of business economics and commitments to supportive ideals without support, faculty are largely left to delicately bend to these conflicting parts of the institution.

My interest is in the impact that these tensions and subsequent design decisions have on pedagogy. Instead of embracing learning paths (pl), instructors are doubling down on uniform learning outcomes. Instead of considering the impact of the design of the course, the classroom, or the materials on teaching and learning, instructors are building an ironclad syllabus that covers all possible questions. We can debate why this is the case, but from my vantage, it seems that many instructors are protecting themselves: from cancel culture, conflicts with students, negative evaluations, and any generally unpleasant experience associated with teaching and learning. Of course, this is the rational response. The institution supports this armoured disembodiment of education as it supports scale and efficiency and prevents risk.

Teaching in Fear

Instead of brave spaces where students and instructors together push the edges, embrace uncertainty, have difficulty discussions, and explore gnarly problems, instructors avoid vulnerability, the main ingredient in building trust in the classroom. "They hide behind a podium that creates distance from the students; PowerPoint presentations are used, which draws attention away from solely engaging with the teacher; and teachers come 'prepared' to class with extensive lesson plans that leave no time for raw discussion or unprompted question-and-answer sessions."[3] No time for thinking, critiquing, or exploring.

This conundrum has left us with transactional interactions and innumerable checklists: for teaching, for learning, for making content accessible, for being inclusive, and for pedagogical practices. The problem is that the checklists all fall short. Human beings are social creatures and teaching and learning is fundamentally a relational act, so approaching education with a checklist process for accessibility and inclusion might leave us feeling better (because we have deferred to a supposedly vetted checklist) while still falling short. Any learner or teacher whose needs are not covered by the process is deemed the problem, not the process or the context.

These are the outcomes of what I argue is poor design in education. Below is a conversation about what it looks like to build equity into education using an inclusively designed, applied pedagogical approach that need not be in direct conflict with the business imperative of the institution.

The Context

To start with, education happens in spaces. To use a feminist lens, education is an activity that is situated in a complex place and time. When we speak of designing education, what do we mean then? What I mean is that when we 'design education' we make many decisions (big and small) about the physical layout, setup, the tools available to us, the furniture, the colours, everything around us. There is a difference between teaching 200 people in an introductory class arranged in stadium seating, teaching 15 people in a room shaped like a circle with modular furniture, and teaching 40 students online in a Zoom videoconference with breakout rooms. It impacts teaching and it impacts the learning too.

Every decision that is made about context, tools, and presentation impacts teaching and learning. I can ensure that some students will not participate by creating groups big enough that they won't have to. I can force everyone to stare at the person in the front of the room by teaching in a room with stadium seating (you literally cannot turn your body around), and I can mute everyone's video and audio in a Zoom room making 'the others' all passive observers.

In some cases, educators are invited to make intentional design decisions about their classroom space, the tools available to them, and the content. In most cases, they are assigned a room with a collection of furniture, given a tool procured by someone else, and given content affirmed by someone else. In-person rooms are furnished by people in procurement. What kind of design process do they use to arrive at the furniture decisions? I am fascinated by procurement decisions about chairs—how many left-handed chairs does your physical classroom have, for example? Are there directional chairs at all? Do you know who was involved in making that decision? Do you know how many lefties you have in your classroom? Do you know the impact of that design decision on those entering the class for the first time? Central computing might determine your videoconferencing application and set defaults for who is a HOST and who is a GUEST, who can enter the meeting room and who is left in the waiting room, who must authenticate to join, whether captions are available, if you can follow and generate a transcript, and more. Who makes the decisions about the content that will be consumed in class? Is it a book from the bookstore? Is it an Open Educational Resource (OER) and therefore free?

None of these decisions is neutral – they all carry power, and that power is conveyed to those entering the teaching and learning moment. These decisions have a fundamental impact on who feels welcome and intentionally designed for and who feels as though their needs or preferences were not considered.

Design Decisions are Not Neutral

When we ask from the architectural, digital, and content what makes up education, we know that the answer is every single decision, no matter how big or small. Every decision is a design decision. The context all around us impacts education. Every decision around us contributes to or interferes or neutrally exists with us as we teach and learn. To understand if it contributes, interferes, or unobtrusively just is, we must interrogate it. After interrogating, we can see more clearly that there are design decisions we can easily change with nothing more than awareness, something that will fit nicely into the economics of the institution.

Question – Reflect – Disrupt

The questions we ask must get at the historical provenance of the design decision, the ethics of that moment, and a critical perspective on how to imagine re-designing the design altogether in the current context and culture. This approach can help us put into action the words that many institutions are nominally proclaiming; to not just centre dominant epistemologies and instead attempt to understand how to make education equitable, addressing the needs of the individual while educating 'at scale,' and creating a context that allows for belonging and inclusion.

To move from theoretical musings or aspirational goals into actioning inclusion and equity in education, we must address the design decisions in the space.

How can we do this?

I have developed a simple process for beginning the complex conversations about design in education. I have found it helps bridge the good intentions of diversity, equity, and inclusion (DEI) and makes them real and actionable without falling into ambiguity or else the checklist. The process is simple, but the contexts for applying it are complex.

Architectural

I noticed a sign in my classroom years ago that dictated the room population limit as mandated by the fire marshal and I wondered what pedagogical thoughts the fire marshal had. Of course, it isn't about teaching at all. It's about fire safety and egress – our ability to evacuate safely if there is a fire.

So, I wondered where those values came from, I questioned their provenance. It turns out that it comes in part from Florence Nightingale, researcher, and founder of modern nursing. Nightingale is also partially responsible for the distance regulations we all adhered to during COVID.[4] That is the history of those decisions—the inheritance of our spaces today. Florence Nightingale was concerned with how much space we needed to be healthy, and how we could maximize fresh air and ventilation. We can feel the impact of carbon dioxide levels in board rooms and at most conferences. Many people are together in small rooms, and they yawn a lot, feel tired, and arguably are impacted by the cognitive effects of high carbon dioxide levels. Classrooms too. As we come to understand the impact of carbon dioxide on cognitive performance, we learn the impact it has on decision-making, attention, and test scores. Who is making the decisions that impact air quality in the classroom and how are the decisions being made? And what about lighting and seating and any other environmental decisions? They all matter.

Digital

The decisions about what technology to allow in the classroom or to make up the classroom have created numerous new models of pedagogical delivery: asynchronous, hybrid, online, distance, MOOC, and more. Each technological tool that we use in teaching and learning has an impact on both; the decisions about how information is accessed, shared, organized, and collected all have impacts. "Technology is ideology. Technology is epistemology. How we know shapes what we know, but we have not yet fully grasped the different ways that our new access to global and local stores of knowledge should be revolutionizing higher education. We can be doing so much better."[5]

The monitoring features in Learning Management Systems (LMS) have an impact on how instructors trust (or do not) students. The attempt to re-create a space for the interpersonal in threaded discussions has an impact on whose voice is heard. The grid-like layout of the LMS where courses are swimlanes that are distinct units never to overlap or converge are all design decisions that have an impact on teaching and learning. Those design decisions are largely made by Education Technology companies, and the defaults for the interfaces are chosen within the institution, often selected by computing staff. Those staff together with whomever is making procurement decisions make design decisions about what should be integrated: single sign-on, identity management systems, authentication levels, seamlessness with other campus resources like Microsoft Teams, Google for Education, Office 365, Zoom, Echo 360, repositories, media sharing platforms, cloud-based system, and more. Who decides? Who procures? And how do they determine what is a 'good' and necessary teaching and learning tool? What if the technology is not fully accessible? Who reconciles the needs of the many with the needs of a few? What about the legal responsibilities of the institution? Who can we tolerate not considering?

Content: The Relational

The point where instructors and learners meet interpersonally is increasingly relegated to digital platforms. We know that the social is the single most important determinant of success: "Instructional methods and the way they are implemented on the microlevel are substantially associated with achievement in higher education…Among the different approaches to teaching, social interaction has the highest frequency of high positive effect sizes."[6]

Teaching and learning are fundamentally relational activities; it happens at the point where people engage each other, and engage content, and we do it in spaces and places where others have made design decisions. The point where instructors have arguably the most power to design is in the creation of engagements of people with each other and with content.

Instructors can design interactions among people: small groups to work together, and interaction spaces where people can feel brave, and where all voices are heard and worthwhile.

The elements that make up education are entirely positional, intersectional, situated, and socially contextualized events. And in those events are people—and wherever we have people, we have power. And what we do with that power is what matters. There will always be power—but the design choices we make entirely determine how it is distributed (or not). What standard, as pedagogues, will we hold ourselves to? Are there ways to build in accountability and balances of power? Are there ways to employ care, awareness of trauma, and sensitivity to learners without fear? The answers to these questions are not singular. There will never be just one way to connect with people, and that is a moment worth exploring.

Human Complexity

Before we even get into the physical and digital spaces where education happens, we carry our individual human complexity with us. We all carry a backpack, but this backpack isn't full of books and computers and cables. Instead, this backpack is full of our ancestor's experiences, our histories, our preferences, and our needs. This backpack is who we are anywhere outside of that educational space—it's who we are and everything that comes into the room with us. It's our personality, whether we're comfortable speaking in front of others, whether we're an introvert or an extrovert, whether we speak English natively, and so much more. It's us, undeniably and unrelentingly us.

And we are complex. We are never one thing or the other, as if at our core is an acknowledgement and a rejection of what are false binaries all around us: we are intersectional, intertwined, amalgamations of experiences. We are coming into these spaces and everything in the space and every interaction and every moment is a complex of context, goals, hopes, dreams, feelings, insecurities, physical objects, digital objects, decision-making, planning, executive functioning—and much more.

ONE SIZE FITS ONE[7]

In the architectural, digital, and interactional spaces where education happens, every decision is a design decision and each one impacts the experiences of teaching and learning. Rather than seeing this as crippling complexity that we can never fully fathom or address, the awareness alone can help us all as actors in teaching and learning. We can be intentional, consider who we are failing or leaving behind, and build alternatives when we know that designs are disadvantaging some.

As instructors, we should all ask why we are making the design decisions we make. We should all explore how our own identities, lived experiences, and positionality impact those design decisions. We should explore how our own backpack impacts our ability to empathize and support each student.

And I think that's a great place to start.

The design decisions we make about content should also include the following interrogations:

- How might this resource decentre the dominant culture (the default) and ways of knowing?
- How might this resource address social inequities and justice issues?[8]

CONCLUSION

Instead of tiptoeing around the latest statements from our institutions about equitable education that have very little to no follow-through or guidance on how to accomplish it, I suggest we approach the architectural, digital, and interactional from a design perspective with curiosity, wonder, a rejection of one-size-fits-all, and unwavering flexibility. We can do this by beginning with questioning where design decisions come from, then interrogating and reflecting upon the ethics of those beginnings, and then endeavouring to explore ways to make changes to the ruts of doing and thinking.

If we make a transparent effort to do this work, if we are open about our own positionality, if we consider students unique individuals with stories each their own, I think we can begin to herald in actionable, inclusive pedagogies that need not raise the eyebrows of those interested suspicious and alarmed by heterodoxy.

The context within which Roy Ascott was revolutionizing my own institution was around the time that global planners Horst Rittel, a design theorist, and Melvin Webber, an urban planner, coined the term "wicked problems." to describe complex, often open-ended, interconnected issues: what we might call systemic issues now. Their complexity makes them difficult to solve at all and uniquely resistant to linear, traditional methods of problem-solving and project planning. They describe in their seminal work two belief systems that are in opposition: first, the "planning intellect [that uses] reasoning, rational discourse, and civilized negotiation", and second, the "feeling approach, of compassionate

engagement and dramatic action, even of a revival of mysticism, aiming at overcoming The System which is seen as the evil source of misery and suffering."[9] As Cathy Davidson reminds us, "The mismatch of archaic education systems and the demands students face in their future is a wicked problem, too."[10]

Right now, scale and economic arguments are given primacy over individual student connection and learning. As Todd Rose reminds us, "We no longer need to compel people to conform to the same inflexible standardized system, because we have the science and technology to build institutions that are responsive to individuality."[11] I, and others, suggest an approach that does not altogether threaten scale, but does not prioritize it over individuals' needs.

NOTES

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TEACHING THE CHANGE YOU WANT TO SEE (ON SET)

Author:
HEATHER COKER HAWKINS

Affiliation:
UNIVERSITY OF TENNESSEE, USA

INTRODUCTION

There is a great and revolving number of fresh cinema program graduates supporting industry productions in various entry-level capacities. They are often hungry to work and meet the demands of a destructive and widespread work ethic to be the best, most eager, and available worker, often at the expense of their health and well-being so that they are the person hired for the next job. This fear is exacerbated by employers who fire at-will employees who might object or resist unreasonable expectations or harsh working conditions. In the dominant Hollywood mode of production exists a bottom-line driving force that values profit or, at the very least, protects the employer over the employee, who without their labor, there would be no production.[1]

The quality of a person's labor is a condition of their skill, desire, and motivation, an interwoven and malleable effort. My life, research, and teaching are fluid aspects of my whole person. Sadly, I witness students in varying degrees of distress in my role as an educator. In response to this distress and my desire to disrupt the structures of the industry, in spring 2020, I began incorporating a wellness component into teaching a collaborative filmmaking process. I designed a one semester upper division cinema class to address and reshape the focus of individual wellness while developing, filming, and completing a short film. I believe this model is one that addresses the whole student. It provides opportunities for students to engage as themselves with their peers in an activity with clear structure that allows for creative exchange and acceptance of each other as human beings. I propose that modeling this filmmaking approach could result in perpetuating a value and practice in the profession toward a well-person-focused set of standards to be adopted by unions and the industry at large. When a laborer's value is recognized and they are treated like human beings, the laborers will invest in their work differently and the resulting outcome of shared effort will reflect the environment.[2] Another hopeful byproduct will be empowerment of those laboring to know and protect their worth as human beings rather than operate from fear of scarcity of opportunity serving the monetary gain of a few individuals.

Background

My perspective is influenced by years of academic training and professional experience with two different art forms culminating in an interdisciplinary art-making practice and approach to pedagogy. One is an embodied practice of physical performance, dance, and choreography. The other is a technical, cerebral, and often seated activity of making film and video works. I began teaching full-time at the University of Tennessee in Knoxville, TN in the fall of 2019. My appointment included teaching Video Editing, Introduction to Video Art & Cinema Studies, and an advanced special topics version of the Video Art & Cinema Studies course. The courses served as production instruction for students in the

Cinema Studies program and Time-based Art major. At UT, I had freedom to design the 400-level course according to my interest and expertise. This led me to formulate a collaborative filmmaking course set to begin in the spring of 2020.

Addressing the Problem of the Industry in the Classroom

This piece of writing serves to document the design of an upper division collaborative filmmaking course including well-being pedagogy in its learning objectives and content. This focus not only shaped the structure of the course but proposed to address the larger infrastructure of the industry that similar courses typically emulate. The industry, reliant on human labor, is typically destructive to the individual's wellness and sense of well-being.[3] Some problems include excessive work hours with low pay, porous work-life boundaries, gig-based freelance structure, and typically fewer opportunities for women and people of color in leadership roles.[4] The current mode of production is unsustainable to an individual. Instead of addressing the demise of the individual, the industry preys on the endless fount of new laborers to replace those who cannot or do not continue working in the industry. It is a revolving door for fresh laborers to replace those with institutional knowledge, experience, and a diminished sense of well-being.

In this paper, I take a critical view of the Hollywood mode of production[5] and assert the need for a new approach to filmmaking. The argument is in service of all laborers and their well-being working in the industry. The classroom teaching production and filmmaking as a process can either perpetuate the model that exists or challenge and promote a different method. Through implementing well-being focused strategies, there is potential for students to assume a better situation for themselves while pursuing their degree. This practice could cultivate expansive shifts for graduates to claim a better future for themselves and ripple outward to laborers in the professional field.

Hollywood Mode of Production Defined

The Hollywood mode of production includes a three-stage process: Pre-production, Production, and Post-production. There is invisible labor that occurs before and after these three stages to which many contribute their inspiration, creativity, and effort. Many people now describe the filmmaking process as a five-stage process: the period of preparation and planning is the Ideation and Research Phase of Production. Pre-production follows and can last for weeks to years depending on the size and scope of the production and its constituent departments. Production is the stage when principal photography occurs, and the pre-production plans are put into practice. Post-Production involves the editorial processes, both picture and sound. Sound editing, sound effects, and music scoring are assimilated into the final mix. Color grading and any digital effects occur in post-production as well. The last phase, distribution, is the phase that connects the project to its audience including all manner of marketing and economic support necessary to make an audience aware of the film's existence and screening availability.

DISCERNING NEED FOR A NEW APPROACH

In the previous semester, the Fall of 2019, I observed that many student projects were contemplative of the future world, anxious about environmental crisis and increasing tragedy affecting the youth of the world. This ominous tension, pressure, and fear permeated their lives and bodies and found expression through their projects. I deduced that the time I spent with these students could address or ignore the reality of their lived experiences and focus of their mental energy. I proceeded with curiosity whether our time together could reframe students' awareness of their bodies and their well-being while learning

a collaborative process and honing their artistic voice together. Post-pandemic this perceived and documented student anxiety expressed in the classroom has increased at an alarming rate.[6]

WELL-BEING vs WELLNESS

The Global Wellness Institute defines 'wellness' as "the active pursuit of activities, choices and lifestyles that lead to a state of holistic health".[7] The practical association of wellness includes active strategies such as eating a healthy diet, engaging in physical exercise, and getting enough quality sleep, for example. Whereas well-being relates to a more holistic view of an individual that wellness impacts. Well-being "encompasses [an individual's] mental health, physical health, and more."[8]

The wellness-focused component of the course was a separate and individual assignment from the film that was being made collectively. The class followed a framework including activities that required students to evaluate their wellness in their daily lives. Based on their responses to questions and information gleaned from activities, students pinpointed an aspect of their general wellness that they would like to improve. They were guided in drafting an actionable plan to reduce or include behaviors that support this one change to improve their wellness which would in turn affect their greater sense of well-being. Incorporating well-being focused curriculum throughout the course design would potentially result in the following benefits: "Less depression and anxiety; better performance at school, sports, and work; reduced risk of dropping out of school; better physical health outcomes...Research demonstrates that well-being is not only valuable because it feels good, but also because it has beneficial real-world consequences."[9]

Students as Co-creators of Their Own Wellness Plan

The wellness portion of the class was clearly presented as one of a two-pronged effort of the course. I was transparent in the tools I was teaching providing a written version of each sourced exercise (promoting breathing for alertness, anxiety reduction, and physiological stress management) with our purpose for engaging with it and its potential benefits. The learning objectives were met when students engaged with the assignments and interacted with their peers discussing perceived progress with their self-defined wellness goal. Allowing the student agency to determine their own wellness goal was the first step in trusting the students to personalize their experience and find value committing class time to their individual wellness objective.

Students developed a partnership with a fellow classmate who was outside of their department. This ally also served as an accountability partner. This growing mutual respect and concern for one another rippled out to our larger classroom community. Having a peer to look out for in a class is a key to forming community and a stronger sense of well-being[10] beyond the classroom. I often encourage the class to form phone groups within the class so that they can stay connected and check in with each asking questions. Sometimes when at their best, these groups carry on their conversations into the social sphere and beyond the semester. In the professional sphere it is important to have comrades outside of work but also on the job to enhance joy at work but also to serve as an ally when the larger structure may not support individual well-being.

Well-being: Seligman's PERMA™ Model

The PERMA™ model developed by Dr. Martin Seligman is defined as instilling (positive psychology) **P**ostive Emotions, generating good feelings in students. **E**ngagement occurs when strengths are matched to the challenge. Students can find flow and fully engage with the task at hand. **R**elationships are forged by connecting to one another authentically. Students are supported and find **M**eaning leading

to feelings that their existence is purposeful. **A**ccomplishment can contribute to well-being and is enhanced when experienced as a shared experience with peers.

The different letters of the PERMA™ model connect to one another in useful ways. Student 'Engagement' was high as they met the challenge of the assignment to form 'Relationships' and collaborate with their peers and performers from the Theatre Department and local community. For this course, 'Meaning' was expressed through the expansive assignment and classroom activities serving a greater and deeper collective purpose than the pursuit of earning a passing grade. As students worked together in the classroom and on set, they forged a team and friendships which resulted in 'Positive Emotions'. Upon completion the film enjoyed a remote screening the following fall allowing students to see their work and celebrate their effort in a local film festival. They felt a sense of 'Accomplishment' when completion of one stage of production occurred, giving way to the next.[11]

Building the Experiential Classroom Environment

With each class I strive to form a community. The in-classroom on-set experience reflects my values creating a classroom environment steeped in mutual respect rather than following a hierarchical structure typical of the Hollywood mode of production. One of the ways to disrupt this hierarchy is to listen and practice respect for one another. With concern for the professional film production, listening costs more time, slowing down to have brief conversations rather than quiet those ranked lower in the chain of command reflected by their pay. In the classroom, listening costs time; however, the benefit relates back to the well-being goal valuing students, forming positive relationships, and instilling Meaning[12] by practicing collective decision-making to reach a shared goal that extends beyond the reach of a receiving a grade for a class.

The unforeseen event of the pandemic occurred midway through this course forcing a remote post-production process. Counter to the often-disengaged audiences of today's Zoom classroom, the online meeting was new, a solace when we could no longer meet face to face. The well-being focus of the class was established and familiar when we accessed the tools for stress management and grief as isolation, fear, and uncertainty abounded at the beginning of the lockdown. I believe incorporating a well-being model or introducing tools should happen from the first day of a course's introduction. Students will not always react favorably or engage when tools are provided midstride without precedent or explanation of their purpose. With this class, there was ready access to vocabulary and openness to explore topics of wellness and well-being from the beginning. Having time to learn and gain understanding of a wellness tool or technique's purpose, increased students' perception of their value and affected the students' acceptance of them over time.

Equitable Division of Labor

The class of fifteen students formed departments of two to four people. Depending on the time commitment of a given role, students were assigned a role in at least two different stages of production. Each role was double cast.

All students participated in the ideation process brainstorming ideas. The three writers drafted three short synopses based on the collaborative brainstorming session. The ideas were narrowed down to two and students discussed the possibilities of producing each idea, the challenges and current assets that would allow some ease of location, protection from weather, and other logistical concerns. One idea surfaced as a clear winner and the writing team began meeting regularly to draft the screenplay while all other departments moved forward producing and planning with the knowledge of the premise and desired visual style. The writers divided the script into three acts, each writing one act and then trading them for edits.

The class experience was quite varied in scope and content from one student to the next. Some were very active on set carrying much of the weight during principal photography, serving as grips, camera operators, and sound recordists, in addition to, PR and marketing duties later creating the poster and online press kit. Another wrote one-third of the screenplay and served as music supervisor researching and selecting music tracks to accompany the picture. There were two directors who developed the look of the film together and divided the workload on set guiding the production team. Then, during post-production, one director designed and mixed audio and the other created the titles and credit sequence.

On Set

Production consisted of nine days total, though some were half days and reshoots. Principal photography had wrapped just before the 2020 pandemic. We needed exterior shots and connective tissue to bridge scenes but had no possibility of candid campus footage with students. Instead, we relied on past student projects for campus footage and filled in the rest of the gaps with stock footage. There were pick up shots that students collected and shared remotely with the editors. We became a remote post-production team defining our method as we transitioned the entire class to a synchronous online format. I created video tutorials to teach students audio editing techniques that I would have taught in the lab.

Learning Outcomes

The goal of the class was to begin a film and reach some semblance of completion by the end of the semester. The importance and focus were on guiding students through production of a project. This class of students made a short narrative film. The simultaneous focus foregrounded collaboration and working together identifying strengths and weaknesses supporting one another in an aware, responsive manner. The project did not finish by the end of the semester, but the students were committed to see it through even though it extended one month beyond the term. Eventually, the film did reach completion and it screened at the local film festival a few months later, which was held online. The student directors participated in a Question and Answer session where they were able to share their story of the making of the film.

A Proposal for More Time, Greater Impact

I offer my observations and examples to discuss, follow, amend, and improve upon. I propose that a multi-semester format could support deep exploration during and understanding of film production. A singular process perhaps perpetuates works made with a certain formula hindering their ability to push the medium forward in artistic and creative ways. This extension of time with the students would allow them to try on various roles and find their fit within the process. A longer engagement could mean deeper connections with peers and instructors forming bonds over time and through shared experiences.

CONCLUSION

Educational institutions are uniquely situated to respond to structures of oppression existing in industries in which their graduating students will seek employment. Faculty with industry experience working in a common and dominant workplace climate are compelled to inform their students of the potential challenges and barriers while also modeling a better mode of production to support the humans laboring for their employer. I write from a position of earned and unearned privilege providing a view of the industry where I gained access to job opportunities based on my whiteness, economic ability to matriculate from a film school, but I was also prevented from many opportunities as a woman. This article does not speak to the historically misogynistic environment of a film set. As a woman who has

worked in the camera department on student and professional productions, I bore close witness to or was the recipient of objectification and sexual harassment. This behavior was not perpetuated nor was it tolerated on our set. One of the directors for our film is a young woman. All departmental roles were filled by students regardless of gender. That said, it is important for women and students of color to be in leadership positions in school film productions. The film content, its characters, and the actors who fill the roles should also be selected with consideration for representation outside of limiting decisions usually made by unimaginative executives. In education, we have the expectation and academic freedom to explore, make change, and dare to dream of a better future for all.

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ARTIFICIAL INTELLIGENCE, LEARNING ANALYTICS, AND ADAPTIVE LEARNING: ORBIT-SHIFTING INNOVATION IN EDUCATION

Author:
JENNIFER QIAN

Affiliation:
LOUISIANA STATE UNIVERSITY, USA

INTRODUCTION

The fusion of Artificial Intelligence (AI), Learning Analytics (LA), and Adaptive Learning (AL) epitomizes a paradigm shift in education. AI's ability to simulate human intelligence, LA's utilization of data-driven insights, and AL's adaptive methodologies collectively redefine the educational landscape. This conceptual paper aims to delve into the interconnected nature of these domains, illustrating how their synergy catalyzes advancements in personalized learning, pedagogical innovation, and educational effectiveness.

ARTIFICIAL INTELLIGENCE IN EDUCATION: AI'S COLLABORATIVE ROLE

Teaching and learning are entering the AI age. Different from previous educational technologies, AI is more intelligent, reactive, and adaptive, representing a technology that is closer to humans' cognition. Research studies in AI in education (AIED) highlight the human-like qualities of AI as a distinctive affordance that sets it apart from conventional educational technologies.[1] The role of AI, thus, has been perceived as that of learning tutors, assistants, and companions to human students and teachers.[2]

Empirical studies investigating the collaborative role of AI encompass Fryer's[3] exploration into the peer dynamics between AI chatbots and students in foreign language learning, Ji's[4] investigation into conversational AI within language learning, and Kim and Cho's[5] study on the impact of student-AI collaboration on creativity and expressivity in performance tasks. Shifting away from perceiving technology as merely a mediating or augmenting tool, current perspectives on AI lean towards recognizing its collaborative and partnership role in the teaching and learning process.[6]

LEARNING ANALYTICS: AI'S FORECASTING ROLE

In addition to its collaborative role in teaching and learning, AI is a foundational enabler for learning analytics (LA). The concept of "learning analytics" is not new, and it was proposed and developed by George Siemens and Dragan Gasevic in 2011,[7] marking its inception. As an emerging academic field, the influence of AI has significantly accelerated its development. With its advanced methodologies and AI technology, learning analytics stands poised to transform educational practices and enrich the learning experience. In contrast to traditional research, it embodies a more sophisticated, detail-oriented, and data-driven approach to understand and enhance the teaching and learning process. This improved research approach provides a nuanced, holistic, and dynamic means to capture insights into the

individual learner, the learning environment, and the interactions within, setting it apart from conventional research practices.[8]

Recent studies on using AI for learning analytics have predominantly focused on **predictive analytics** - utilizing AI algorithms to predict student performance, identify at-risk students, and recommend personalized interventions.[9] Predictive analytics using AI algorithms has been studied extensively in the context of student performance prediction and identifying at-risk students. Hoti et al.[10] conducted a survey on the impact of AI and ML techniques in student performance prediction, aiming to detect opportunities, good practices, and research challenges. Moeketsi and Mosia[11] developed a probabilistic machine learning model to identify at-risk students at different stages throughout the academic calendar, incorporating student engagement data, demographic data, and student performance data. Oppong[12] conducted a systematic literature review on predicting student performance using machine learning techniques, highlighting the use of neural networks as the most popular classifier and the effectiveness of supervised learning and feature selection methods. These studies provide initial insights into the utilization of AI algorithms in the field of learning analytics.

ADAPTIVE LEARNING: AI'S PERSONALIZATION ROLE

AI's collaborative role with teachers and students, coupled with its predictive function in providing insights into learners, learning environments, and learning outcomes, converges to form a significant role in education known as adaptive learning. Adaption for personalized learning has long been an aspirational goal for both educators and learners. With the advancement of AI technology and learning analytics methodology, adaptive learning is getting close to becoming a reality. AL utilizes AI technologies to tailor the learning experience for individual learners, considering their learning styles, preferences, and prior knowledge.[13] Its objective is to minimize disorientation, enhance engagement, and boost motivation among learners.

AI-enabled adaptive learning is implemented through three primary mechanisms. Firstly, the utilization of **Intelligent Tutoring Systems (ITS)** stands out. These systems leverage AI algorithms to offer personalized instruction tailored to the learner's progress and performance. Through sophisticated algorithms, they dynamically adjust the content and pace of learning, catering to each student's specific needs and abilities. This adaptation is achieved by incorporating machine learning techniques, which analyze extensive data on student interactions. Consequently, strengths and weaknesses are identified, enabling the provision of targeted feedback and support.[14]

Secondly, the integration of **Adaptive Assessment Systems** plays a crucial role in AI-enabled adaptive learning. These systems harness the power of AI to assess a learner's knowledge and skills through ongoing evaluations. The adaptive nature of these assessments is notable, as they dynamically modify the difficulty and content of questions based on individual performance. This adaptive approach ensures a more precise measurement of understanding, effectively identifying gaps in knowledge. Subsequently, these systems contribute to tailoring future learning experiences according to the learner's needs.[15]

Thirdly, **Personalized Learning Paths** are integral to AI-enabled adaptive learning strategies. Leveraging AI, these paths are designed to individualize the educational journey for each learner. Factors such as individual preferences, learning styles, and proficiency levels are taken into consideration to deliver content in the most effective manner for the student. The continuous assessment of a student's skills and understanding allows these personalized learning paths to dynamically adjust the curriculum. This ensures not only optimal engagement but also the mastery of concepts. [16]

AI-LA-AL: INTERCONNECTEDNESS AND SYNERGY

The synergy among AI, LA, and AL is evident in their complementary roles, as discussed above. AI's computational capabilities process vast and diverse datasets collected by LA, enabling the customization of learning experiences in AL systems. LA provides the necessary insights for AI algorithms to adapt and refine the learning environment, creating a feedback loop that enhances the efficacy of personalized learning. The interconnectedness and synergy of AI, LA, and AL are illustrated in Figure 1 below.

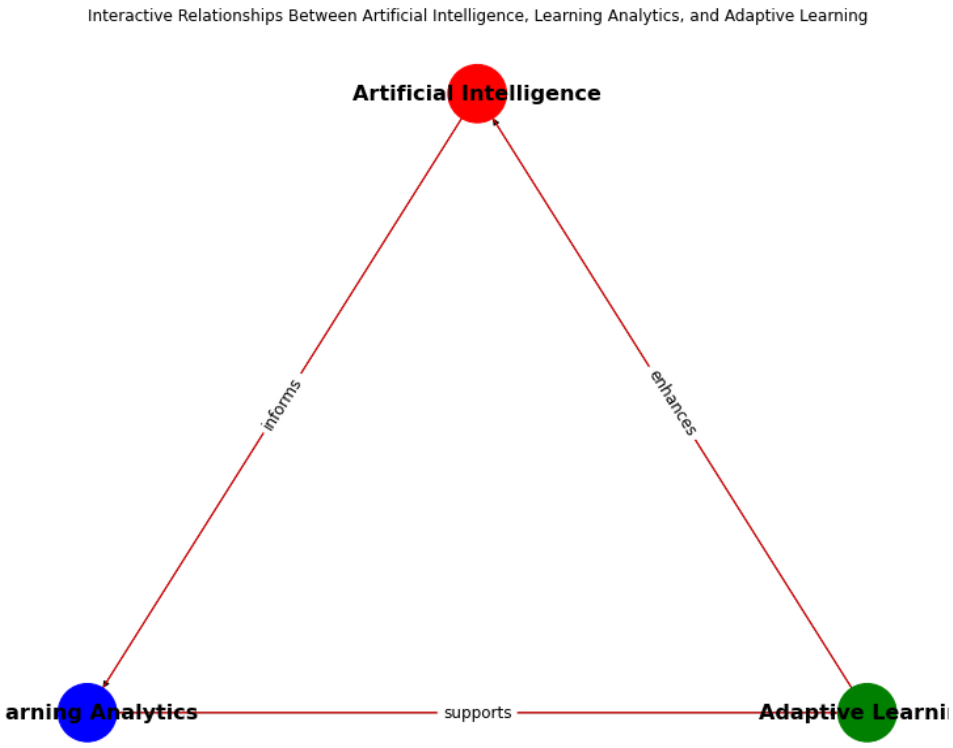

Figure 1. AI, LA, and AL are interrelated.

The convergence of AI, LA, and AL presents an unprecedented opportunity to revolutionize education. Their interdependency forms the backbone of personalized, data-informed, and adaptive learning experiences. Embracing this synergy entails navigating challenges and fostering ethical, inclusive, and innovative practices to harness the full potential of these transformative technologies in education. Future research in this line can delve into exploring novel methodologies to enhance the interpretability and transparency of AI algorithms in educational settings. Additionally, investigating the long-term impact of AI, LA, and AL on student motivation, engagement, and overall academic success will provide valuable insights. Furthermore, research avenues should be pursued to refine algorithms for adaptive learning, ensuring optimal customization without reinforcing biases. By steering our scholarly efforts in these directions, we can unlock the full potential of the triad of AI, LA, and AL to usher in a new era of education that caters to the diverse needs and aspirations of learners worldwide.

AN INTELLIGENT LEARNING ECOSYSTEM

Let's imagine a future learning environment in which AI, LA, and AL are intertwined to provide an intelligent learning ecosystem. In an innovative higher education institution, Future Learn University (FLU), an AI-LA-AL approach is embraced, strategically leveraging the potential synergies among these three pillars. The primary objective is to craft an intelligent, robust learning environment, process, and experience tailored for students pursuing a Data Science degree. Table 1 outlines the pivotal components and roles that define this innovative learning environment, while Table 2 articulates the dynamic teaching and learning processes that unfold within this intelligent educational landscape.

Components	Roles
AI-Integrated Learning Management System (LMS)	FLU employs an advanced AI-integrated LMS that processes vast datasets collected from various student activities. The AI system utilizes machine learning algorithms to understand individual learning patterns, preferences, and proficiency levels.
Learning Analytics Tools (LAT)	Learning Analytics tools continuously monitor and analyze student interactions with course materials, discussions, and assessments. Learning analytics tools provide real-time insights into students' engagement, strengths, weaknesses, and collaborative learning tendencies.
Adaptive Learning Platform (ALP)	An Adaptive Learning platform is implemented, seamlessly integrating with the AI-driven LMS and leveraging LA insights. AL dynamically adapts the learning path, resources, and assessments based on individual student performance and engagement.

Table 1. Components/Roles of An Intelligent Learning Ecosystem

AI-LA-AL	Process
AI-Driven Curriculum Personalization	At the beginning of the semester, students complete an AI-assisted diagnostic assessment to evaluate their existing knowledge and learning preferences. The AI system processes this information to customize the curriculum, recommending personalized learning paths and supplementary resources for each student.
Learning Analytics-Enhanced Collaborative Projects	Throughout the semester, AI continuously analyzes students' performance in assessments and engagement with learning materials. AL adjusts the difficulty and format of assessments based on individual progress, ensuring an optimal balance between challenge and support.
Adaptive Learning Tailored Assessments	An Adaptive Learning platform is implemented, seamlessly integrating with the AI-driven LMS and leveraging LA insights. AL dynamically adapts the learning path, resources, and assessments based on individual student performance and engagement.
Real-Time Feedback and Intervention	Students receive instant feedback on assessments, guiding them on areas for improvement. Instructors access dashboards enriched with AI, LA, and AL insights, allowing them to provide timely intervention and personalized guidance to students who may be facing challenges.

Table 2. Teaching/Learning Process in An Intelligent Learning Ecosystem

As depicted in the two tables above, the interconnected AI, LA, and AL systems at FLU create an intelligent and spontaneous learning ecosystem. Students benefit from a personalized curriculum, collaborative projects that leverage their strengths, and adaptive assessments that cater to their individual learning trajectories. Instructors gain actionable insights to tailor their teaching strategies and support students effectively. This scenario exemplifies the transformative potential of integrating AI, LA, and AL in higher education, fostering an intelligent and powerful learning experience for students pursuing specialized fields like Data Science.

CONCLUSION

The convergence of AI, LA, and AL presents an unprecedented opportunity to revolutionize education. Their interdependency forms the backbone of personalized, data-informed, and adaptive learning experiences. Embracing this synergy entails navigating challenges and fostering ethical, inclusive, and innovative practices to harness the full potential of these transformative technologies in education. Future research in this line can delve into exploring novel methodologies to enhance the interpretability and transparency of AI algorithms in educational settings. Additionally, investigating the long-term impact of AI, LA, and AL on student motivation, engagement, and overall academic success will provide valuable insights. Furthermore, research avenues should be pursued to refine algorithms for adaptive learning, ensuring optimal customization without reinforcing biases. By steering our scholarly efforts in these directions, we can unlock the full potential of the triad of AI, LA, and AL to usher in a new era of education that caters to the diverse needs and aspirations of learners worldwide.

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TRANSCENDING TEACHING THROUGH LEARNING, UNLEARNING & RE-LEARNING

Author:
FATIMA SIDDIQI

Affiliation:
INDUS VALLEY SCHOOL OF ART & ARCHITECTURE, PAKISTAN

INTRODUCTION

This paper delves into innovative pedagogical strategies designed to expand horizons of art education beyond the confines of traditional university curricula. Central to this approach is the integration of transformative processes of learning, unlearning, and relearning. Learning, the foundational stage, involves the acquisition of fundamental artistic skills and knowledge within the established curriculum. The paper argues that mere accumulation of technical proficiency may limit artistic expression. The second phase (Unlearning), encourages students to challenge preconceived notions, shed outdated practices, and break free from conventional artistic paradigms. This process is facilitated through critical inquiry, encouraging students to question established norms and explore alternative perspectives. Relearning emerges as the culminating phase, where students actively reconstruct their artistic identities. This involves synthesis of newfound insights with their existing skillset, resulting in a more dynamic and versatile artistic practice. Encouraging experimentation and risk-taking, this phase empowers students to forge innovative pathways in their creative journey. Furthermore, this paper advocates for an inclusive and adaptable curriculum that accommodates diverse learning styles and individual artistic trajectories. It emphasizes importance of mentorship, dialogue between educators and students, fostering an environment of mutual growth and inspiration. By incorporating the iterative processes of learning, unlearning, and relearning, art education transcends boundaries of conventional curriculum, empowering students to not only master technical skills but also cultivate a deeper, more authentic artistic voice. This approach not only prepares students to navigate the ever-evolving landscape of contemporary art but also encourages them to become catalysts for transformative change within the artistic community.

LEARNING

While there isn't a single, universally agreed-upon definition of learning in universities, it can be broadly understood as the acquisition, integration, and application of knowledge, skills, and attitudes within higher education settings. Numerous research papers explore facets of learning in universities, offering diverse perspectives on this complex phenomenon.

Learning as Constructive Knowledge Acquisition

Learning is a process of constructing knowledge.[1] The importance of prior knowledge and its integration with new information cannot be denied, a process particularly relevant in university education where students build upon existing understanding.[2] Learning in universities involves the active construction

of knowledge by students. It's like building a mental framework where new information and ideas are added onto what's already known. Think of it as assembling a puzzle, where each new piece fits in with what's already there, gradually creating a more complete picture. This process considers what students already understand and then integrates new concepts, making connections and expanding their understanding.

Social and Collaborative Learning

In universities, students engage in communities where they collectively construct knowledge through interaction, discussion, and collaboration, fostering deeper understanding.[3] Understanding how social groups influence learning and identity formation is crucial. Participation in communities fosters shared knowledge, shapes individual identities, and plays a pivotal role in professional and personal growth. Learning is deeply embedded in social contexts, where dialogue and shared experiences drive the construction of knowledge and meaning. The collaborative nature within these groups emphasizes the significance of collective engagement in shaping learning pathways and nurturing a sense of belonging and identity among participants.

Meta Cognition and Self-Regulated Learning

Understanding how we learn involves actively managing our learning process. It's about monitoring, controlling, and reflecting on how we acquire knowledge.[4] Taking charge of our learning empowers us, fostering autonomy and adaptive strategies. When we're in control of our educational journey, it significantly impacts our success. This autonomy, driven by metacognitive skills, influences our achievements in educational settings. Ultimately, recognizing the role of self-regulated learning allows us to shape our learning experiences, enhancing our capacity for academic excellence and continual growth in learning.[5]

Learning Environments and Experiential Learning

Learning thrives in environments rich with experiences, where reflection, conceptualization, and active experimentation intertwine. Engaging directly with real-world situations, followed by introspection, aids in grasping theoretical concepts more effectively.[6] This reflective process bridges the gap between theory and practice, enhancing comprehension. When we actively apply learned concepts through experimentation, it solidifies our understanding, making the learning process more meaningful and applicable. This cyclical process of experiential learning, from hands-on experiences to reflection, refining conceptual ideas, and then actively applying them, strengthens our grasp on knowledge. It's this blend of experience-driven comprehension and reflective practice that forms the bedrock of deep, practical learning, fostering a connection between theoretical knowledge and its real-world applications, enriching our overall learning experiences.

Critical Thinking and Problem-Solving

Exploring critical thinking reveals its pivotal role in higher education. It encourages a deeper comprehension beyond mere memorization, enabling individuals to analyze, evaluate, and synthesize information effectively. Prioritizing the development of critical thinking within educational structures empowers students to question, reason, and draw informed conclusions. This approach fosters adaptable and intellectually curious individuals capable of tackling complex real-world challenges. Ultimately, nurturing critical thinking skills nurtures a more discerning and analytical society, capable of engaging thoughtfully with information and making well-informed decisions across diverse contexts. The emphasis on critical thinking in education extends beyond academic success. It nurtures individuals capable of navigating ambiguity and making sound judgments in diverse scenarios. Encouraging

analytical reasoning cultivates a mindset inclined towards curiosity and continuous learning, fostering a society where individuals approach information thoughtfully, assess perspectives critically, and make informed decisions adeptly across various domains and challenges.[7]

UNLEARNING

The contemporary educational landscape grapples with multifaceted challenges. The prevailing standardized framework tends to overlook the nuanced intricacies of individual learning proclivities, disregarding the imperative for tailored and personalized educational experiences. Rote memorization supersedes the cultivation of critical thinking and the pragmatic application of acquired knowledge, impeding the holistic advancement of learners. Furthermore, the inflexible curriculum structure exhibits sluggish adaptability to societal shifts and technological progressions, thus failing to meet the evolving needs of a dynamic world. The prevalent teacher-centric pedagogical model sidelines methodologies that foster student engagement and empowerment. Lingering socioeconomic disparities perpetuate unequal access to quality education, exacerbating educational inequality. The overemphasis on grades risks eclipsing students' comprehensive development, while the glaring absence of essential life skills in curricula leaves learners inadequately equipped to navigate real-world challenges. These collective challenges hinder the educational system's capacity to effectively cater to the diverse needs and holistic development of its learners.

Finding Middle Ground: Standardization vs. Individualization

The tension between standardization and individualization in education underscores a critical debate in pedagogy. "Education is not preparation for life; education is life itself,"[8] emphasizing the need for tailored educational experiences. This conflict is evident in the educational landscape, where standardized approaches often overshadow the individual learning needs, as highlighted by Vygotsky in his exploration of the Zone of Proximal Development.[9] The push for uniformity in curriculum and assessment fails to consider the diverse learning styles and abilities of students, restricting the realization of their full potential.[10] In reconciling this paradox, educational systems face the challenge of balancing the necessity for consistency while honoring the unique strengths and weaknesses of each learner.

Balancing Memorization with Critical Thought

In the sphere of education, the perpetual dialectic between prioritizing rote memorization and nurturing critical thinking delineates a pivotal dichotomy that significantly shapes pedagogical approaches. Bloom's seminal work underscores the fundamental role of knowledge as the scaffold upon which critical thinking and problem-solving capabilities are erected, advocating against reducing knowledge to a commodity solely for memorization.[11] This poignant assertion echoes across educational discourse, resonating with Gardner's call for a broader educational framework that transcends the mere recitation of facts to encompass the holistic development of diverse intelligences.[12] This dichotomy manifests prominently in educational practices where the conventional emphasis on memorization often overshadows the cultivation of critical thought. Embracing education as an experiential continuum intertwined with life, contests the predominant rote-learning approach.[13] The crux of this tension lies in achieving equilibrium between the acquisition of foundational knowledge, and the cultivation of higher-order thinking skills.[14] Balancing these elements necessitates an educational paradigm that reveres not just the absorption of information but its application, analysis, and synthesis. This approach aims to cultivate adaptive, critical minds capable of navigating the complexities of an ever-evolving global landscape. Addressing this delicate equilibrium requires a pedagogical renaissance that integrates

memorization as a foundation while elevating critical thinking as the apex of educational pursuits, forging a symbiotic relationship between the two paradigms.

RELEARNING

The exploration into relearning after intentional unlearning is a multifaceted journey, delving into cognitive mechanisms and adaptive learning strategies grounded in seminal works in cognitive psychology.[15] Memory processes, retrieval mechanisms, and metacognition are highlighted as foundational elements shaping the efficacy of relearning endeavors, aligning with contemporary educational theories.[16] Real-world examples demonstrate the seamless integration of relearning strategies into diverse professional contexts,[17] solidifying theoretical concepts and emphasizing practical applications. Despite challenges, strategic approaches informed by recent literature on adaptive learning address anticipated hurdles, recognizing the dynamic nature of the learning process. Technology's transformative role in facilitating relearning, informed by insights from the digital learning landscape,[18] is explored, and case studies exemplifying successful relearning initiatives draw from current perspectives on experiential learning. The emerging trends and future opportunities in relearning, contributes to the evolving discourse on lifelong learning and adaptability, positioning relearning as a dynamic and essential component of continuous personal and professional development across educational and practical domains.

Recognition of Knowledge Gap

The initial phase of relearning involves the crucial step of recognizing knowledge gaps, marking a pivotal moment where individuals acknowledge deficiencies in their understanding or skills. This realization often emerges from a palpable awareness of struggling to recall information or encountering hurdles in its application. Subsequently, individuals delve deeper to delineate specific areas within the subject domain where their comprehension is lacking, pinpointing exact concepts or skills requiring reinforcement.[19] Understanding the ramifications of incomplete knowledge serves as a potent motivator, compelling individuals to address these gaps. Emotionally, this recognition may evoke a complex blend of frustration and determination, fueling the resolve to embark on the relearning journey with renewed purpose.[20] Ultimately, this acknowledgment catalyzes proactive steps toward seeking resources, strategies, and support necessary to bridge these knowledge lacunae and enhance overall competence.[21] Through this foundational phase, individuals lay the groundwork for robust relearning endeavors, poised to navigate challenges with heightened awareness, vigor, and proficiency.

Recalling Pre-existing Knowledge

The recalling of pre-existing knowledge is a fundamental cognitive process essential for learning, problem-solving, and decision-making. It involves the deliberate effort to recall information stored in long-term memory, activating neural pathways associated with previously acquired knowledge. This process plays a crucial role in consolidating learning and facilitating the application of knowledge to new situations. The act of retrieval strengthens memory traces, enhancing long-term retention and aiding in the transfer of knowledge to real-world contexts.[22] Through repeated retrieval attempts, individuals reinforce neural connections associated with specific information, making it more readily accessible for future use.[23] Research in cognitive psychology has demonstrated the benefits of retrieval practice in promoting deeper learning and retention. For example, the concept of "desirable difficulties," suggesting that the process of retrieving information from memory, even when initially challenging, leads to more robust learning outcomes compared to passive review.[24] This finding underscores the importance of active engagement in the retrieval process for effective learning. Moreover, retrieval of

prior knowledge is not a passive recollection but an active reconstructive process influenced by various factors such as context, cues, and encoding specificity.[25] The context in which information is retrieved can significantly impact memory recall, with retrieval being more effective when the retrieval context matches the encoding context. Retrieval of prior knowledge is a dynamic process central to learning and memory. By actively engaging in the recall of previously learned information, individuals strengthen their memory traces, promote deeper learning, and enhance their ability to apply knowledge in diverse contexts. This process underscores the importance of incorporating retrieval practice strategies into educational practices to optimize learning outcomes and foster long-term retention.

The Cognitive Mechanism of Relearning

The cognitive mechanisms underpinning relearning constitute a nuanced interplay of intricate mental processes aimed at the assimilation, retention, and application of previously acquired knowledge. At the forefront is the pivotal role of memory retrieval and activation, a process intrinsic to relearning wherein information stored in long-term memory is summoned and relevant neural pathways are activated, thereby reinforcing existing connections.[26] Complementing this, associative learning serves as a cognitive linchpin, enabling the establishment of connections between newly acquired information and pre-existing knowledge, thereby enriching the depth and complexity of cognitive structures.[27] Metacognition, a cornerstone of relearning, involves higher-order thinking processes. Reflective thinking, within the realm of metacognition, facilitates self-assessment of comprehension, identification of knowledge lacunae, and the subsequent refinement of learning strategies.[28] Further contributing to the cognitive landscape is the concept of neuroplasticity, wherein the brain's malleability allows for the dynamic reorganization of neural networks in response to experiential stimuli, a phenomenon that substantiates the adaptability inherent in relearning. Integral to the cognitive machinery of relearning is the notion of transfer, wherein previously acquired skills or information find application in novel contexts. Transfer of learning is instrumental in consolidating relearned knowledge and skills into versatile and applicable forms.[29] Collectively, these cognitive mechanisms unveil the intricate processes orchestrating effective relearning, shedding light on the multifaceted nature of cognitive engagement and adaptation in the continual pursuit of knowledge mastery.

CRITICAL PHASES IN RELEARNING: REVIEW, REINFORCEMENT, APPLICATION, MONITORING, AND ADJUSTMENT

Review, reinforcement, application, monitoring, and adjustment constitute the cornerstone of effective relearning strategies, each phase meticulously designed to bolster knowledge retention and refine skill acquisition. Following the retrieval of prior knowledge, individuals embark on a comprehensive review and reinforcement process, immersing themselves in a plethora of learning resources such as revisiting notes, consulting textbooks, or engaging in targeted practice exercises. This iterative exposure to information is paramount, solidifying neural connections and enhancing memory traces, as echoed here that "Relearning involves repeated exposure to information, reinforcing neural connections and solidifying memory traces".[30] Moreover, this process serves as a vital bridge between theoretical understanding and practical application, a transition exemplified in Kolb's advocacy for experiential learning, underscoring the pivotal role of practical engagement in fortifying comprehension.[31] As individuals navigate through the relearning journey, continuous monitoring and adjustment become imperative, enabling meticulous assessment and refinement of strategies. Sajna Jaleel illuminate the significance of metacognitive awareness in this regard, elucidating, "Metacognitive awareness allows individuals to monitor their relearning progress and make necessary adjustments to optimize learning outcomes."[32] This vigilance ensures that learners remain attuned to their evolving needs and tailor their

approaches accordingly, thereby maximizing the efficacy of the relearning process. Moreover, the integration of these multifaceted components facilitates a holistic relearning experience, characterized by deepened comprehension and enhanced skill mastery. The iterative nature of review and reinforcement fosters a nuanced understanding of complex concepts, while practical application nurtures the development of real-world competencies. Concurrently, the process of monitoring and adjustment empowers learners to navigate through challenges with agility and resilience, leveraging metacognitive insights to refine their approaches and optimize learning outcomes. This meticulous engagement with the relearning process cultivates a culture of continuous improvement, where individuals embrace the journey of lifelong learning with zeal and purpose. Therefore, the meticulous orchestration of review, reinforcement, application, monitoring, and adjustment delineates the framework for effective relearning. By immersing themselves in a cycle of iterative learning and adaptation, individuals harness the transformative power of relearning to deepen their understanding, refine their skills, and embark on a journey of lifelong growth and development.

CONCLUSION

In summation, the imperative of learning, unlearning, and relearning resides at the nucleus of adaptive competence in an era marked by incessant change. Learning endows individuals with foundational knowledge, positioning them as active contributors in a knowledge-intensive society. Purposeful unlearning becomes a strategic endeavor, enabling the discernment and relinquishment of outdated paradigms. Notably, relearning emerges as a deliberate cognitive process that integrates new insights with prior knowledge, fostering a continuous and nuanced evolution of understanding. This triadic interplay is not merely a cyclical process but an intellectual scaffolding crucial for perpetual growth and adaptability. In scholarly discourse, the significance lies in the cultivation of a dynamic cognitive schema that transcends the conventional boundaries of static knowledge acquisition. The symbiosis of learning, unlearning, and relearning, therefore, constitutes an intellectual repertoire essential for navigating the complex terrains of contemporary existence with acumen and resilience.

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DECOLONIZING EDUCATIONAL METHODOLOGIES IN HAWAI'I: UTILIZING GENEALOGY AND FAMILY HISTORY IN SOCIAL STUDIES LEARNING

Author:
KAI PHUNG

Affiliation:
UNIVERSITY OF HAWAIʻI AT MĀNOA, USA

INTRODUCTION

Being a citizen of one's community, nation, and the world is vital amidst the cacophony of division and discrimination that plague our lives and society. Critical thinking skills and an appreciation for the richness of the human condition are essential in our day and age when information and stereotypes in the media are so readily accepted. Accordingly, history is one of the key disciplines in addressing these aforecited needs; however, history education in the Hawaiian context represents a colonized space which consistently shortchanges students. One possible method of decolonizing the space of history in Hawai'i is through more extensive use of family histories and genealogies or *mo'okū'auhau*. Family histories and genealogies intrinsically include oral history which helps to engage students in a more indigenous methodology to learning as opposed to the textbook reading methods that are often applied in public school social studies classrooms. Family history also helps in creating a more multicultural education as student narratives explore varying socioeconomic situations, cultural backgrounds, and belief systems that are not reflected in the dominant narrative told in history textbooks. Additionally, family histories play a large role in increasing the intrinsic motivation of students for learning history as they see the relevance of the skills and content that relate to their own family. Family history and genealogy are intimately tied to place and if we truly want our students to make any contribution to the world, they must first know their own community, identity, and history. This paper will focus on the following questions: In what ways can family history be effectively used in teaching social studies? What are the limitations of using family history in history education curriculum? What are the benefits of using family history in history education curriculum?

This literature review will first delve into the methods and positionality of this paper. Second, the findings will weave a pattern of topics that outline the background and foundational aspects of social studies education, family history, and genealogy. Third, the discussion section faces a critical tension that becomes apparent through the different literature on utilizing family history in the classroom to decolonize methodologies while the implications section will analyze how these educational practices contribute to teacher praxis.

LITERATURE REVIEW

Social Studies Education

U.S. vs. Traditional Hawaiian Approach

This research presents an intersection between perspectives of history education in the United States and Hawai'i. In the United States, history education is rooted in the democratic ideals shared by founding fathers such as Benjamin Franklin who "saw the need for an educational system that would develop in students a sense of patriotism and nationalistic values."[1] History education thus became the hammer used to pound non-white populations such as African Americans and Native Americans into the model of a "good citizen" of the United States.[2] In connection, we can see that the goal of helping students to become good citizens is still perpetuated by the HCPSS, although it now is more inclusive of community and world instead of solely national citizenry. In Hawai'i, social studies was called *mo'olelo*. The purpose of native history or *mo'olelo maoli* was first to transfer knowledge and identity through creation, origin histories, genealogies, and second to connect Hawaiian gods to the Hawaiian ruling class and the people. *Mo'olelo* has an intimate connection with *mo'okū'auhau* which means genealogy because genealogy traces ancestry through names and places that one is connected to while *mo'olelo* shares the stories of those ancestors.

In addition to these definitions, we need to understand the juxtaposing methodologies of history education in the U.S. and Hawai'i. Even from the early stages of U.S. history education, textbooks were the main driver of historical knowledge and teaching.[3] Conversely, prior to Western influence the methodology of history education in Hawai'i was rooted in oral tradition. *Mo'olelo* is translated as legend, story, or history but when the word is broken apart, a more clear understanding emerges. *Mo'o* means succession and *ōlelo* means the spoken word. Hence, *mo'olelo* denotes a history and culture maintained through oral means.

Colonization of History Education Methodologies in Hawai'i

When these two methodologies of social studies converged in Hawai'i with the arrival and preaching of Christian missionaries, one fought to suffocate the other. The first missionaries arrived in Hawai'i after a 159 day voyage aboard the Thaddeus. They arrived on March 30, 1820 and after close interrogation by King Kamehameha II, Liholiho, were allowed to stay on a one year trial basis. If the Hawaiian court was not pleased with their work, they would be sent away. Thus, the wide reaching work of missionaries began. Missionaries started teaching English throughout many of the islands and by this means often found introduction into sharing their religion. Particularly with King Kamehameha III, Kauikeaouli, the work of education through missionaries spread as the king felt that new times called for new learning. Christian missionaries such as Sheldon Dibble created some of the first written versions of Hawaiian history, but naturally had an agenda in line with their missionary work.[4] Thus, Dibble's inaugural history, *Ka Mo'olelo Hawai'i,* "depended upon the disavowal, erasure, and overwriting of customary Hawaiian modes of organizing and preserving knowledge of the past, while at the same time situating these new histories as the origin for Hawaiian history and the history of the Sandwich Islands and, by extension, legitimating the American settler presence in the islands."[5]

In all, the United States espoused an ideal of instilling democratic principles through history textbooks which often had Western/Eurocentric inclinations, while Hawaiians use of *mo'olelo maoli* and *mo'okū'auhau* focused on legitimizing the ruling class and providing identity and connection from the land to the Hawaiian people (*Kanaka Maoli).* The destructive force of Eurocentric methods in social studies is that the *Kanaka Maoli* were disconnected from the land and their identity. Eurocentric ideology is characterized in Renaissance thought with the paramount importance of the reasoning of man. Within Eurocentrism, the onto-epistemological paradigm that developed is characterized by a

break between mankind and nature. These ideals that flourished during the Enlightenment period focus on the theory that the faculties of men exist on a higher plane than other sources of knowledge; thus, men were entitled to create universally-applicable truths. In other words, the scientific reasoning of mankind exudes the paramount summit of epistemology, and the global capitalist economy is the idealized mode of living. This Eurocentric ideology is extremely detrimental to indigenous epistemologies of history and life. As missionaries wrote the history of Hawai'i, they colonized the history and did not preserve the deep connection that the *Kanaka Maoli* had to the land.

This epistemological dominance needs to be challenged, and accordingly De Lissovoy shares about the fallacies of colonialism and specifically points out social studies as an area of focus for decolonial application:

The dominative force of colonial logic is multidimensional and opportunistic. Its violent cartographies of center and periphery reach beyond the domain of politics and economics even to the level of language, logic, and spirit, as colonized cultures (and their histories) are constructed as lesser or partial versions of an authoritative European modernity.[6]

Applying principles of decolonial theory that seek to root out those colonial educational methodologies is essential because this will work to restore indigeneity to students' learning.

GENEALOGY AND FAMILY HISTORY

Brief Historical Overview

Oral History in Family History/Genealogy

Family history has an intimate relationship to oral history because it utilizes the local tradition of talking story which also plays a part in decolonizing history teaching methodologies because of the emphasis on historical oral traditions. According to Hudson and Santora, oral history connects to Paulo Freire's ideas of "critical consciousness" because of the ways in which it engages students, teachers, and communities in the learning process instead of placing the education capital solely with educators.[7] Oral histories work to counter the alleged banking model of education where students are passive customers who withdraw knowledge from the vault of teachers. Oral history is a means by which even the most "ill-equipped" students can become engaged participants of history. Therefore, oral history is a democratic means of engaging students in history and connecting them to their communities.

Decolonizing education in Hawai'i is of paramount importance because Eurocentric methods of education are extremely detrimental to indigenous learners. One of the power means to decolonize education is through utilizing oral history more extensively in history classes. Working to change the current methodologies of learning to be more indigenous and place-based is essential specifically with *mo'olelo* because oral history is such an integral part of the culture in Hawai'i and throughout Oceania:

Oral history is all around you, evident in the people, art, traditions, environments, and genealogies that speak to inherited experiences. For many indigenous communities, oral history is inextricably connected to identity. It is a collective enterprise essential to cultural survival, naming the world, asserting power and belonging, and narrating relationships across time and space to land, sea, sky, and each other.[8]

Through oral history, our students can feel more connected to the places they live and the people who are close to them. Furthermore, utilizing the methodology of oral history and *mo'olelo* in social studies classrooms around Hawai'i could be a gateway to connecting back to who we are as people of Oceania.

DISCUSSION

Tensions to Using Family History in Social Studies

In reviewing the aforementioned findings, a major tension point in the conversation of utilizing family history for education is the difficulties faced by three groups of people: indigenous populations, those in foster/adopted families, or those individuals with traumatic family experiences.

Research from McCoy et al. shows that although family histories are very valuable because of the connection they make from students to their families, for many students with indigenous backgrounds, family histories can be uncomfortable and even traumatic because of the Eurocentric framework they are often presented through. Teachers often assign students to write histories of their nuclear, biological family because this is the Western idea of a family. However, limiting the definition to only direct ancestors for genealogy and family history forces students with indigenous ties to not truly work on the people that they consider family. Therefore, we need to adopt a definition of genealogy and family history that is more inclusive of indigenous families which often expand beyond blood ties. In Hawaiian culture, the practice of *hanai* or adopting children into one's family because of position or other nuanced factors is very common. Hence, when a student is asked to exclusively look at biological ties, they either cannot find information or do not feel any real connection to those they are assigned to talk to. Many other non-western populations include the same ideals of family extending beyond the Eurocentric biological family.

Reconciling Genealogy and Family History with Identity

In order to reconcile this method of utilizing genealogies and family histories in history education we need to change the definition of family history that we embrace. McCoy et al. 's research points to a more inclusive and harmonious definition of genealogy and family history: "It is not the biological facts of childbirth and parenting that matter so much in defining family. It is the actual relationship that is real and recognized."[9] Accordingly, we as educators need to expand our definition of family histories beyond the nuclear, biological family to include those relationships that extend beyond blood ties. In presenting genealogical and family history projects, teachers should seek to validate the family ties that the student deems to be efficacious.

Another nuanced aspect of implementing family history into social studies classrooms is how to avoid the trauma of student's family histories which include rape, incest, or other serious matters. One method is by focusing more on genealogy rather than family stories as proposed by a Native Hawaiian educator, Maya L. Kawailanaokeawaiki Saffery:

The succession of generations within one's moʻokūʻauhau (genealogy) can be created by a human ancestral lineage. However, we are all a part of many moʻokūʻauhau beyond those of our families, including genealogies of places, organizations, and movements that include individuals, groups, natural creatures and phenomena, and so on. One becomes a part of these many moʻokūʻauhau not only through familial ties but also through sustained practice, presence, and commitment to people, places, and causes.[10]

Accordingly, when educators work with students who have traumatic experiences within their family history, they can seek to direct that student to focusing more on the genealogy and history of the place or organization that are a part of their identity. For example, students who have grown up around Kualoa can tell the story of the the mo'o (lizard) who tried to stop Hi'iaka (Hawaiian goddess) on her way to Kaua'i and all that was left of the mo'o is the tail that is called Mokoli'i (China man's hat). A student in this area could also tell the mo'olelo of the highest peak of the mountains of Kualoa, Kanehoalani, who was a great chief that married Kualoa. This genealogy shows leadership and strength which can do much in helping students to develop their sense of identity despite trauma in their family's history. The

modifications of broadening the definition of genealogy and family history, valuing family stories for their meaning to the family, and focusing on the genealogy of place will help indigenous students to reap the benefits of family history and genealogy in social studies which have long been an integral part of many indigenous cultures.

CONCLUSION

Through the thick and thin of utilizing family history in social studies, the benefits consistently shine through. Family history helps in creating a more multicultural education as student narratives explore varying socioeconomic situations, cultural backgrounds, and belief systems that are not reflected in the dominant narrative told in history textbooks. Additionally, family histories play a large role in increasing the intrinsic motivation of students for learning history as they see the relevance of the skills and content that relate to their own family. Through another lens, family history research helps students to engage with primary sources which develops their skills in historical disciplinary literacy.[11] Furthermore, family histories nearly always include oral history which helps to engage students in a more indigenous methodology to learning history as opposed to the textbook reading methodologies that are often applied in public school social studies classrooms. Lastly, family histories help students to gain a deeper and more complex understanding of their identity which is critical in the formative years of secondary education.

While this literature review is helpful in understanding the foundational aspects of social studies education, family history and genealogy, and decolonization, one of the main gaps in the literature is the lack of qualitative studies with teachers that implemented this methodology. This is a major gap as student voice would greatly aid the conversation of understanding how utilizing family history can affect the motivation of students in this discipline and help to decolonize their learning. Nonetheless, the authors referenced throughout this literature review help to inspire my practice as a teacher, and my master's research will focus on developing a more extensive and nuanced family history curriculum unit that integrates the philosophies and methodologies of research. Potentially in doctoral research I hope to eventually conduct qualitative research with both teachers and students to understand more about the effects of employing family history in social studies education.

In summation, it is prudent to ask the following questions: who is being represented in school's social studies, and how are they being represented? Do we teach about presidents or the common people? The issue of social studies always boils down to representation. Is having students start with family histories selfish, or can it promote engagement and utilize the above mentioned methodologies of micro-history, primary sources, and indigenous Hawaiian *mo'olelo*? While one cannot ever conclude one methodology of teaching social studies to be the pinnacle of best practice, through this literature review one can see how family histories synthesize many of the best practices of social studies. If we truly want to make any contribution to the world, we must first know our own community, identity, and history. Family histories build crucial skills, make connections for students to their heritage, engage students' intrinsic motivation to learn history, and decolonize the methodology of history education.

NOTES

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TEACHING CODING AND DIGITAL COMPETENCIES BEYOND UNIVERSITIES' PROGRAMS

Author:
DELPHINE BILLOUARD-FUENTES

Affiliation:
EMLYON BUSINESS SCHOOL, FRANCE

INTRODUCTION

For about ten years, many schools proposing coding or digital courses have emerged in France. These initiatives are promoted by a public policy developed by the French government to meet growing needs of these competencies in our new digital world. In France, as in many other countries, there is a lack of people trained to answer the high demand of this sector. In this article, we will introduce some of the best-known schools created, and we will study their differences with traditional universities' programs, the profiles of their students and their professional opportunities.

THE CONTEXT

Competencies for the future

Technologies and business models have evolved enormously in recent years. This has an impact on the competencies needed to face the future. In its report "Future of education and skills 2030",[1] the OECD insists on the necessity for future professionals to develop digital literacy and data literacy. More precisely, many authors emphasize the importance of developing coding competencies for the future.[2] This is confirmed by the World Economic Forum, who anticipates a net growth of jobs in the technology sector, and particularly for developer positions.[3]

The IT talent shortage

This evolution leads to talent shortages in several domains, but the Data Analytics and IT sectors are the first to be affected. A recent McKinsey survey suggests that 87% of business executives and managers consider that their company is facing skills gaps or will face it in the next years.[4] Syntec, a professional union of digital service companies, software editors and technology consulting companies in France, publishes key figures for the sector each year.[5] In 2023, as in the last precedent years, the union notes the difficulties of digital companies in recruiting and retaining their employees in a fast-growing market. Several reasons explain this situation. First, we observe in France a lack of trained students. And surprisingly, computer science curriculums are only in 13th position in students' choices of universities programs. Another explanation is the fact that in France the salaries in the IT sector are low comparing to some other countries. Good professionals tend to migrate to other countries to earn more.[6] As a result, the expectations of employers are evolving. A few years ago, companies focused their recruitments on Masters' graduates. Nowadays, job offers are no longer focused exclusively on graduates, but also on candidates with lower degrees.

Curriculums

Before this talent shortage, IT professionals were graduated from traditional curriculums. The notion of curriculum appeared in the sixties and several definitions were given since then. We will here focus on Doctor Mulenga's definition, which synthetizes the different components of a curriculum.[7] We will consider the curriculum as: "all the selected, organized, integrative, innovative and evaluative educational experiences provided to learners consciously or unconsciously under the school authority in order to achieve the designated learning outcomes".

The curriculum includes all educational experiences provided by the school or the university in an organized way. In this definition, we can see that the curriculum defines what is supposed to be taught according to a determined order.

But as we have seen, universities and traditional schools cannot face the need for digital competencies. In France, the criticism of the gap between the French training system and the needs of the job market has been rising since a few years.[8]

BEYOND CURRICULUM SCHOOLS IN FRANCE

This context explains the emergence of several coding and digital schools beyond curriculum in France for about ten years. Using the Finland's context, Tuomi identifies three different approaches to learn coding skills: in traditional curriculums, in non-formal settings (as online or after school clubs) and in informal events (as Hackathons for example).

Even if not cited by Tuomi, short coding trainings exist since many years in different countries. These trainings started with the appearance of coding bootcamps mainly in the US. A study from indeed, the recruitment website, showed the rise of these bootcamps in 2017 and the good perception of these trainings by employers.[9] The bootcamp model evolved in France since 2013 with the emergence of several digital and coding schools. Regarding the needs of the sector, public initiatives were developed to promote these schools. In 2015 a French national label was created: "Grande Ecole du Numérique".

The French "Grande Ecole du Numérique » is a public initiative created in 2015 to certify beyond the curriculum schools. This initiative had two main objectives: meet the growing needs of digital skills on the job market and promote socio-professional integration for populations far from employment. The ambition was to train 10.000 people in coding and digital competencies in 3 years. It was successfully achieved with almost 19.000 learners trained in 2018.[10] The specifications to obtain the certification require to include a minimum of people with low or little qualification (high school graduates or lower levels) and a priority is given to schools located in deprived neighborhoods.

The certified schools are mainly private schools with short trainings. They are divided in seven categories:

- Digital communication, marketing and e-commerce
- Data, AI and IoT
- Cybersecurity and cloud
- Development
- Network, maintenance and telecoms infrastructure
- Interface, graphics and design
- Management and strategy

For this paper we will focus on schools dedicated to coding as this sector encounters a huge talent shortage and was the first ambition of "Grande Ecole du Numérique".

As these trainings are dedicated to people with little qualification, the pedagogy needs to be adapted. That is the reason why "Grande Ecole du Numérique" promotes innovative pedagogy. This term is not precisely defined, but some general principles are given such as agility, integration, peer-to-peer,

serendipity and do it yourself. This pedagogy framework aims at removing the academic prerequisites to develop skills through trial-error approach and thus encourage motivation. We will see in the next part how these principles are applied in two different certified schools.

EXAMPLES OF CERTIFIED SCHOOLS

For this part we will focus on certified development trainings. In the following table, you will find the most famous coding training courses.[11]

School	Duration	Price	Academic Pre-requisite
42	1,5 year (3 years with a specialization)	Free	No
3W Academy	5 months	7.000€ per year	No
Ada Tech School	21 months	8.000€	No
Web@cademie	24 months	Free	No
Simplon.co	9 months	Free	No
Le Wagon	2 to 6 months	6.000 to 7.000€	No
WebForce 3	10 months	5.000 to 8.000€ per year	No

Table 1. Most famous certified coding trainings.

As you can see in this table, there are no academic pre-requisites for these trainings. But candidates must perform tests to be accepted. These tests are not academic, but consists mainly of logic tests, comprehension tests and/or motivational interviews.
The duration of the trainings differs a lot from one school to the other. And as you can see, some of them are free, but it is not the case for all of them.

42

42 is one of the two schools which served as a model to create the "Grande Ecole du Numérique". It was created in 2013 by Xavier Neal, founder of the French telecommunications group Free. The founder wanted to overcome the shortcomings of the French education system and to propose a training close to the needs of the companies. It was first a school created in Paris. It is now a network of schools, with 52 campuses around the world.
42 was the first school in France to propose coding courses without any diploma requirement and without any fee. It was first dedicated to people between 18 and 30 years. It is now also opened to people in retraining.[12]
The acceptance in 42 schools depends on the validation of a first step called "piscine" (the pool in English). The piscine is a one-month training using 42 pedagogical's approach. Candidates must validate this first step to enter the school. Training modules are proposed to candidates, and they are automatically evaluated on these modules. They are also evaluated by other candidates. During weekends, mandatory group works called rushes are provided. These are evaluated by the pedagogical staff who gives candidates a feedback. Once a week, a machine exam is proposed to test the capacity of the candidate to perform code in a limited time. At the end of the month, successful candidates can integrate the school.
During this first month, candidates can have a broad view of the pedagogical approach of the school which relies on four main principles:

- A learning by doing approach: there are no courses, no teachers. Students must find their own solution.
- Group work: students are encouraged to work in groups, share with others and ask for help.
- Do and Redo: failing is not an issue, it is a way to progress. Students have the possibility to redo the exercises as many times as they need.
- Peer-to-peer evaluation: this allows students to discover other ways to perform a module and see that there is not just one unique way to code.

The learning by doing approach is applied by most of the coding school we described in table 1. But regarding students' profiles and the characteristics of these trainings, can we consider that these schools as successful?

Performance of certified development schools

The "Grande Ecole du Numérique" schools announce 64% of positive outcomes after training. But if we focus specifically on development schools, more than 90% of the participants pursue studies or find a job in the months following the trainings. Moreover, if we focus on 42, 100% of students find a job after the core training, 94% of them having a long-term contract.

It seems that this new model of schools, beyond traditional curriculum, is a successful innovation for the digital job market in France.

Some common pedagogical principles

Most of these schools share the same pedagogical principles. Learning by doing is recognized as an effective way to disseminate education since many years. This approach requires students to actively participate in their learning.[13] Unlike the traditional teaching approach, in which students are mostly listening to lectures and follow other's instructions, learning by doing consists of learning from its own experience. This mode relies on trial-and-error learning, particularly in coding trainings. This method is very effective for two main reasons: first, learners are freer to choose the way they will learn, and second, this mode tends to develop naturally social relations.[14] These two elements contribute to making this teaching method a very good approach for the learners of these schools.

In the same way, peer assessment is known in education research as being a very effective pedagogical tool. In this method, students evaluate other students' works. This improves the comprehension of the assessors by having an active analysis of the other student's work.[15] This method has been proven as very effective for coding courses.[16]

Most of the schools are also proposing group works. These activities correspond to what is called "Pair Programming". This allows to teach students to create code with each other, which is a very important competency for their future as they often will have to code with colleagues. Pair Programming has many benefits: it improves the quality of the code, it allows knowledge transfer, increases productivity, and creates enjoyment.[17] This is particularly important during teaching because it improves the motivations of learners.

These pedagogical principles are included partially in some curriculums. But they are largely developed in these new schools and proved their efficiency in this context.

A new school model: La Toile

The technical schools described before proved their value. But the path to achieving these trainings is not always easy for young people without qualifications. Being able to practice learning by doing in an autonomous way is not easy for all. A new school's model appeared recently.[18]

La Toile, a program created in 2021, is a global program designed as a reset in motion for people. It has been developed for motivated people without technical or diploma prerequisites.

To support participants towards the job market or further studies, this 17 weeks' program relies on three main pillars:

- Digital skills: the program focuses on the technical skills necessary for web design and development.
- Personal skills: the objective here is for students to become aware of their personal skills and to develop them.
- Professional project support: an individual support is provided to build and learn how to present the professional project of the participant.

This training is the first step to start a journey towards employability, further study, or business creation. Created by a business school, this free program allows participants to benefit from the speakers and employment support of the school. The school also provides them a computer and they have a meeting with their advisor every week to help them to solve any personal obstacle that would prevent them from continuing training.

People trained during the first sessions may have difficulties integrating coding schools regarding their profiles. Indeed, in the last session, 30% of the participants were handicapped and 98% of them have at least one factor of discrimination.

At the end of the training, participants know the technical basics and languages necessary for the design and development of websites. They also learn how to lead a project and communicate around it. But moreover, participants develop self-confidence, which is a capital step to pursue studies or to go on the job market. Moreover, the school supports them in the long term and proposes to connect them with companies for internship or employment up to 18 months after the end of the training.

This school is quite recent, but the first results are very motivating. After the last session, 81% of the participants were pursuing studies or having an internship in a company and 10% of them were starting an entrepreneurial project.

CONCLUSION

In this article, we presented the growing needs of digital professionals and the incapacity of traditional curriculums to answer those needs. In a second part, we presented a public initiative called "Grande Ecole du Numérique", which was created in France to certify beyond curriculum trainings in digital competencies. The certified innovative programs cover several sectors, but we focused our analysis on coding trainings. After having presented one emblematic school, we have studied the results for learners and saw that these trainings were successful to bring unqualified people to the job market or to studies. The adapted pedagogical approach proved its effectiveness for people not comfortable with traditional curriculums. In a last part, we presented a new school which was designed for unqualified people who may not be able to attend the coding schools first. This school proposes an interesting step for these people so that they can regain self-confidence and integrate another school with more autonomous paths.

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ADVANCING THE VALUE OF DESIGN COMPETITIONS THROUGH EXPERIENTIAL LEARNING

Author:
JEANNINE VAIL, NATALIE ELLIS

Affiliation:
UNIVERSITY OF NORTH TEXAS, USA

INTRODUCTION

Inviting failure is not a consideration often given in today's world that desires idealized perfection. Experiential Learning Theory (ELT) seeks to integrate learned experience and reflection from learning, creating opportunities for rich reflection and deep meaning thinking. As a result, outcomes are potentially transformed, and the new knowledge gained from the reflection becomes richer, broader, and deeper.[1] For future student endeavours, the need exists to create opportunities for students to tap into the benefit of ELT with hands-on experiences and reflection. When supported in the studio environment, the student design competition bridges learned classroom theories and the affiliated knowledge and prepares students for professional practice. The following work explores how a CIDA-accredited Interior Design program can use design competitions as a framework to guide students through experiential learning techniques. Additionally, can instructors learn from one another when engaging in timed learning events, such as design competitions, to incorporate ELT to improve our Design Studio pedagogy?

As background, design competitions have the opportunity to introduce students to real-world design problems through an evolving process using an analytical and experimental approach. The authentic issues integrated into the design problem seek to promote theory application to meet a client's needs. Information learned and the students' lived personal experiences contribute to reflective solutions and provide alternative design outcomes.[2] Competitions allow the students to transfer the knowledge they gained to the next level of design development. It is found that learning through the reflection of heightened individual growth and emotional interest promotes motivation and involvement for students in their educational journey.[3]

Using this knowledge, the research began in a student competition project during the fall of 2022. With direct student observation and feedback, it was found that the competition aided the students in stretching their prior thinking processes, realizing different capabilities, and studying design in new ways. Simultaneously, the students realized their struggles with time management, fear, and anxiety associated with competition were challenged to deal with more outwardly.

Following the outcome of the aforementioned project, the research faculty felt it necessary to seek ways to incorporate competition projects better. As a result, a workshop was developed to seek out other teaching professionals and their experiences to gain clarifying feedback. Experience outcomes from the Institutional Review Board (IRB) approved workshop highlighted critical and instrumental critique for future design studio learning opportunities. The presented research represents the experience of engaging art education teachers in a timed design experience.

LITERATURE REVIEW

Experiential Learning Theory (ELT)

Experiential Learning Theory (ELT) emphasizes transforming experience into knowledge through reflective observation, abstract conceptualization, and active experimentation,[4] imposing the idea that concrete experiences are enriched by reflection and given meaning by thinking and action transformation. The new knowledge allows the opportunity to become richer, broader, and deeper for everyone involved. The learning cycle builds upon the idea of double-loop learning by Chris Argyris and Donald Schön, involving the transformation of perceptions held by learners[5] seeking to create opportunities for students to tap into the benefits of this learning with hands-on experiences and reflection, connecting theories and knowledge learned in the real-life application. Kolb proposed a structure composed of four cyclical stages in which, in a (1) concrete experience, the learner must be actively involved in the experience. (2) Reflective observation involves the learner reflecting on the experience. Followed by (3) abstract conceptualization, where the learner must possess and use analytical skills to conceptualize the experience. Concluding with (4) active experimentation, the learner uses decision-making and problem-solving skills to apply the new ideas gained from the experience.[6]

Design competitions are a design pedagogy tool to prepare students for real-world design problems. A brief literature survey on innovative teaching practices that used student design competitions revealed multiple connections with experiential learning outcomes. Some authors found crucial components for effective experiential learning encompass open-ended and multidisciplinary project types. The act of reflection facilitated through subjective experiences, objective outcomes, and feedback from industry experts led to improved student understanding of how they learn through experiences. The competitive framework serves as a catalyst for student motivation, engagement, and excitement.[7]

Design competitions can have tremendous educational value in developing skills involving team-based work, self-directed learning, mentorship and leadership. The practical nature of these projects promotes experiential learning and caters to a variety of learning styles, real-world design, and learning from failure.[8] In contrast, traditional projects teach design in isolation, often with lectures and exams and no input from design colleagues or industry professionals.[9] A significant number of traditional projects rely on paper-based approaches, which tend to be teacher-directed compared to student-initiated and student-managed.[10] In addition, a research study from competitions involving robotic engineering students found that the problem-solving process inherent in experiential learning activities contributes to the development and enhancement of students' dimensions of creativity.[11] A further study found that students who participate in competitions are more active in classes, make better projects, and get better grades.[12]

Two key research questions guide the following exploration: 1) How can design educators use timed design experiences as a framework for experiential learning, and 2) do the observations made by participants align with researchers' perspectives? The paper navigates these questions, shedding light on the nuances of employing student design competitions as effective interior design pedagogy.

Design Competition in Pedagogy

The literature review explored the impact of design competitions on student learning and the potential for faculty learning through experiential engagement. A comprehensive overview of a previous research study conducted by the authors in Fall 2022 explores how such competitions integrate authentic issues, promote theory application, and contribute to reflective and alternative design solutions.

A national design competition challenged interior design students to research and imagine life as a refugee, then charged them with designing a 50-square-meter temporary sheltered environment to feel

safe and psychologically sound. Insights from the study of student observations and feedback include increased motivation, personal growth, and areas of weakness. Five unique, multifaceted outcomes were found: the management of time, the importance of decision-making, the benefits of research application, connecting past work to the present, and controlling one's fears and anxieties during competition. From these opportunities, can the role of a student design competition break the silos within the curriculum and foster connections between theory and practice?

As a foundational framework for understanding the learning process, the study scrutinized the application of ELT in the context of design education, specifically in student design competitions. Understanding learning as a process whereby knowledge is created through the transformation of experience and meaning contrasts with a traditional lecture, which is often criticized for its passive style, lack of realism, and failure to provide personal learning outcomes.

METHOD

In keeping with previous study methods that sought to explore the benefits of student design competitions in higher education pedagogy, the study used a qualitative research design model to explore how educators can use a timed design experience as an informing framework for experiential learning and to determine if aligned or congruent observations between participants and classroom mentors can be observed. Using an inductive research approach, from the "bottom-up, using the participants' views to build broader themes and generate possible new interconnecting theories or themes."[13]

As a result of wanting to explore how other teachers use competition projects, a 90-minute workshop was created, tested, and analyzed before the fall 2023 interior design studio competition to maximize student learning. Acknowledging that all students learn differently, including faculty as students, we offer various paths to understanding that bring more learners along.[14] The workshop emphasized that developing multiple learning strategies for learning outcomes improves the competition experience and enables the full benefits of experiential learning. Two workshops were conducted throughout one morning of participants enrolled in a Fine Arts Festival, including K through 12th-grade public school district art teachers, with the intention of gaining new and unique theories and lessons to conduct with their students. All over the age of 18, the workshop participants comprised of men and women. Workshop One consisted of 11 educators, 8 women and 3 men and Workshop Two consisted of 16 educators, 8 women and 8 men, for a total of 27 educators. The study's data collection was based on three engagements. The first involved field observations of the educators' interaction with each other during the timed experience. Immediately following the observations was a confidential online polling survey where participants could see the results in live time. Finally, the last touchpoint was an invitation extension to each participant to participate in a confidential online post-workshop survey. Through the workshop, the research delves into the multifaceted benefits of motivation, peer-to-peer learning, and creative enhancements in a fun yet challenging situation, leading toward a better understanding of the value of student design competitions as a part of interior design pedagogy.

Project development and implementation

Aiming to test the effectiveness of timed design experiences in understanding one's learning process, the workshops comprised of a lecture, a timed design experience, group presentations, and reflection. They explored the engagement, collaboration, and creative aspects observed during the activity, providing valuable insights into the effectiveness of the approach. Finally, serving as a testing ground to understand if such a workshop would be beneficial to conduct with students in preparation for the next design competition.

The exercise was designed to meet the goals of experiential learning, and the objectives developed were based on the problems previously revealed from the outcomes of the fall 2022 design competition with students, such as overcoming the fear and anxiety of competition and understanding your strengths and weaknesses and how they may benefit the team.

The workshop began with a lecture explaining what embodies experiential learning, how to demystify a design competition, and how to incorporate personal experiences plus classroom knowledge to enhance the outcomes of the design challenge. The lecture was then followed by a team-building 45-minute timed experience, where the teachers as students worked to design a board game and complete the specified criteria, including a name, concept, theme, mechanics to progress through the game, constraints, and finally, how to be victorious. As an aid in developing the game, the worksheet included idea-generating questions. Each team, with our outside mentoring, had to solve the design problem uniquely and quickly reach a consensus by maximizing individual strengths for the team's benefit – as illustrated in Figure 1.

Figure 1. Team generating board game concept.

At the end of the timed experience, each team had the opportunity to present their results and gain insight from their peers' feedback. Immediately following the exercise, real-time individual and group feedback was collected and shared with the participants using a confidential online polling survey. The poll allowed for questions and comments between peers (the professional teachers) and the mentors (the researchers), plus the opportunity to address difficulties experienced during the timed experience. Following the workshop, each participant had an opportunity to contemplate further through an online survey, providing multiple opportunities to reflect upon the experience and provide feedback.

FINDINGS

During the timed design experience and group presentations, observations of the educators found that the participants were instantly engaged in the activity, demonstrated creativity and willingness to take risks, listened to their peers, encouraged new ideas for improvement and displayed moments of panic due to the time restriction.

Real-time reflections and feedback obtained through an online polling survey provided transparent and accessible information and allowed for instantaneous learning. A word scramble poll asked, "In one word, what did you learn about yourself during the timed design experience?" The results of the poll, presented in Figure 2, indicate that “teamwork” was the most used word as a personal learned experience shared by the group.

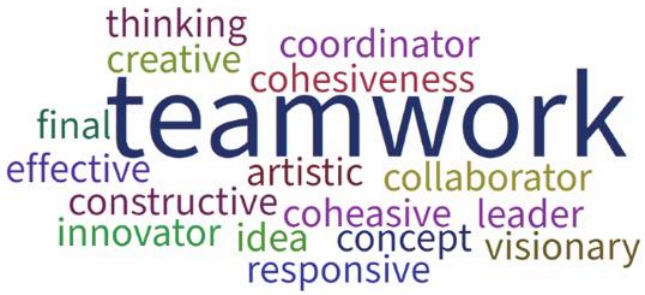

Figure 2. Word scramble poll results.

The first question led to the researcher's second question: Do participant observations align with researchers' perspectives? Many similarities were found by comparing the researcher's observations during the activity to the word scramble poll by the participants. Thus, the researcher's observations aligned with the educators' observations of themselves, their group, and their interactions with one another.

The post-workshop survey remained available for two weeks following the workshop, allowing educators time to further reflect on their experience. Eleven participants responded. A summary of the results, shown in Figure 3, highlights that communication, problem-solving and critical thinking are the top soft skills used in the timed activity that would be used again to accomplish future projects. Peer-to-peer learning best described the majority's learning experience, which reinforced what the researchers observed during the activity and noted in the participant's word poll regarding the abundant use of the word teamwork. Finally, having fun, being challenged, and making connections are the outcomes that drove the educators most to be engaged during the workshop.

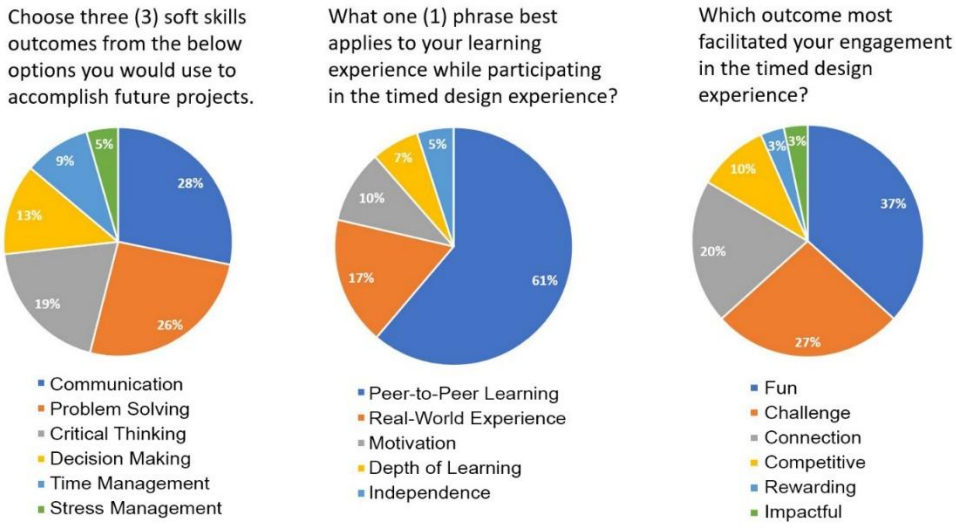

Figure 3. Post-workshop survey results.

Further qualitative data from the post-workshop survey helps answer our first research question regarding how design educators can use timed design experiences as a framework for experiential learning. Participants in the research study reflected on their experiences and shared insightful observations about themselves. One participant expressed a newfound awareness of the value of time, planning to leverage this understanding to motivate students to utilize their time wisely. Another participant demonstrated resilience, acknowledging the ability to succeed even when facing significant

time constraints. A sense of openness and excitement for collaboration emerged in the responses, with one participant expressing enthusiasm about exploring and expanding on ideas collectively, enjoying the role of being the leader's right hand in facilitating the vision. A participant who found joy in working alongside peers emphasized the importance of collaboration, highlighting the positive impact of collaborative efforts in the learning process. Overall, these reflections underscored a range of valuable self-discoveries and stressed the significance of time management, resilience, openness, and collaboration in their personal and professional growth.

DISCUSSION

The initial student research began during the fall of 2022 and demonstrated that the students had mixed emotions about design competitions. Through efforts to develop techniques and strategies to help them better understand their strengths and weaknesses, learn from their experiences, overcome adverse reactions, such as fear and anxiety, and move forward with enhanced knowledge to gain success in similar future endeavors, a simple workshop with educators was conducted to understand if there is value in repeating the workshop with our students on future competitions. The study's findings with the educators indicate that implementing a workshop about ELT and design competitions, incorporating a quick timed experience, allows participants to quickly understand how they learn under pressure in a team environment and how these outcomes can be applied to future projects. When workshop participants were asked what they learned about themselves, the comments exhibited evidence of ELT, that reflecting on the timed design experience transformed their learning, creating richer and broader new knowledge for themselves and what they could transfer to their peers and students.

The participant's frequent use of the words creative, real-world design, problem-solving, engagement, and teamwork in their learning outcomes from the timed experience overlaps with the literature review on the benefits of competitions for experiential learning; acknowledge that there potentially is a positive correlation between Experiential Learning Theory (ELT) and successful design competition pedagogy as presented in Figure 4.

Figure 4. Intersection of design competitions and Experiential Learning Theory (ELT).

The next step for the research is to continue measuring the value of student design competitions to contribute to the study's validity and reliability. Before the fall of 2023's Interior Design Education Council (IDEC) competition, the workshop experience will be interjected within the design competition pedagogy. A post-competition survey will be offered to compare the results with the previous fall 2022 student survey.

CONCLUSION

Ultimately, in a brief but fun learning experiment, teachers as students and teachers as researchers had an opportunity to reflect on their own experiences and grow from lessons learned during the timed design event. The outcomes can potentially connect university research with public education pedagogy and higher-education interior design studios in effectively applying to future design competitions and the personal and professional experiences to be encountered. The paper highlights key findings and the significance of advancing the value of design competitions in interior design education through experiential learning. Additionally, the study suggests that instructors can learn from one another when engaging in timed learning events, such as design competitions, to incorporate Experiential Learning Theory (ELT) and improve their Design Studio pedagogy. The presented research underscores the potential for transformative learning experiences that benefit students and educators, fostering a deeper connection between theoretical knowledge and real-world application.

NOTES

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INCORPORATING THE ASSESSMENT OF TEAMWORK SKILLS IN A UK BUILT ENVIRONMENT HIGHER EDUCATION CONTEXT

Author:
KAYLA FRIEDMAN

Affiliation:
CAMBRIDGE INSTITUTE FOR SUSTAINABILITY LEADERSHIP, UNIVERSITY OF CAMBRIDGE, UK

INTRODUCTION

For at least twenty years there has been a surge of interest in employability skills[1] as governments have become increasingly focused on how a trained workforce enables countries to participate in a global economy. The focus on employability skills in higher education is broadly general and spans across all disciplines. While there is widespread debate on the appropriateness or efficacy of linking higher education delivered employability skills to employability,[2] within some disciplines there is recognition that some of these identified skills are crucial to professional success. Within the UK built environment, the 1994 'Latham Report' established the groundwork for collaborative working as critical to the success of the industry.[3] This recognition of the need for better interdisciplinary practice within the built environment was one of the key drivers for the development of the Master's in Interdisciplinary Design for the Built Environment (IDBE) at the University of Cambridge in 1994. Since then, this part-time postgraduate course has been dedicated to improving the interdisciplinary practice of diverse built environment professionals. This requires an academic approach to the teaching and assessment of a number of employability skills such as capabilities for collaboration and teamwork. This paper explores the development of a team-based assignment on the IDBE programmes with a specific focus on the assessment of teamworking skills.

TEAMS AND TEAMWORK IN THE BUILT ENVIRONMENT

One definition for a work team is:

- being composed of two or more individuals;
- exists to perform organisationally relevant tasks;
- share one or more common goals;
- interact socially;
- exhibit task interdependencies;
- maintain and manage boundaries; and,
- are embedded in an organisational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity.[4]

Projects within the built environment can involve just a few or a large number of individuals. The structure and composition of the project team will change throughout the lifespan of a project depending

on the stage and needs. In this way, a built environment project may be seen as being made up of many different teams throughout its lifespan, and teamwork skills are therefore critical to successful work within the built environment.

Team typologies

To understand the skills needed to support effective teamwork, it is important to isolate and consider the specific team interaction. There is extensive literature that tries to classify teams through various criteria. These include typologies based on the mission of the team, the structural features of the team, the maturity of the team, and the diversity of the team members.[5] Sundstrom et al. uses six general typologies to describe teams: production teams; service teams; management teams; project teams; action and performing teams; and, advisory teams. Project teams describe 'temporary entities that execute specialised time-constrained tasks and then disband'[6] and are the most appropriate typology to describe the majority of built environment project team interactions.

Relevance to teaching teamwork

Understanding team typology, i.e. formation and composition sets the groundwork for the subsequent stages of teamwork in the literature: team socialisation and development; team processes, effectiveness, and enhancements; team leadership and motivation; and team continuance and decline.[7] Resources exploring how to make construction teams more effective tend to focus more on practical outcomes than theoretical underpinnings[8] and tend to focus on single dimensions of teamwork theory. This raises the question of what the objective is in teaching teamwork. If skills and competencies are divorced from the theories that support their importance, how much do students truly understand teamwork, and does that have an impact on the development of their competency in teamwork?

TEACHING TEAMWORK IN A BUILT ENVIRONMENT HIGHER EDUCATION SETTING

Scant literature was found specifically on teaching built environment students how to work better together in the multi- and interdisciplinary teams that will be required of them professionally. Part of the challenge is that the traditional discipline specific education pathways of land economy, engineering, architecture, geography, etc. do not include the other future relevant disciplines. The increasing complexity of knowledge and skills in the modern built environment leads to a need for increased specialisation within the individual disciplines. With increased specialisation, there is less opportunity for interdisciplinary exchange. This in turn leads to specialised vocabularies, similar approaches to problem solving, common interests, and understanding of issues. The resultant, 'discipline-specific view of the world is taught and reinforced through the socialization processes of educational experiences'.[9] This has clear implications for how well multi- and interdisciplinary teams communicate, or are able to communicate with other disciplines.

Around the world, there are special modules, courses, or studios that bring different disciplines together in an education setting, but this is more of the exception than the rule[10]. The teamwork education literature reviewed focuses almost exclusively on multi-individual team or collaborative learning activities. This paper uses this model of delivery as the basis for subsequent discussion on teamwork teaching but acknowledges that other types of individual learning on teamwork practice represents a different pathway to teamwork education, which is beyond the scope of this paper.

Teamwork teaching literature

When teamwork learning is presented in an education setting, Bolton suggests that educators typically default to providing teamwork tasks without 'the concrete support and systematic guidance they need to effectively navigate their team-based assignments'.[11] This paradigm emphasises opportunity over guidance and expects that students will learn simply from having the opportunity to do so without clear instructions or support for what exactly is required.[12] Although there is also some evidence that this model can be successful,[13] the failure of students to work together effectively as teams is commonly reported in the literature.[14]

Preparing students for teamwork

Bolton proposes that there are three distinct segments to teaching teamwork. First, that students are taught about the specific qualities of high-performing teams and introduced to theories of positive collaboration. Second that the instructor helps to facilitate the team through managing diversity and conflict. And third, that students are given an assessment activity to help them process and learn from the teamwork experience.[15] Ellis suggests that the success of team training depends on a skills inventory to identify what specifically is needed.[16] These skills should also be taught alongside instruction on the more general qualities of high functioning teams.[17] There is no consensus on the core skills for effective teamwork, and some attributes are more commonly mentioned then others in the literature. A non-exhaustive list of skills is presented in Table 1.

Effective Teamwork Skills	
Ability to manage conflicts[18]	Active listening[19]
Adaptability[20]	Communication[21]
Decision making and problem solving[22]	Defining goals, objectives, and results[23]
Defining roles and expectations[24]	High energy and commitment from individuals[25]
Involvement, ownership, and commitment to team[26]	Leadership[27]
Mutual performance monitoring[28]	Personal values contribution[29]
Planning, task, time and cost management[30]	Respect[31]
Self-management[32]	Trust[33]
Visioning and steering[34]	

Table 1. Skills for effective teamwork

Preparing for teaching teamwork

The literature suggests that there are two specific avenues of delivering content that should be considered with respect to teaching: developing a skills inventory,[35] and, teaching on the more general qualities of high-functioning teams.[36] To do this, it may be helpful for a teacher to consider the life-cycle stages of teamwork and present broader theoretical understanding to students around team processes. Based on the specific task to be accomplished, a teacher could identify what skills will be required and consider how they are to be applied in action. Each identified skill would then need to be explored for the best way to engage the students with it. This could be incorporated into the task material and also be supported by complimentary readings, lectures, and exercises.

Manging diversity and conflict

One of the challenges identified in teamwork education literature is that it is assumed that strategies suggested for professionals, apply to students as wel.l[37] Fredrick suggests that teams in an education setting are more likely to experience conflict due to specific education-based circumstances. One reason

is that the nature of classroom hierarchy means that students are on a horizontal plane where their relative authority in relation to one another is undefined. Professionals who work in teams will operate under very different circumstances where their individual expertise allows them to assert authority in interactions with teammates. Another issue is that students may be social peers prior to a teamwork exercise that may pressure them to maintain that social relationship in opposition to the team needs. Finally, in a Western system of education, the student as an individual may feel in competition with other students, even when put into a team-based setting due to the overarching individual assessment that characterises Western education.[38] Students can be taught the fundamentals of conflict resolution and negotiation as part of teamwork skills training. However, it is also important for the teacher to be able to facilitate groups through conflicts if they cannot self-resolve their issues.[39]

Assessment

It is critical to note that successful teamwork does not necessarily equate to team success.[40] A team may work well together, and exhibit all the skills desired for effective teamworking, but still fail to produce a successful product. Conversely, a team that produces a product to a high standard may not have engaged in successful teamwork. If developing effective teamwork is a learning objective, then it should have demonstrated value in the task and course assessment.[41] It is well established in the learning literature that assessment influences students learning.[42] Therefore, if the team-based project is only given a grade based on the final outcome, it is likely that students will focus on improving teamwork strategies only as much as will be needed to achieve a positive final outcome.[43] If the process of completing the task is important, assessment must include metrics for including these components.[44]

CASE STUDY

This paper reflects on a process undertaken to incorporate teamworking assessment into a pre-existing collaborative group activity on the Master's programme- the group project. The group project is a 10-month activity undertaken in the first year of the Master's. A supervisor mentors six students towards undertaking a group research project. During their first year, students attend three residential weeks in Cambridge. During those weeks, time is provided for the group to meet with and without their supervisor. It is expected that most of the work is done remotely. Students come from all over the world and groups may be co-located across every continent.

Each group submits one 7,000 word research essay at the completion of the assignment and receives one mark, which is the mark each individual student receives. Students self-assess each other's participation, which can modify their individual mark. This is moderated by the supervisor and capped at plus or minus 12.5%. The average of all the individual group marks must equal 100%. Historically, students received a number of lectures on, and support for, conducting research that they were expected to apply to the group project and the marking criteria for the completed essay was entirely based on the quality of it as a piece of research. One of the first changes to the assignment was to explicitly state and provide weighting to the two key project objectives:

- To undertake and produce collaboratively an original piece of research that draws upon the collective experience of the group- worth 80% of the mark.
- To consider, reflect upon, and improve student skills and competencies in interdisciplinary practice- worth 20% of the mark.

These objectives are explicitly linked to four of the course learning outcomes shown in Table 2.

4. Insight, knowledge and research for the design, delivery, management, and use of sustainable and resilient built environments	
LO4B	Generate advanced primary and secondary research in individual and group contexts to formulate critical responses to sustainability, resilience, and interdisciplinary practice challenges and opportunities.
5. Personal, team, organisational and professional leadership and effective action as an agent of change in diverse built environment contexts	
LO5A	Identify, develop, assess, and apply advanced concepts that enhance the skills, knowledge and competencies that support effective leadership and teamworking
LO5B	Engage with, develop, critically evaluate, and apply concepts of leadership through reflective practice as a competency to improve personal and professional practice
L05D	Identify, develop, and generate impact through interdisciplinary and collective collaborations to effect positive outcomes

Table 2. Extracted course learning outcomes related to the group project

Supporting student knowledge and awareness of effective teamworking

A series of lectures already present within the wider programme were repurposed to focus more specifically and explicitly on skills needed for effective teamworking. Having reviewed the learning outcomes, assignments, and typical team processes a selection of skills were identified as most relevant. Students receive readings, lectures, and workshop activities that cover: theories of effective teamwork, active listening, communication, conflict resolution, defining goals and objectives, diversity, intercultural awareness, leadership, and negotiation skills.

Reflection portfolio

To facilitate an outcome of having evidence of teamwork process understanding that could be assessed, a reflection-in-action approach was adopted.[45] This is challenging to do well and ensure students get the best value from the reflection.[46] However, there is some evidence that reflective practice can be particularly useful in teamwork situations.[47] The reflection portfolio incorporates four individual reflections made at specific moments of the group project: one at the start, one at one third complete, one at two third complete, and one submitted after the assignment submission. Students receive formative feedback on the first three submissions, and summative assessment and a mark on the final portfolio submission.

The reflection portfolio requires students to reflect on three thematic categories of teamwork competency in each reflection: on themselves as an individual; on themselves in relation to their fellow group members; and on the group as a singular entity. To help facilitate the reflections students are given example portfolios from past students (with permission). They are also given a selection of prompts or scaffolding to help facilitate reflection. A selection of prompts are provided in Table 3.

1-Personal Internal Reflection
○ What are your personal strengths and/or weaknesses in relation to team or group working?
○ What is needed to help enable you to perform at your best?
○ Does how you feel about a project change the way that you work?
2-Personal External Reflection
○ What role would you like to have in the group, and how will you try to undertake it?
○ How well do you communicate with your group, and do you feel you are understood by your group members?
○ How do you support other group members to perform their best?
3-Group Reflection
○ What do you think the biggest challenges for your group will be?
○ How are ideas shared, and chosen or discarded?
○ How do you know if your group is performing well or not?

Table 3. A selection of reflection prompts by thematic category

The scaffolding helps to initiate and support student reflections, but students are encouraged to make the assignment their own by considering what is most meaningful and useful to themselves and their own personal learning needs. To this end, students are also required to identify one or two specific personal targets, challenges, or tasks related to teamwork competencies that they will commit to and use the reflections to report progress on.

Assessing the reflection portfolio

As noted earlier in this paper, it is important to demonstrate value in the task by formalising it into the course assessment. To do this, a formal assessment scheme was developed specifically for the reflection portfolio. Following the format of other course assessment schemes used on the programme, the portfolio reflection scheme is comprised of six categories:

- Personal reflection – individual (20%)
- Personal reflection – group (20%)
- Group reflection – interdisciplinary practice (20%)
- Task setting and development (20%)
- Progression (10%)
- Presentation (10%)

Each category provides further detailed criteria used in marking of each category and is provided to students in advance of starting the assignment.

Implementing the reflection portfolio and assessment

It is useful to reflect here that while the creation of the reflection portfolio and assessment scheme was relatively straightforward, cascading it to the course team to be implemented was not as smooth. For the group supervisors, the facilitating and marking of the reflection portfolio was a learning experience as well. Incorporating feedback, reviewing, and revising the reflection portfolio and assessment criteria helped to make it more robust and clearer. However, while the supervisors recognised the need for, and very much supported, the improvement of teamwork teaching, there was a great deal of reluctance to formally assess what was seen as students' personal skills. Several supervisors expressed discomfort at their ability to confidently mark or rate students in the categories provided. After much debate and discussion amongst the group, it was decided that the reflection portfolio would be marked using a system of fail, below expectation, met expectation, and exceeded expectation. This satisfied the majority and was used in the first iteration of the assignment.

Having provided formative feedback throughout the project, when the supervisors came to do their marking, they reported that they found it easier than they had anticipated at the outset. Supervisors reported that in order to provide a category mark, they would typically mark students based on the assessment scheme numerically and convert it to the category band. By the second iteration of the reflection portfolio, all supervisors expressed confidence in the marking process and the band system was abandoned in favour of a numeric marking system, aligned with all other marking on the course.

Reviewing student reflections

Being reflective in practice as an educator, has meant that I, as the Course Director responsible for this intervention, has read every student portfolio to review and reflect if the designed intervention meets the learning objectives. While broadly the answer is yes, regular refinement and adjustments are part of my own cycle of reflective practice. The course delivery team meets regularly to discuss student assignments and suggest improvements. The student reflections themselves, a selection of which are shown in Table 4, show that by providing prompts and explicit tasks, students direct their reflection and learning in the desired directions- better understanding themselves and their own capabilities, better understanding how they interact with others, and better understanding how groups function. The reflections also show that students are connecting associated content provided to support teamwork learning from readings, lectures, and workshops to the group project assignment.

A key task for me is to improve my confidence in this setting – I will know that I have succeeded if I feel that I have been able to contribute to and further the discussion.	*…it could be easily interpreted as overly critical, or else arrogant. My second challenge, then, is to develop a means of giving constructive, critical feedback within a group environment.*
There are a number of books on successful teamwork that I scanned for reference when writing my reflective case study – I think it will be helpful to return to these in greater depth.	*I feel that my personal and professional experience is less relevant than others in the group. This has led to some anxiety, … and has put me on the back foot in terms of progress.*
I think the biggest challenge of working in a group is understanding that your opinion is not always the best solution.	*I don't like conflict…but I can reflect positively on the skills workshop where it was suggested conflict can drive new ideas and innovation.*
It was interesting to note from the teamwork workshop, that we all identified with the 'Green'/ 'Phlegmatic' personality traits. This should mean that we get on well as a group, however, we may sometimes struggle to make decisions for fear of offending each other.	*This group project was an opportunity for me to explore strengths and weaknesses I don't always see. At work, I usually choose my partners and teams. Here, I was able to test myself in a group where I wasn't always entirely comfortable, but had to deliver regardless.*
To achieve a good group dynamic the individuals must believe in the process, commit to the goals and take the responsibility to support each other, sometimes in practice this is not the case. If even one player is disengaged the team can fall into a cycle of uncertainty and disillusion. My takeaway is to look to recognise this disengagement and commit to combating it.	*My strengths include organisation, a sense of humour, a love of learning, kindness, patience and honesty. Areas that I wish to develop are a better understanding of leadership, understanding of different perspectives and how to improve my listening. I often can be too amiable in a group, but also on occasion closed minded and too assertive.*

Table 4. A selection of student reflections (with permission)

CONCLUSIONS

This paper has illustrated that teamwork is a competency that is critical to the successful delivery of built environment projects and suggests that innovative ways to improve teaching teamwork should be elevated amongst the built environment professions and included in core teaching at all levels. One such successful innovation was showcased, the incorporation of assessing teamwork on a group project assignment on a postgraduate higher education built environment programme. While useful lessons can certainly be drawn from this example, this paper also highlights the lack of published education practice in this area and suggests that more research and innovation is needed. Since educators may feel uncomfortable or reluctant to pursue the assessment of collaboration and teamwork, it is also recommended that more training and support is provided to educators around employability skills training and assessment. As one of the skills teaching contributors, Oliver Broadbent tells our students, 'We only learn by doing difficult things.'

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ORDER MEETS COMPLEXITY: TRANSFORMATIVE PEDAGOGY – MANIPULATION OF ARCHITECTURAL IMAGERY THROUGH DIGITAL ART.

Author:
FATIMA ZAHRA

Affiliation:
BEACONHOUSE NATIONAL UNIVERSITY, RAZIA HASSAN SCHOOL OF ARCHITECTURE, PAKISTAN

INTRODUCTION

This paper explores an approach of using digitally manipulating architectural photographs as a medium to cultivate spatial and creative expression. Particularly evident in the photographs captured within the walls of Lahore, a city rich in history, heritage, and a diverse urban fabric that melds together the past and the present. Through the lens of the camera, the urban environment unveils its layers, offering a unique opportunity to explore the densities of the cityscape and uncover the hidden geometries within the mundane chaos, highlighting the artistic potential within every corner of its streets. This intuitive process involves taking a photograph and using the taken image to dissect and reassemble using digital media. The iterative process of creating the image starts from a two-dimensional output turning it into a three-dimensional reality. Photographing the three-dimensional reality back onto a two-dimensional plane, and using it as a medium of creating art by simply superimposing the flat images together creates new intrinsic geometric patterns. As the human eye is naturally attuned to perceive patterns and regularity. Combining geometry and architectural aesthetics offers a rich palette for creative exploration, enabling the artist to produce visually striking compositions that transcend conventional boundaries.

Disciplines of Creativity and Perception

Art and Architecture

The Sciences and Technology have historically co-existed in an easy trilateral alliance with the arts.[1] Art encapsulating architecture in its realm and allowing it to germinate with other disciplines is one of the most amazing forms of exploring ideas and their conception. Sharing a symbiotic relationship, each influencing and shaping the other in a continuous dance of creativity and expression. The design principles leading to any creation in both fields are similar i.e., harmony, order, scale, rhythm, value, list goes on. Architecture integrates a myriad of disciplines, including aesthetics, technology, and sciences. Art serves as a lens through which we explore the intricate layers of these elements within architectural design.

Geometry

Natural phenomena have underlying patterns of geometric form, proportion, and associated wave frequencies that orchestrate all perceptions and identifications. In that lies our fundamental capacity to relate, interpret, and know. Every aspect of the natural world emerges from simple fundamental geometric patterns. Each of these basic patterns carries information that facilitates the development of diverse life forms—animals, plants, minerals, and humans—resulting in intricate and beautiful beings. Each with an intrinsic awareness of its setting in space and time. When these seed patterns are incorporated into our architecture, a vibrational exchange takes place between the building and its occupants in a way that is like the connection we have with nature, and which leads to a sense of well-being. Le Corbusier said, "Man is free, his tendency is toward pure geometry." "Geometry is the foundation...Modern art and thought...are now seeking beyond what is merely accidental: geometry leads them to mathematical forms, a more and more generalized attitude."[2]

Just like in dance, geometry facilitates the synchronization among dancers and shapes the patterns within their movements. Dancers rely on memorized patterns in their steps, and the rhythm of music is synchronized with their movements. In ballet dancing, geometric shapes form the architecture of performances, and strategically arrange themselves in symbolic shapes like triangles and circles. These formations convey intention, as observed in the grounded stability of a triangle or the symmetry depicted in Leonardo da Vinci's Vitruvian Man, showcasing the idealized proportions of the human body. The plane shapes, and solid shapes are essential in perceiving and creating architectural designs. The multitudinous combinations of geometric shapes in patterns and solid compositions appeal both to imagined and real architectural design.

Photography

Architectural photography is a tool essential for not only documenting and communicating, it serves as a visual language to convey design intent, aids in educational purposes and plays a crucial role in preserving and promoting the didactic aspects of the discipline. A photograph constitutes geometry as well, as it involves the composition of visual elements within a frame, employing geometric principles such as lines, shapes, and angles. The capturing process relies on optical geometry to translate three-dimensional scenes into two-dimensional images.

According to Frank Lloyd Wright, architecture is not bounded by four dimensions but many more: Alfred Stieglitz claimed that camera work is dimensionless. However, when camera work is employed to record architecture, the dimensions are sharply reduced. Time is their common denominator. Three-dimensional space is an illusion in photography - though Baroque buildings exploit the same illusion.[3]

The camera, functioning as a tool for both observation and image creation, inherently embodies the concepts of a view and an image even before the actual capture of a photograph. This notion of an image encompasses both the idea of an existing image and the anticipation of an image yet to be produced.[4] Nonetheless, there is more than photographic reality at stake when photography encounters architecture; the substance of architecture is altered.[5]

Symbiosis of Architecture, Photography, and Geometry: A Multidimensional Exploration through Digital Art

Starting from the relationship between perception and execution, this paper will analyze the relationship between various disciplines coming together within an educational framework to explore them through an innovative method. Through the process of intuition, and exploration this study aims to pursue new methods while respecting dynamic relationships between these diverse fields, using them to further

enhance the learning process and illuminating the transformative opportunities inherent in interdisciplinary education.

Walter Gropius emphasized that the integration of arts, design, and technology was important, leading to his commitment to interdisciplinary collaboration, functional aesthetics, and the use of modern materials. Gropius's experimental model of education focused on the development of prototypes that might yield commissions, bringing the school closer to its aim of combining artistic inventiveness and industrial production or, as he had formulated the new credo at the 1923 Bauhaus exhibition, demonstrating the fusion of "Art and Technology."[6] The enduring relevance of Gropius' ideas lies in their holistic and forward-thinking principles, shaping modern design thinking and education worldwide.

The overview of this study is to explore geometry as a branch of learning through the perspective of digital art with the help of architectural photography. The investigation will expose the creator(learner) to several aspects of 'Principles of Art and Design'. Shapes, colors, and lines are arranged to give a sense of *pattern*, *contrast*, *balance*, and more, though now the shapes are recognizable as objects and forms. The principles of composition emerged in the late nineteenth century and rose to prominence as a language to address the formal elements of early and mid-twentieth-century abstract and experimental art.[7]

The Act of Taking a Photograph

The process commences with the taking of a photograph. The setting in which the photograph is taken is a highly dense urban fabric, offering an opportunity for a profound capture within the Walled City of Lahore. Why select the mentioned cityscape? Because of the intricate juxtaposition of historical layers with contemporary forms. The chaotic life of the city yet having a sense of rhythm, creates a dynamic canvas for a keen observer to record the fluidness and complexity of the urban environment. The photograph, destined to become a vital component of a larger digital artwork, requires deliberate consideration of several elements to encapsulate the unique urban fabric.

The Walled City of Lahore is the focus of photographic documentation for this process because the new and old architectural forms merge seamlessly together, old architectural elements coming together and fusing in with newer forms, these forms are fortified by electric poles and wrapped with wires. Giving a sense of harmony, and ease in the chaos. Even though it is a chaotic environment where a sense of uneasiness should take over, the order in the organic growth of the city gives a sense of harmony and rhythm.

It is important to note that within the photography framework, there exists a dual aspect, encapsulating both the act of creative image-making and a retrospective reflection. Thus, the photographic process mirrors the perceptual experience of viewing and composing images. Our ability to see is intricately tied to recognition, limited to what we have previously encountered. This conceptualization of photography, wherein the notions of a view and image creation are integral to the medium's structure, forms a central theme in Robertson's contemplation.[8]

In the Canadian periodical Archivaría, Phyllis Lambert wrote: 'Photography can be both an art form and a documentary technique, one may enhance the other by combining the record and certain aesthetic qualities. The visual record of buildings also conveys information at a symbolic level and collectively, buildings are a formal expression of society's needs, values, and aspirations.[9]

Specifically tailored for the forthcoming artwork, the captured photograph must meticulously balance negative space between the built fabric and the surrounding environment. Elements that the city offers like wires, intricately wrapping around architectural elements, serve as connecting lines that add depth to the visual narrative. The architectural elements that are permanent structures or temporary add to the multi-layered narrative.

The captured photograph is expected to depict a sense of stillness, contributing to the flatness essential for the eventual digital outcome. A sense of stillness in a photograph refers to the visual impression that elements within the image appear calm, motionless, and undisturbed. The photograph can convey a tranquil atmosphere, often achieved through factors such as the absence of movement, balanced composition, soft lighting, and a lack of visible agitation or activity. A photograph with a sense of stillness can evoke a feeling of peace, contemplation, or a moment frozen in time. Because the built fabric, with its diverse forms, already offers captivating imagery. The photograph should be able to be dissected into three layers — background, middle-ground, and foreground. This not only provides an opportunity to study light and shadow but also allows for the intricate capture of three-dimensional elements onto a two-dimensional plane. Each layer unveils a dimension of the urban fabric, and its true depth only reveals itself through continuous study and the discerning eye of an observer to capture the nuanced layers.

Figure 1. Photograph assessment (foreground, middle-ground, and background).

Construction of a Geometric Arrangement with a Photograph

Advances in the digital ecosphere have been adopted with remarkable speed in the design world and likewise, artists using digital graphics are creating work that is equally successful artistically and aesthetically as compared to traditional art.[10]

The photograph now has landed on the interface of tools like Adobe Photoshop where image manipulation will catalyze the creation of a pattern shaped by architectural elements. The photograph's four points or vertexes serve as the initial reference for pattern construction. Through the process of mirroring and reflecting the photograph, a composite image emerges, revealing diverse forms and shapes(polygons) originating from architectural elements such as balconies, windows, volumes, forms, doors, voids, etc. During this phase, the artist gains insight into the intrinsic patterns captured during the initial photographic stage.

If the perceptual experience of spaces can be a source of aesthetic delight or architectural interest, this might just as well be a matter of ingenious geometry, organic fluidity, or elegant sobriety as of playful complexity.[11]

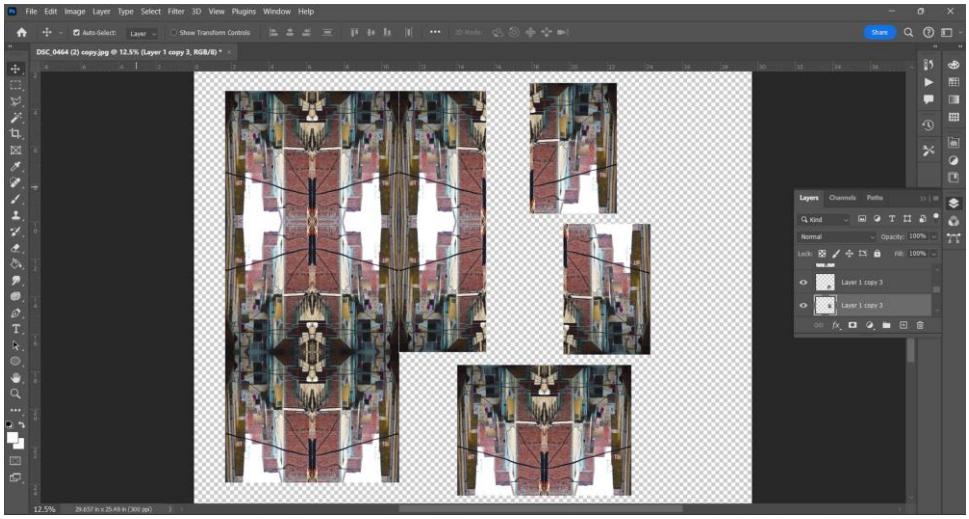

Figure 2. Photoshop Interface where the photograph's vertexes meet.

Le Corbusier realized that although "nature presents itself to us as a chaos…the spirit which animates Nature is a spirit of order."[12] He also believed that in addition to the numbers of the golden section, geometry provides an important basis for architectural design: Architecture is the masterly correct and magnificent play of masses brought together in light. Our eyes are made to see forms in light: light and shade reveal these forms; cubes, cones, spheres, cylinders, and pyramids are the great primary forms ... the image of these is distinct and tangible within us and without ambiguity. It is for that reason that these are beautiful forms, the most beautiful forms.[13]

When the four vertexes of the image converge, it marks the beginning of a pattern that unveils various shapes and forms through the understanding of light and shadow. This transformation involves translating three-dimensional forms onto a two-dimensional digital surface. As lines, shapes, and forms interconnect to form a pattern, the eye discerns a sense of rhythm and order, making it visually pleasing. The once chaotic image now imparts a sense of a systematic arrangement. Its visual appeal lies in human's appreciation for symmetry, predictability, and repetition. Humans, operating in a loop, naturally value the anticipation of what is to come.

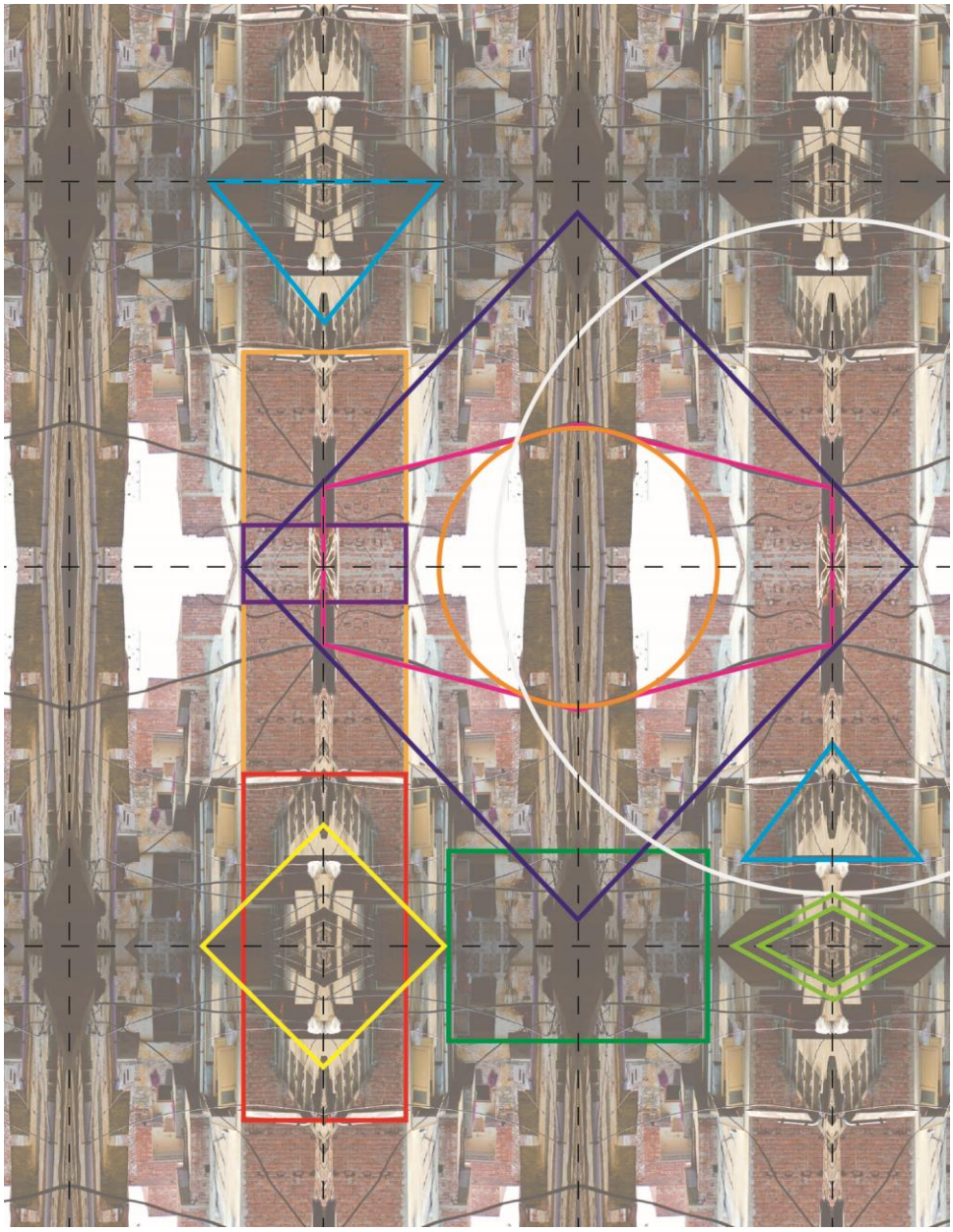

Figure 3. Geometric polygons identified during the construction of the pattern.

Precision is of utmost importance in this process, mirroring the significance seen in any geometric pattern. Some regular tessellations and semi-regular tessellations come into play where the lines of a pattern are the electric wires of the urban fabric, and the polygons formed are from connections created by the architectural elements: balconies, windows, volumes, forms, doors, voids, poles, etc. The generated pattern defines angles, lengths, and orientations, while their connections give rise to a structured grid. Serving as the language of precision, lines, and connections constitute the foundational fabric of geometry, playing a pivotal role in expressing fundamental principles within this discipline and leading to the creation of a captivating pattern.

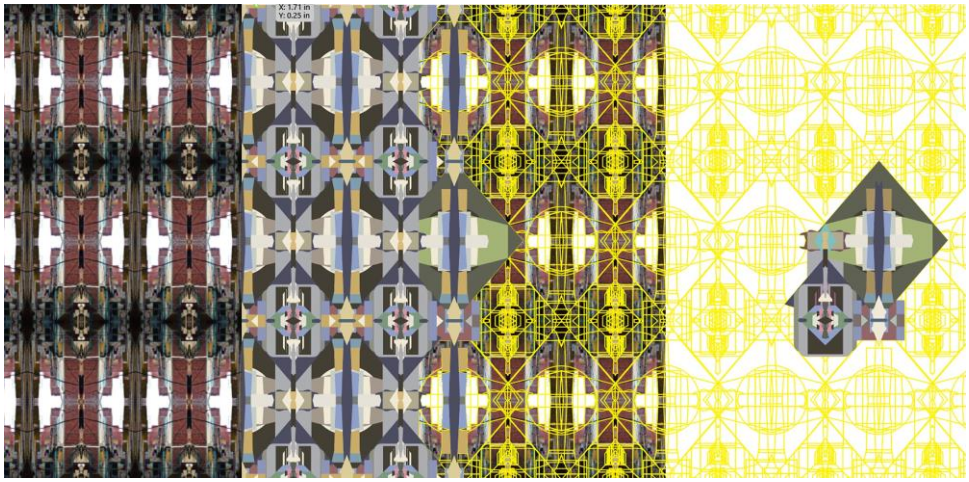

Figure 4. Transition from photograph to pattern. Formation of Grid, Segments, and tessellations.

Engaging in this process is not only experiential learning but also calming as it provides a learning experience about geometry through the repetition of patterns facilitated by mirroring and reflecting of an image. As a sense of predictability and unpredictability emerges, some forms appear identical while others diverge. An impression of infinity surfaces, suggesting a never-ending point that extends beyond the confines of the image. Perspective an important component of a photograph, diminishes. The composition becomes reorientable; images that once adhered to gravity now challenge it, resulting in flatness and scalelessness. The repetition observed in the art is purposeful, guided by the nuances of the original capture. Symmetric formations(grids) within the digital artwork introduce a fresh perspective, encouraging the eye to explore and appreciate the inherent repetition in geometric art.

Figure 5. Snippet of a pattern that shows continuity(infinity) in an arrangement.

This method aligns with the drawing approach employed by the renowned architect Louis Kahn, reminiscent of his sketches where scalable elements like windows were often omitted to distill the essence of forms. The ensuing geometric patterns convey a sense of continuity, offering a contemporary interpretation of traditional studies in forms and shapes.

With overlapping and digitally manipulating an image, the artwork becomes a canvas of layers, offering diverse perceptions and dimensions. From a distance, the viewer may discern a pattern on a two-dimensional surface. However, upon closer inspection, the architectural elements within the digital creation become more apparent, transitioning from a defined pattern to tangible materials and substance. The manipulation of scale within the digital space is a fascinating aspect of this artistic process. Massive forms, originally captured in the photograph, can be played with on a smaller scale, akin to arranging Lego pieces or Tetris blocks. This creative freedom allows the artist to experiment with spatial relationships and visual impact introducing a fascinating dimension to the composition. The transition

from two-dimensional to three-dimensional and back to two-dimensional, and perhaps even three-dimensional eventually, adds layers to the narrative.

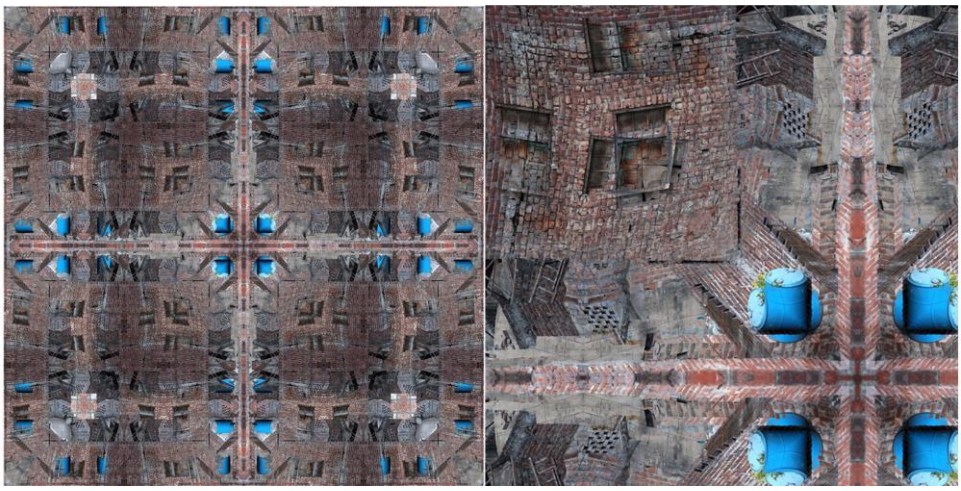

Figure 6. Artwork(size 30”x30”) from a distance and its detailed image.

Breaking the Symmetry

Usually, the artwork has a center from which the pattern emerges. And that adds to the symmetrical value to it. This central locus, however, subtly shifts as the observer engages with the evolving visual narrative, ensuring continuity within the established grid and segments. Additionally, breaking the strict symmetry imposed by the four vertexes is essential for generating interest and promoting a continual sense of intrigue in the pattern.

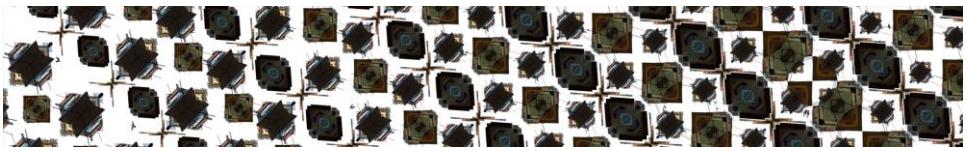

Figure 7. An example of breaking geometry, Artwork inspired by MC Escher (size 120”x18”).

MC Escher's mind-bending optical illusions and paradoxical spatial constructions, the evolving pattern challenge conventional perceptions, inviting viewers to explore the visual puzzle before them. In this context, the shifting center aligns with Escher's optical illusions, where focal points change dynamically, creating a mesmerizing effect. Similarly, the geometric brilliance of Frank Lloyd Wright's window designs, known for their intricate patterns and light, informs the exploration of form and structure within the digital artwork. Breaking away from strict symmetry, as emphasized by Wright's innovative window designs, introduces a dynamic asymmetry that captures attention and adds a layer of unpredictability to the visual experience. appreciate the geometric intricacies reminiscent of Wright's architectural genius. This synthesis of influences contributes to the richness and depth of the digital artwork, creating an experience that goes beyond the ordinary and encourages a continuous exploration of its visual intricacies.

Pedagogical Approach and Further Exploration

The intersection of art, architecture, geometry, and photography forms a compelling and interdisciplinary nexus. Each discipline contributes unique perspectives and methodologies, enriching the collective understanding and creative potential. Teaching geometry through the innovative approach

involves a dynamic fusion of these disciplines. By introducing students to the captivating process of capturing urban environments through the lens of a camera, educators provide a unique and immersive experience. The selection of a cityscape, such as the Walled City of Lahore, offers a rich tapestry of historical and contemporary architectural elements, enabling students to delve into the complexities of form, space, and light. Through the act of taking a photograph, students learn to carefully consider composition, balance, and the understanding of positive and negative masses. The subsequent transition to digital art involves mirroring, reflecting, and manipulating the captured images, cultivating an understanding of geometry in an experiential and visually stimulating manner. Study of regular tessellations and if there's a break in the conditions for perfectly regular order in two dimensions in a systemic order, semi-regular tessellations can be achieved and learned about through this process.

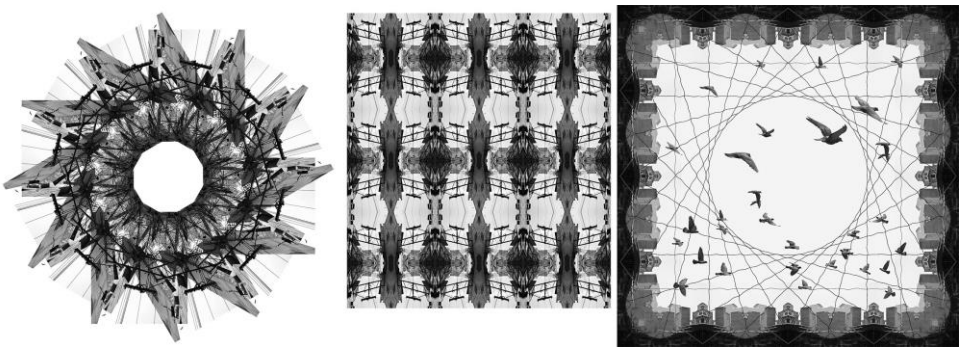

Figure 8. Three artworks housed in a Boutique Hotel in Lahore.

This pedagogical approach not only fosters a deep appreciation for the aesthetic potential within the urban environment but also inculcates a profound understanding of geometric principles. Students are exposed to a process that translates forms on two-dimensional surfaces to three-dimensional spaces and captures them back to a two-dimensional plane, and perhaps it again goes to three-dimensional reality translating the forms with the help of Augmented Reality/Virtual Reality. The seamless transition from two-dimensional to three-dimensional and potentially back to two-dimensional adds intricate layers to the narrative. As a result, students engage in a multidisciplinary learning experience that seamlessly integrates geometry, art, and technology, paving the way for a holistic understanding of spatial concepts and creative expression.

CONCLUSION

In conclusion, the symbiotic relationship between architecture, geometry, and photography, explored through the innovative medium of digital art, has unveiled a multidimensional tapestry of creative expression. This journey began with the act of capturing the rich urban fabric of the Walled City of Lahore through the lens of a camera, where the layers of history and contemporary life converged into a visual narrative. The subsequent transformation of these photographs into intricate geometric patterns demonstrated the interconnectedness of disciplines and the transformative power of digital manipulation.

The pedagogical implications of this exploration are significant, offering a unique approach to teaching geometry by integrating architectural exploration, photography, and digital art. This interdisciplinary method not only enhances students' understanding of geometric principles but also fosters a deep appreciation for the aesthetic potential within the built environment. The seamless transition from two-dimensional to three-dimensional representations adds complexity to the learning experience, paving the way for future exploration in Augmented Reality/Virtual Reality.

In essence, this digital creation process transcends conventional boundaries, inviting viewers to perceive geometry in a novel way. The resulting artwork serves as a dynamic representation of the urban fabric, encouraging intellectual enrichment and engaging the audience on multiple levels. The patterns created are not mere replicas; they are deliberate explorations that offer a contemporary and visually stimulating interpretation of the intricate relationship between architecture and geometry. As we reflect on this journey, it becomes evident that the convergence of art, architecture, geometry, and photography opens doors to transformative opportunities, shaping a new narrative in the realm of creative exploration.

NOTES

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TEACHING WELLBEING: THE EMERGENT APPROACHES OF THE OKANAGAN CHARTER

Author:
LARISA CASTILLO

Affiliation:
UNIVERSITY OF CALIFORNIA, USA

INTRODUCTION

In response to the mental health crisis that stemmed from the pandemic, The University of California, Irvine became one of the first public institutions in the US to adopt the Okanagan Charter of 2015.[1] The charter articulates a transformative vision of wellbeing; moreover, it recognizes the university setting as a primary site of health transformation. Universities that adopt the charter undertake both current and future aims: to provide a framework that reflects what "health" and "wellbeing" mean within our immediate historical context, to encourage intersectional research on these ideas, and to integrate this model of health and wellbeing into all sectors of university culture, our immediate communities and larger society. At the university, the classroom serves as the primary site for such transformative change because classrooms create space for us to theorize about wellbeing while modeling holistic approaches to wellbeing described in the charter.

In what follows, I outline the charter's holistic, ecological view of health to argue for the incorporation of emergent pedagogies into our teaching practices. The charter views the classroom as a "living laboratory" for incorporating its novel, transformative, holistic approach to wellbeing into our learning, our way of relating, and our everyday lives.[2] Pedagogies of emergence support this process because they respond to the charter's call to "provide transformational teaching and learning environments" that cultivate the health of faculty, staff and students and extend wellbeing to the broader community.[3] In the process of reorienting us to more holistic understandings of human experience, they reimagine how we structure power within the classroom, what we identify as class "content," how we understand the disciplines and the learning process, and most fundamentally, why we learn at all.

The Okanagan Charter

To understand how we can engage in such transformational pedagogy, we must first understand the view of wellbeing presented in the Okanagan Charter. Health is "viewed holistically, reflecting 'physical, mental, and social well-being and not merely the absence of disease or infirmity'."[4] The charter envisions infusing this view of "health into all aspects of campus culture" based upon a understanding that health moves "beyond a focus on individual behaviour towards a wide range of social and environmental interventions" that engage "all sectors" of our society.[5] Given this expansive vision, health is improved by encouraging "compassion, wellbeing, equity and social justice" and strengthening "ecological, social and economic sustainability."[6] The charter views these aspects of wellbeing intersectionally, recognizing that the "wellbeing of people, places and the planet are

interdependent."[7] Moreover, its "whole system" approach understands health as more than an "expanding concept," but as a dynamic process that enables people to "thrive and achieve their full potential" while it protects the "ecosystems of the planet."[8]

What is novel about the Okanagan Charter's interpretation of health is its understanding of health as an "emergent" principle.[9] It explicitly "builds" on the proposals of the 1986 Ottawa Charter for Health Promotion, which also emphasizes the "interconnectedness between individuals and their environments," [10] but it understands this interconnectivity as emergent; that is, as constantly shifting into new paradigms and knowledges. This complex systems approach serves as a model for teaching about and for wellbeing in the classroom.

Because of its emergent approach, the Okanagan Charter recasts the scope of individual wellbeing to include the environment. The Ottawa Charter's concept of "environment" is more anthropocentric; viewing health promotion as the process of "enabling people to increase control over, and to improve, their health," which includes their ability to "change or cope with the environment."[11] Here, the environment is imagined as something attuned to human agency--referring to the lived space that humans inhabit, not the broader, enmeshed ecologies of life on our planet. By making the environment secondary to human experience, the Ottawa Charter misses the Okanagan Charter's call to "value local and indigenous communities' contexts and priorities" that may imagine environment, land, and human agency non-hierarchically.[12] The Okanagan Charter pushes the definition of "environment" by conceptualizing it as a living entity that "doesn't belong to us," one with which humans have a dynamic, reciprocally-sustaining relationship.[13]

By reimagining our relationship to the environment, the Okanagan Charter also reimagines what human agency means, and by extension, what wellbeing is, and how it emerges. It imagines wellbeing as emerging from human coexistence with, not over, another being or environment. Thus recontextualized, human action is not just about attaining an outcome; it is a process that serves as an end in itself. Moreover, human action is necessarily cross-sectional and interconnected. For this reason, the charter implores "all sectors" to support the wellbeing of all people because the "wellbeing of people, places and the planet are interdependent."[14] In this view, each effort toward flourishing contributes to, and changes, the emergent process of wellbeing for all life on the planet. Human agency does not stem from having control over a static concept ("health"); rather, it exists in our capacity to relate--to notice what is happening, recognize what is needed, and adjust to change.

This ecological perspective informs how universities function in the charter's fruition. Like its definition of health, the charter's action framework for the university is an expansion model, in which the university's efforts at embedding wellbeing into campus culture extends to global health. The university has a "unique opportunity and responsibility to provide transformative education," because it is an "emergent knowledge society" that can "generate, share, and implement knowledge and research findings to enhance health of citizens and communities both now and in the future."[15] The university contributes to global wellbeing precisely because of its emergent qualities, where new knowledges and practices are ever-developing. It is therefore in a position to encourage emergent, "cross-cutting approaches to embed an understanding and commitment to health, wellbeing and sustainability across all disciplines and curricula."[16]

What does it mean to incorporate emergent approaches to wellbeing into our curriculum? How do cross-cutting, ecological approaches in the classroom teach and model wellbeing? These knowledges, as I show below, involve the development of teaching methods that, like the charter's definition of health, are themselves emergent in nature. Emergent approaches are processual, attuned to the shifting quality of the present moment as it manifests in the classroom. As such, they are grounded on students' felt experience: their sensations, emotions, and thoughts. Structurally, this shift toward immediate

experience also shifts the focus of knowledge production away from teachers and the texts they advance and toward students' self-awareness and relationality. These approaches turn the action of learning, like the action of wellbeing outlined in the Okanagan Charter, into process, and process into an end in itself, one that generates wellbeing.

PEDAGOGIES OF EMERGENCE

Though the pandemic has heightened our awareness of teacher and student wellbeing and the need to incorporate wellbeing into the classroom,[17] curricular efforts at improving wellbeing in the classroom setting have been a decades-long effort. Some of these health-focused pedagogies are traditional, knowledge-based teaching approaches that develop awareness of the components of wellbeing, such as classes centered on happiness and human flourishing.[18] Others have included the incorporation of practical models, such as the integration of group therapy and resiliency programming.[19] We also see this work being done with the expansion of "positive education" in countries such as Bhutan, China, Dubai, Australia and Mexico, as well as in the United States.[20] Though positive education models are primarily focused on primary and secondary education, these are beginning to be adopted in higher education as well.[21] Positive education models use integrative measures to increase happiness by using the PERMA theory of wellbeing that highlights positive emotion, engagement, good relationships, meaning, and accomplishment.[22] Seeking many of the same outcomes of positive education, contemplative pedagogies have been used in various capacities in higher education, and more recently in primary education, to improve student and teacher mindfulness and resiliency.[23]

These approaches support the charge of the Okanagan Charter by teaching the content of wellbeing, with some incorporating certain wellbeing practices. But the charter calls for more integrative approaches that attend to the present historical moment. The charter's definition of wellbeing signifies that stressors have taken on an imbricated, interlayered form; indeed that one of our primary stressors is their interwoven quality. Stress comes from having to navigate complexity; inversely wellbeing comes from having the capacity and resiliency to successfully navigate complexity. Thus, teaching approaches that address this complexity, that both implicitly and explicitly foster wellbeing,[24] and that both conceptually and practically teach wellbeing, are essential for improving wellbeing at the university. To align with the Okanagan Charter, these interdisciplinary, cross-cutting teaching approaches must address physical, mental, spiritual, individual, relational, and collective wellbeing while simultaneously encouraging equity and social justice, compassion, and ecological sustainability.

Pedagogies of emergence fully meet the charge of the charter, being ecologically structured and replicating the very process and dynamicity of wellbeing. Emergence is a dynamic process, one in which novel happenings emerge from a specific constellation of factors, or bases. Theories of emergence observe, follow, and analyze this process.[25] The theory of emergent wellbeing presented in the Okanagan Charter, for example, identifies the different aspects of wellbeing but also takes an interest in how those aspects shift relationally over time, how they synthesize, moment-by-moment, into something new. It accounts simultaneously for parts and whole as they re-constellate over time. Such a theoretical perspective maps onto the classroom via processual teaching approaches that observe and analyze the emergent process of human experience in the classroom, following how teachers and students feel, relate, and learn. These pedagogies intentionally create space for emergence—for unplanned happenings to take place within the classroom so that novel experience becomes the primary basis of knowledge production and learning. In that sense, emergent approaches are at once dispositional, logistical, and performative.

Scholars have understood pedagogies of emergence as ways of modeling and engaging with complex adaptive systems and have indicated how they might meet certain aspects of the charter's charge. Sue

Mcgregor shows how they perform, and thereby teach, the neurocircuitry of deep learning, preparing students for the ever-changing systems they have to engage when they leave college.[26] Dalke et al. see their pedagogical value in their ability to teach both students and teachers how to adjust to complexity and non-knowing.[27] Creating space for non-knowing is a crucial pedagogical tool for teaching resilience and carving out space for possibility. Sarah Almser has shown how, in cases where social and political forces that breed inequity are so disempowering that they close down possibility and conversation, pedagogies of emergence open space for the possibility of transformation.[28] By prioritizing creative and dialogical learning, emergent pedagogies "offer methods for, and demand that we attend to problems of, creating spaces, times and opportunities for happenings and possibilities for people to engage in more nonessentialist ways of learning and being together." [29] For Almser, transformation only happens through our becoming, and becoming requires moments of encounter—our engagement with the "happenings" that emergent pedagogies occasion. Happenings, in other words, are the foundational thresholds through which we attain freedom.

Most theorists of emergent pedagogy write from a cognitive or critical-pedagogical perspective. Few, if any, take a phenomenological perspective, accounting for the embodied experience that grounds all emergent phenomena. Yet, as Almser suggests, the "happenings" within the classroom are what center emergent approaches; and those happenings are always meditated through bodies. To observe, follow, and analyze the emergent moment fully, somatic experiencing is essential because the body is the integrative site of the various emergent bases or aspects, the site at which the emergent moment is held. An emergent pedagogy therefore already implies embodiment. As emergent pedagogy develops, it will be necessary to integrate the embodied practices of contemplative pedagogy more explicitly, in which presence (emergence) is felt somatically.

IN THE CLASSROOM

Such an embodied approach developed in a class I taught for a small group of students at the University of California, Irvine. Like many traditional approaches to teaching wellbeing, the class explicitly addressed the elements of wellbeing the Okanagan Charter presents, including readings centered on the separate aspects of wellbeing, such as positive psychology, mindfulness, rest, trauma theory, equity, social justice, diversity, environmental sustainability, and learning. But instead of seeing content aggregation as an end in itself, the class encouraged students to think and feel emergently. They watched how their relation to content changed over the course of the quarter and learned to relate to the knowledge they accumulated as a process, not an end. For that reason, my emphasis here is not on describing content, which often shifted according to the needs of the students, but on the emergent approaches that taught students about wellbeing by creating space for happenings to occur.

The emergent approach relied upon making embodied, felt experience the foundation of our learning. Students engaged in a series of evidence-based mindfulness practices and positive psychology exercises throughout the term, practices that helped sharpen their awareness of the quality of the present moment. These moments of reflection created space for happenings to occur, which helped students better understand the matrix of stressors and wellbeing elements that affected them, and the complexity of their interaction. Meditation practices heightened students' awareness of their sensations, thoughts, and feelings, and helped them develop a more complex understanding of their internal landscape because they were able to parse out the emergent bases of a particular problem, noticing their shifting interaction over time.

By experiencing and analyzing the emergent quality of internal experience, students became more skilled at complexifying their relationship to external stressors and were able to undertake a complex-systems approach to understanding global issues. They became more adept at concurrently observing a

wide array of potential stressors (from personal stress, to social inequity, to eco-anxiety) alongside resiliency supports (gratitude, compassion, social support networks); and they developed the ability to notice the interaction of these elements in relation to systemic problems, such as the economy, climate change, or white supremacy. Their capacity to hold many more individual and dynamic factors within their space of awareness, and to understand their relation, helped students process, and ultimately reduce, their stress.

For example, when students engaged in wellbeing-centered meditation practices that interact with nature,[30] they initially developed a recognition that their connection to nature helped support their sense of wholeness and calm and subsequently that they were missing connection with nature. Through that awareness, they became simultaneously aware of their ecoanxiety and concerns about environmental justice.[31] As these worries arose, we processed them with evidence-based approaches for facilitating wellbeing, such as journaling, compassionate listening exercises, contemplate art projects, and group conversation. As a group, we traced and reconfigured the many aspects of our relation to nature and the feelings and sensations that shape our experience with it. This emergent approach helped students better understand the complexity of their relation to nature and simultaneously to generate positive experiences with nature, experiences that supported them as they addressed their fears about climate change.[32]

An emergent pedagogy, in other words, is responsive but not reactive. It feels into the temperature of the classroom and holds space for the heat of difficulty. And this strategy for being present shifts the structure of the traditional classroom. Because emergent practices attune themselves to the present moment, texts recede to the background of the conversation. The emergent classroom shifts the focus from textual to experiential knowledge; and through that reorientation, it diverges from teacher-centered models of teaching. The more experience students collect from emergent happenings, the more they rely upon their experience as the basis of knowledge; and the more they rely on their experience, the more they direct conversation and determine collective meaning.

Emergent pedagogies, therefore, bring their own challenges to teachers. In the process of becoming less directive, I found that the emergent model takes greater time and patience. While teacher-centered models focus on conveying knowledge and cognitive skills and are often deemed successful based upon the efficiency with which material is covered; emergent approaches, which disengage the teacher's hold of the pacing of the course, may be slow and recursive. Indeed, they may sometimes feel regressive. Instead of directing students' attention, the teacher's role is to listen and notice when students themselves require a transition. For that reason, when engaging in such pedagogies, it is incumbent upon teachers to develop their own self-awareness so that they are able more readily to recognize when their needs compete with the needs of students.

To be sure, this practice is a difficult one, a constant practice of give-and-take, of checks-and-balances. Most often, emergent pedagogy requires us to embrace self-effacement in each moment, to remind ourselves to turn toward student experience first before applying the lens of our own judgments and interpretations. At other times, it requires us to identify the moments in which teacher-centered direction is to the benefit of students' individual and collective experience. These weighty decisions are, in themselves, engagements with emergence—with our own connection to the many aspects and dynamics that comprise the moment. We must practice what we ask our students to practice: feeling into the many, ever-moving elements of our experience.

CONCLUSION

Admittedly, such an approach may be challenging to adapt and may not be meaningfully applied to all classroom settings. Additionally, the incorporation of emergent pedagogies as a way of cultivating wellbeing is slow work. However, there are few, if any, short-term fixes to the number of stressors minimizing student health. Thoroughgoing, systemic work requires us to slow down enough to gauge what is needed on all sides; and emergent pedagogies allow us to model this process. An emergent approach is particularly important for classes that directly address the concept of wellbeing, as the Okanagan Charter's definition of wellbeing makes headway in our colleges and universities. Classes centered on wellbeing—which are now so greatly needed—will not only have to account for the aspects of wellbeing outlined by the charter: physical, mental, spiritual, and collective health, as well as social justice and environmental connectivity. They must demonstrate how these aspects arise, shift, intersect, and reconstitute—how they emerge in the present moment.

NOTES

[1] The Okanagan Charter was drafted to establish Health-Promoting Universities and Colleges in 2015. https://www.acha.org/documents/general/Okanagan_Charter_Oct_6_2015.pdf. To see more on the student mental health crisis, see Pierce, et al., "Mental Health"; Kathirvel, "Post COVID-19"; Brown, "What One University Learned."
[2] Okanagan Charter, "Action Framework for Higher Education," 1.2.
[3] Okanagan Charter, "Health Promotion."
[4] Okanagan Charter, "Health Promotion."
[5] Okanagan Charter, "An Action Framework," "Health Promotion."
[6] Okanagan Charter, "Health Promotion."
[7] Okanagan Charter, "Health Promotion."
[8] Okanagan Charter, "Action Framework," "Key Principles for Action."
[9] Okanagan Charter, "Health Promotion"
[10] "First International Conference on Health Promotion, Ottawa, 21 November 1986." https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference.
[11] "First International Conference on Health Promotion, Ottowa."
[12] Okanagan Charter, "Key Principles."
[13] Okanagan Charter, "Acknowledgement."
[14] Okanagan Charter, "Health Promotion,"
[15] Okanagan Charter, "Unique Role for Higher Education."
[16] Okanagan Charter, "Action Framework."
[17] Dabrowski, "Teacher Wellbeing"; McCallum and White, *Transforming Teaching;* Nandy, Lodh, and Tang, "Lessons from Covid-19."
[18] Shimer, "Yale's Most Popular Class"; Hirshberg, et al., "Study of Flourishing"; Johnson, Bauman, and Pociask, "Teaching the Whole Student."
[19] Brunwasser, Gillham, and Kim. "A Meta-Analytic Review"; Leppin, et al. "The Efficacy of Resiliency Training Programs"; Gillham, et al., "Cognitive-Behavioral Depression Prevention."
[20] Positive Education is based upon Martin Seligman's PERMA model, presented in Seligman's book *Flourish: A New Understanding of Happiness and Wellbeing*. This model developed into global pedagogical collaborations in Positive Education. See Seligman, et al., "Classroom Interventions"; Seligman and Adler, "Positive Education"; Waters, et al., "Visible Wellbeing and Positive Functioning"; White and Kern, "Learning and Teaching for Wellbeing; Norrish, et al., "Applied Framework."
[21] Parks, *Positive Psychology in Higher Education*.
[22] See Seligman and Adler, "Positive Education"; Waters, "Shifting Teacher Mindsets"; Shankland and Rosset, "Review of Brief School-Based Positive Psychological Interventions." Various approaches, such as the PROSPER model, reformulate Seligman's PERMA model but are nevertheless centered in positive psychology. See Noble and McGrath, "PROSPER."
[23] Contemplative pedagogies have been practiced since the 1970s and are used in individual classes and other institutional settings. See Simmer-Brown, "Contemplative Teaching and Learning"; Simmer-Brown, Grace, and Komjathy, *Meditation and the Classroom*; Barbezat and Bush, *Contemplative Practices in Higher Education;* Owen-Smith, *The Contemplative Mind in the Scholarship of Teaching and Learning*.
[24] Lea Waters makes the distinction between "implicit" and "explicit" approaches to teaching wellbeing in "Shifting Teacher Mindsets."
[25] For a history of the philosophy of emergence, see Kim, *Essays in the Metaphysics of Mind*; Lichtenstein, *Generative Emergence;* O'Connor, "Emergent Properties"; McLaughlin, "Rise and Fall of British Emergentism." These principles have been adapted to mainstream theories of emergence that apply emergentism to social and political action. See Hübl, *Healing Collective Trauma;* brown, *Emergent Strategy;* Scharmer and Kaufer, *Leading from the Emerging Future*.
[26] Mcgregor, "Emerging from the Deep."
[27] Dalke, et al., "Emergent Pedagogy."
[28] Amsler, "'By Ones and Twos and Tens'," 6.
[29] Amsler, 6.

[30] Contemplative and interactive nature practices have been shown to foster greater connection with the environment and to support wellbeing. See Lin, et al., "Contemplative, Holistic Eco-Justice Pedagogies"; Barton and Pretty, "What Is the Best Dose of Nature."

[31] Wray, *Generation Dread* outlines how the present generation is defined by an inability to face ecological crisis and is thereby unequipped to act to prevent it.

[32] This emergent approach to teaching has been employed in a pilot course on "Climate Resilience" at the University of California. Directed by Elissa Epel and Jyoti Mishra, the course brings together "well-known professors as faculty leaders at 10 UC campuses" (Epel and Mishra), who along with mindfulness instructors, engage students in contemplative, emergent teaching approaches as a way of helping students cope with climate distress. The experiential class is a response to calls to action, such as one recently made by the editors of *Nature*, who argue that "a top priority must be developing and evaluating ways to effectively reduce climate change's mental-health burden while strengthening the resilience of communities that are particularly at risk" (235).

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COMBINING CBL-STEAM LEARNING/TEACHING MODELS FOR ARCHITECTURE COURSES

Author:
SUSANA ROSADO, JORGE T. RIBEIRO

Affiliation:
UNIVERSITY OF LISBON, LISBON SCHOOL OF ARCHITECTURE AND CIAUD, PORTUGAL. UNIVERSITY OF LISBON, LISBON SCHOOL OF ARCHITECTURE AND CERENA AND CIAUD, PORTUGAL

INTRODUCTION

In Architecture courses, interdisciplinary is fundamental since in the profession this is a constant. Teams have to work in harmony and the projects' design are all the more interesting depending on the contributions and ideas that come from different areas of knowledge and should be closely interconnected with societal challenges.

Bringing this reality into the academic environment is increasingly relevant in the training of future architects, as well as in other courses. The Challenge-Based Learning (CBL) methodology combined with the STEAM (Science, Technology, Engineering, Arts and Mathematics) approach in teaching and learning precisely responds to this need.

CBL is an educational approach involving the resolution of real challenges as part of the learning process in a hands-on methodology. Everyone is supposed to be engaged in the challenge giving ideas, asking pertinent questions and contributing to producing knowledge.

Simultaneously, STEAM thinking and practices have been used to address complex challenges as well as nurturing techniques such as data visualization. It is fundamental to put theory to the test in terms of addressing real challenges in collaboration with the involved society.

Several authors[1] mention how CBL makes learning relevant and how it provides an effective learning structure in higher education. Additionally, Rosado & Ribeiro[2] showed how the implementation of the STEAM approach encourages creativity and critical thinking, also makes learning relevant and raises awareness for information management and information use for decision-making, and emphasizes the importance of interdisciplinary approaches in those decision-making, promoting collaboration among architecture students. Therefore the combination of the two CBL+STEAM learning/teaching approaches provide an important methodology on a “learning by doing” basis developing essential skills so useful for students’ transition into the profession and even in the practice of it in the future.

Moreover, the practice of contemporary architecture is no longer limited to traditional boundaries, requiring professionals who can approach problems in an integrated manner, considering not only aesthetic aspects, but also social, environmental, technological and economic factors. Blended CBL and STEAM learning meets these needs by offering an educational approach that promotes the practical application of knowledge to real-world projects.

This article presents a pilot experience of applying the CBL+STEAM learning/teaching approaches to PhD students in architecture at the Lisbon School of Architecture, University of Lisbon.

These combined CBL+STEAM models implementation demonstrated their added value in terms of supporting a more structured view of the research carried out and of the questions that arise in the reflections that are made throughout the research.

CBL TEACHING AND LEARNING

Problem based learning (PBL) is an approach prior to CBL and has a long history.[3] These approaches situate learning in a meaningful task. Kilpatrick[4] and Dewey[5] emphasize the importance of the practical experience in learning and probably it is where these methodologies began. In PBL, students work in small collaborative groups and learn what they need to know in order to solve a problem. The teacher acts as a facilitator to guide students.[6] In a PBL approach you are ultimately seeking for a solution whereas in CBL the idea is to produce knowledge while having ideas and posing questions. A problem implies an answer and a solution. A challenge motivates you to learn about it and study it without pursuing a solution or "the correct answer".

The CBL methodology emerged from the project "Apple Classrooms of Tomorrow-Today" (ACOT[7]) developed to identify the essential design principles of the 21st century learning environment.

Challenge Based Learning is an engaging multidisciplinary approach to teaching and learning that encourages students to leverage the technology they use in their daily lives to solve real world problems. Challenge Based Learning is collaborative and hands-on, asking students to work with peers, teachers, and experts in their communities and around the world to ask good questions, develop deeper subject area knowledge, accept and solve challenges, take action, and share their experience.[8] Teachers act as facilitators using a constructivist approach as students work in small groups to design, test, and iterate prototypes of their solutions.[9] So, CBL approach is a pedagogical method that aims to involve students in real-world situations, promoting the resolution of practical problems and the application of knowledge in relevant contexts. It has some basic learning principles that define its development during classes and promotes active learning, collaboration, problem solving, and practical application of knowledge. Some of these principles include:

Realistic Context: The challenges presented to students are based on real situations, in which statistics play a crucial role in making informed decisions. This helps motivate students by showing them the relevance of the subject in the real world;

Interdisciplinary Collaboration: The CBL approach promotes collaboration between students from different areas of study, mimicking the dynamics of work in professional environments. This allows students to see how Statistics is applied in different disciplines and how different perspectives can enrich problem solving;

Active Inquiry: Students are encouraged to investigate and explore challenges independently, using available resources and statistical techniques. This develops the capacity for research and critical analysis;

Solving Complex Problems: The challenges proposed do not have simple answers and involve the analysis of real data and the application of advanced interdisciplinary techniques such as, for example, statistical analysis. This promotes the resolution of complex problems and the development of statistical reasoning skills.

In terms of the fundamental stages of CBL teaching and learning, it is an instructional approach that centers around addressing real-world problems or complex challenges to foster critical thinking, problem-solving skills, and a deeper understanding of the subject. This methodology goes beyond traditional classroom settings, encouraging learners to actively engage with complex issues and explore various dimensions of a challenge. About the fundamental stages of challenge-based learning (Figure 1):

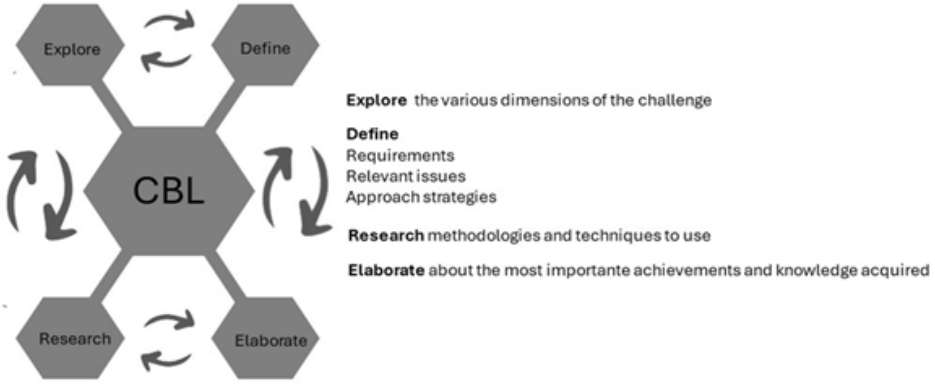


Figure 1. Fundamental stages of CBL.

Identifying and defining the challenge

Requirements Definition: Begin by clearly identifying the challenge. Define the requirements and constraints involved in the problem to ensure a comprehensive understanding.
Relevant Issues: Explore the various dimensions and aspects of the challenge. Identify the relevant issues that need to be addressed to tackle the problem effectively.

Researching methodologies and techniques

Research-Based Learning: Encourage students to conduct thorough research on the challenge. This may involve studying existing solutions, relevant literature, and exploring different methodologies and techniques used in similar contexts.
Problem Analysis: Equip learners with analytical skills to break down the challenge into manageable components. Analyze the intricacies of the problem to identify potential entry points for solutions.

Approach strategies

Collaborative Learning: Foster collaboration among learners. Teamwork allows for diverse perspectives and skills, enabling a more comprehensive exploration of the challenge.
Iterative Problem-Solving: Emphasize an iterative approach to problem-solving. Encourage students to test, iterate, and refine their solutions based on feedback and new insights.
Critical Reflection: Incorporate reflection as an integral part of the learning process. Encourage students to critically reflect on their experiences, methodologies, and the evolving understanding of the challenge.

Achievements and knowledge acquisition

Questioning and Inquiry: Highlight that challenge-based learning is not solely about finding solutions but also about asking meaningful questions. Emphasize that the process of inquiry is as important as the solutions themselves.
Adaptive Learning: Showcase how learners adapt and apply knowledge in real-world scenarios. Highlight the development of transferable skills such as critical thinking, adaptability, and effective communication.
Meta-Cognition: Illustrate how challenge-based learning promotes meta-cognition – the ability to think about one's own thinking. Students gain insights into their learning processes and enhance their problem-solving strategies.

Emphasizing the learning journey

Process-Oriented Approach: Emphasize that the primary focus is on the learning journey rather than just the end result. Acknowledge that not all challenges may have clear-cut solutions, but the process of grappling with complex issues contributes to valuable learning.

Lifelong Learning Skills: Stress the development of lifelong learning skills. Challenge-based learning instills a mindset of continuous curiosity and the ability to adapt to new and complex challenges beyond the classroom.

Hence challenge-based learning is a dynamic and holistic approach that immerses learners in real-world problems, encouraging them to explore, question, and learn throughout the process. It goes beyond the traditional emphasis on finding solutions, placing a strong emphasis on the journey of learning, inquiry, and the acquisition of critical skills for lifelong learning.

STEAM EDUCATION

STEM (Science, Technology, Engineering, and Mathematics) education is designed to enhance the proficiency of students in these critical fields. The primary objectives include improving problem-solving abilities, encouraging the application of STEM concepts, and fostering creativity and innovation in addressing real-world challenges. Additionally, the aim is to elevate the number of students pursuing advanced studies and careers in STEM by raising awareness of the field's significance and generating interest in STEM subjects.

The strategy is underpinned by the understanding that STEM skills are pivotal for economic development. Occupations in STEM are not only among the highest paying but also represent some of the fastest-growing sectors, playing a crucial role in driving innovation. STEM graduates typically experience low unemployment rates, further emphasizing the practical value of a STEM education in preparing individuals for successful and stable careers.

Reports from the OECD indicate that countries, such as Portugal, are making rapid progress in enhancing baseline qualifications, including STEM education. Despite this progress, challenges persist, particularly in capturing the attention of a youth population focused on leisure and immediate technologies. Efforts are needed to make the STEM approach more appealing to young people, aligning educational strategies with their interests and preferences.

In response to this challenge, the integration of the Arts into the STEM approach, known as STEAM, emerges as a transformative strategy (Figure 2).

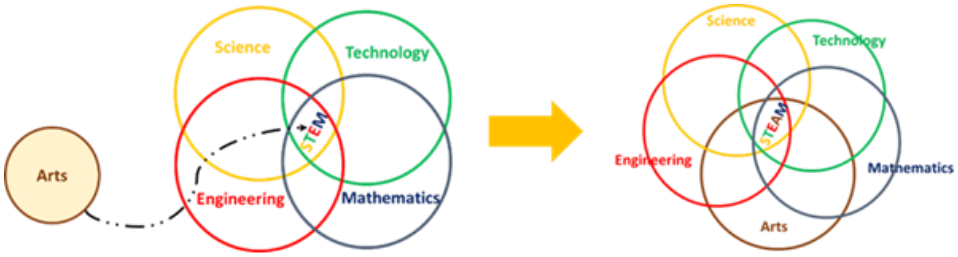


Figure 2. Transition from STEM to STEAM Education (adapted from Rosado and Ribeiro[2]).

STEAM proposes an integrated teaching of scientific-technological, artistic and, in general, humanistic competencies, with integration understood in a progressive sense that goes from interdisciplinary to transdisciplinary.[10]

This approach injects a breath of fresh air into education, providing a more captivating and appealing method.[11] By incorporating artistic elements, STEAM goes beyond traditional STEM education, stimulating sensory awareness and offering a more immersive and memorable learning experience.

The STEAM approach becomes particularly relevant in training young people[12] in areas like architecture, where deep roots in art coexist with an increasing need for scientific and technological knowledge. This interdisciplinary approach prepares students for professions that demand a synthesis of artistic creativity and technical expertise, aligning with the dynamic nature of contemporary career paths.

Hence STEM and STEAM education are pivotal for preparing students for the challenges of the modern world, fostering innovation, and contributing to economic development. The integration of Arts through the STEAM approach adds a creative dimension, making education more attractive and relevant to the evolving needs of society.

CBL+STEAM TEACHING AND LEARNING

The problem of subjects being taught independently of each other, identified in elementary education by Lockwood,[13] also occurs in higher education. The best way for students to learn and understand in depth scientific concepts is through real-world applications of CBL used with a constructivist approach by the teacher.[14] Moreover, this methodology engages students socially to one another and helps in developing social skill.[15]

In higher education, as in architecture courses, this constructivist approach requires teachers from several knowledge areas that foster students' application of scientific-artistic-humanistic concepts to propose creative solutions to the challenges.

The critical thinking and problem-solving skills given by CBL must be combined with the STEAM approach so that students acquire a diverse skill set that can be applied to complex architectural challenges.

The CBL+STEAM combination encourages students to think outside the box and develop unique solutions to architectural problems, stimulating creativity and innovation. Also, encourages students to collaborate effectively with professionals from several knowledge areas giving them excellent abilities to apply the knowledge acquired and enables them to understand and respond to the social and environmental impacts of their practices and for the multidisciplinary situations in real life. Also, social and environmental awareness is increasingly crucial in contemporary architecture, and this educational approach provides a solid foundation for training engaged and responsible professionals.

PILOT EXPERIENCE

To carry out the pilot experience, teachers design challenges and propose them to students, ensuring that they understand them clearly and that there are no doubts left. Students develop strategies to approach challenges that lead to rational solutions. Teachers act as guides for the ideas that are proposed by students, discussing the constraints and benefits of each solution proposed by students.

The four challenges proposed are:

Challenge 1 - The public life of Parque das Nações, Lisbon. How to characterize the dynamics of the use of public space of Parque das Nações, Lisbon (Figure 3a) from a diagnostic perspective, with the purpose of supporting planning and management processes, supporting strategies and decision-making in future and possible architectural and urban interventions?

Challenge 2 - Housing typology, Maputo, Mozambique. How to characterize the residential building of Maputo, Mozambique (Figure 3b), particularly regarding to construction materials and habitability conditions, also from a diagnostic perspective, which contributes to increasing knowledge of that territory and to the typification of some aspects of spatial organization?

Challenge 3 - Sustainability of "Pombalino" buildings rehabilitation, Lisbon. How to quantify the sustainability of rehabilitated "Pombalino" buildings in Lisbon (Figure 3c), mainly from the perspective of the sustainability of the construction materials used?

Challenge 4 - Visitor's stopping points of a church, Alcobaça. How to estimate the stopping areas preferred by the church of Alcobaça Monastery (Figure 3d) visitors?

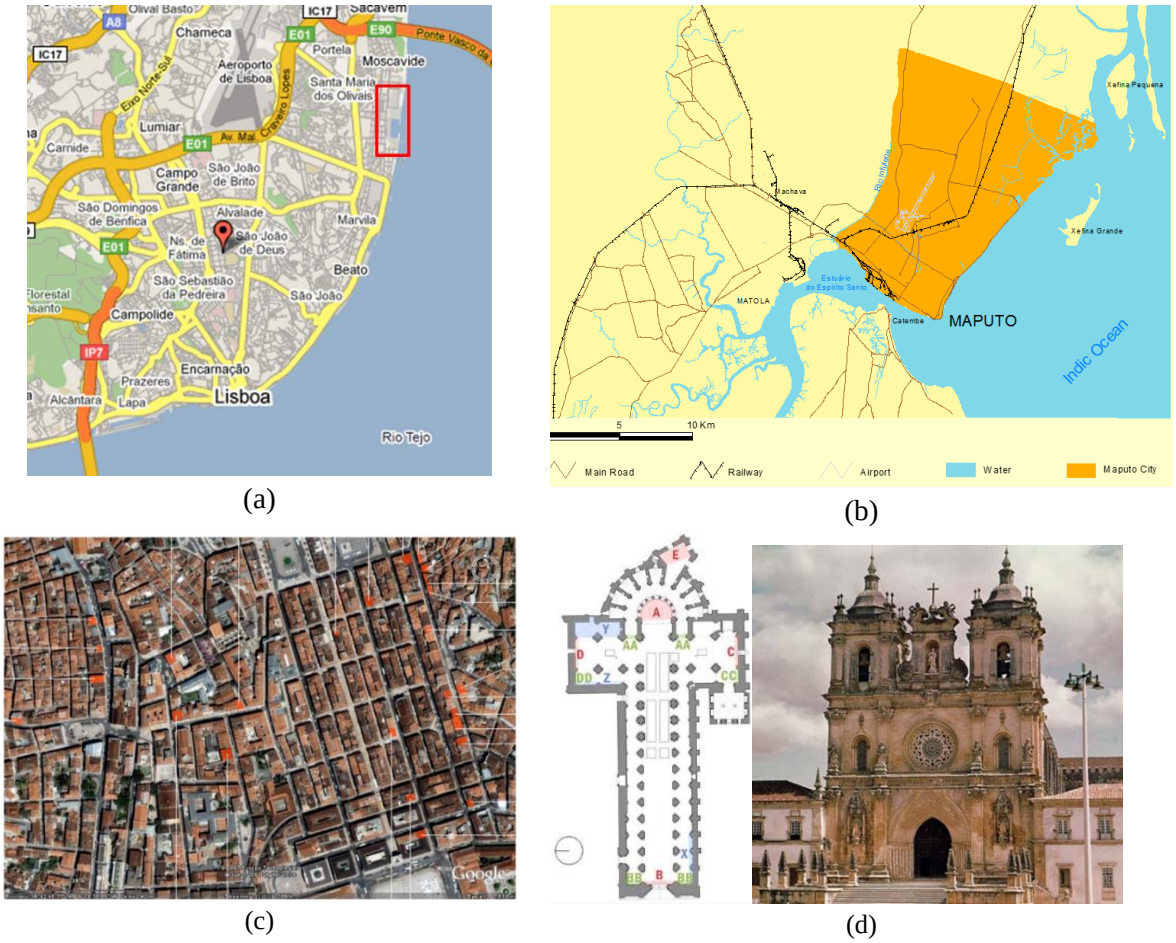


Figure 3. Images illustrating challenges: (a) Parque das Nações, Lisbon; (b) Maputo, Mozambique; (c) "Pombalino" Buildings, Lisbon; (d) Alcobaça Church, Portugal.

The iterative process of discussion between students and teachers guide to the final strategy approached for each challenge (Figures 4 to 7). Each challenge highlights the identification of the tasks to be carried out, as well as planning the execution sequence of these tasks. As each task requires specific knowledge, teachers present the necessary concepts and techniques. This innovative way of transmitting knowledge is more easily acquired by students, much more captivating and greatly facilitates the acquisition of knowledge because their need was raised by the challenge.

Figure 4. Student strategy for challenge 1 - Parque das Nações, Lisbon.

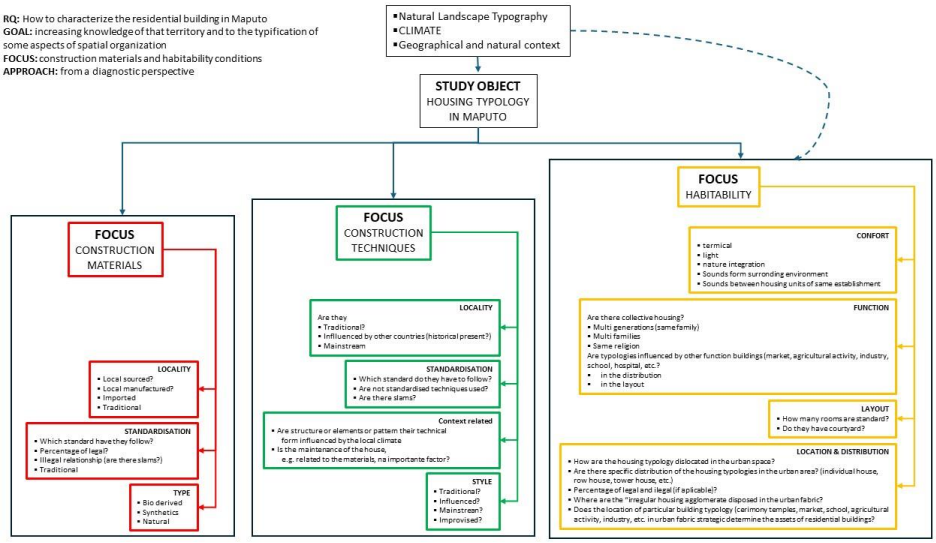


Figure 5. Student strategy for challenge 2 - Maputo, Mozambique.

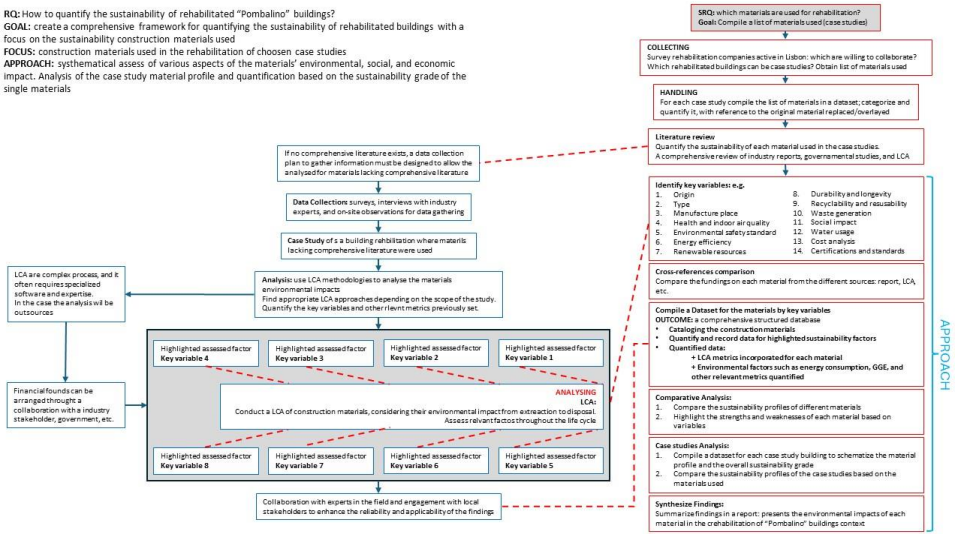


Figure 6. Student strategy for challenge 3 – "Pombalino" buildings, Lisbon.

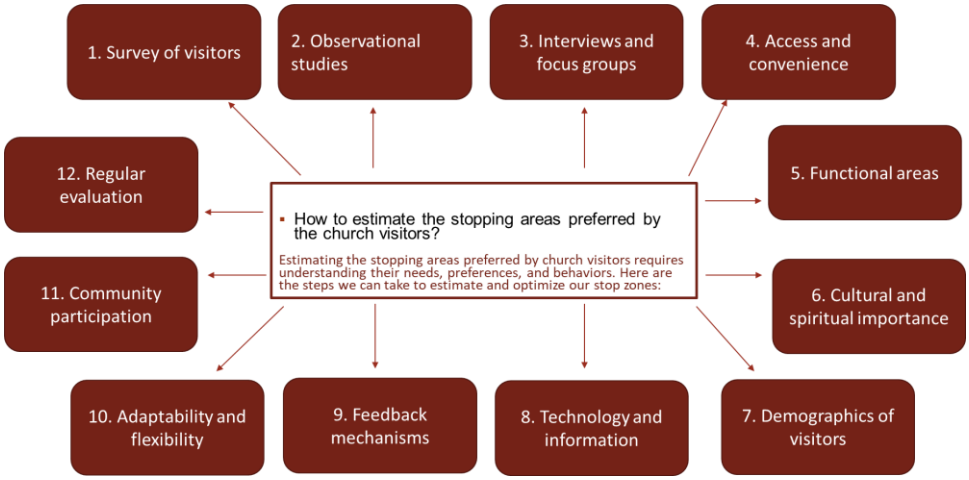
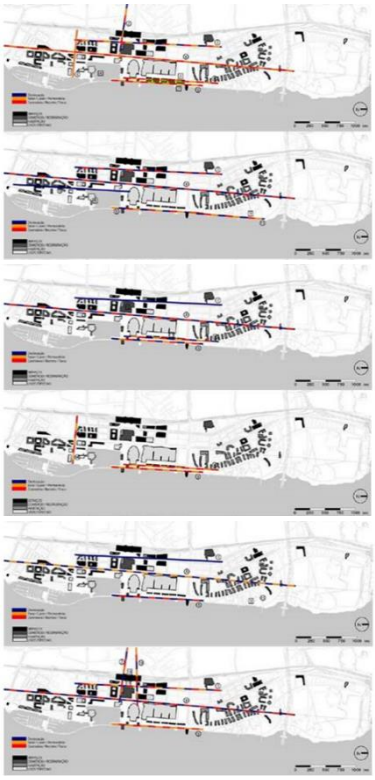
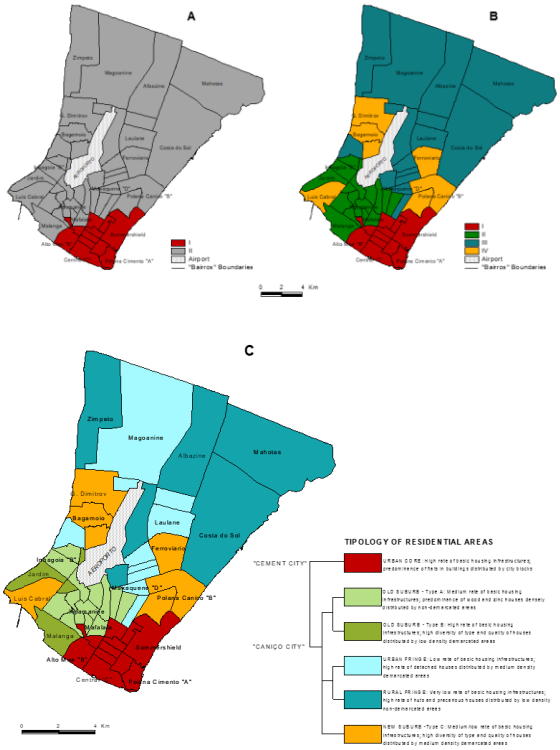


Figure 7. Student strategy for challenge 4 – Alcobaça Church.



(a)



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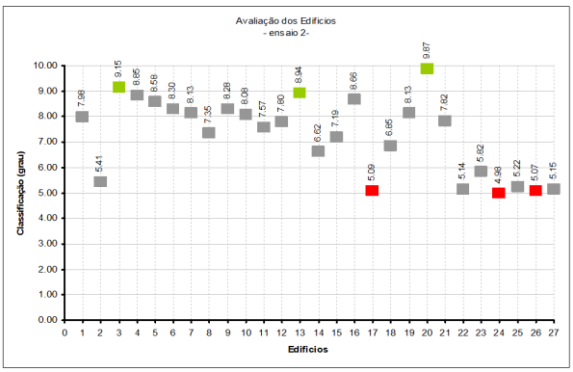
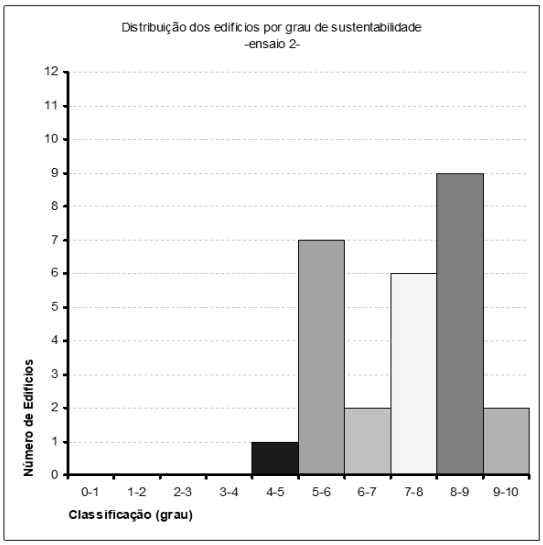
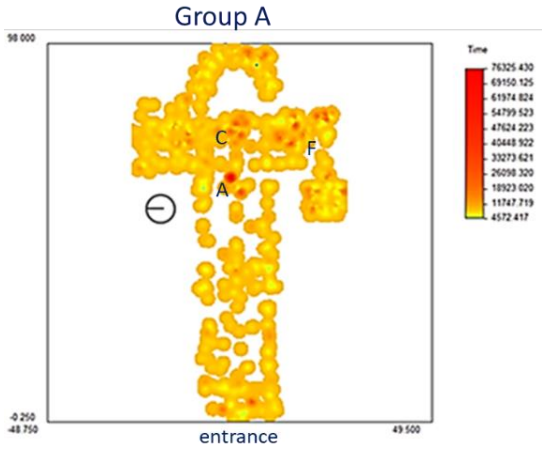
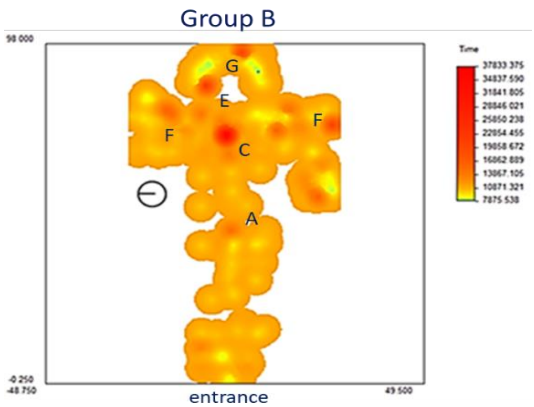




(c)





(d)

Figure 8. Main results obtained for each challenge.[16]

CONCLUSION

The current scenario of architectural practice demands professionals who have a holistic and interdisciplinary approach, capable of facing complex challenges in a constantly evolving world. In this context, the combination of CBL+STEAM methodologies in teaching architecture emerges as a pertinent and necessary response.

Reflecting on the combination of the CBL+STEAM learning/teaching approaches it is clear that the advantages are huge - students are more engaged to class, the stimulus to think rather than only listen and take notes in expositive classes is enormous, social interactions prevail, the desire to learn is much greater and all concepts are taught in a much more interesting way.

In the pilot experience that took place one of the students main difficulties, when thinking about the challenge proposed, was to understand which was the relevant information to consider, so that the flowcharts would illustrate accurately the challenge and the aim of the study.

Undoubtedly, this is a very important methodology that helps to plan, organize and manage information in a research independently of the knowledge area we are working on.

Hence, the combination of CBL+STEAM approach in architecture courses can offer a comprehensive and effective educational approach. It highlights that simplifying the problem to its basic issues is the essence of knowledge. It also reflects the interdisciplinary nature of modern architectural practice developing critical thinking, creativity and innovation skills needed to tackle complex challenges in architecture. Also combining these methodologies prepares students for interdisciplinary collaboration, as architectural practice often involves working in multidisciplinary teams that require STEAM skills.

One of the students gave an interesting feedback that summarizes the pertinence of this approach: “In general, the practical approach and the possibility to have a lot of freedom in carrying out the challenges are very strong points for me because they allowed me to delve into very detailed and specific aspects of the research.”

It is also very interesting that by using this methodology teachers are able to promote the development of engaged citizens as it stimulates social and environmental awareness since the CBL approach can involve challenges that have a social and environmental impact and by integrating STEAM, students are encouraged to consider these factors in their projects, promoting a broader and more responsible awareness. It also promotes adaptation to technological changes as the inclusion of STEAM in architecture education helps students adapt to rapid technological changes, preparing them to incorporate emerging innovations into their design projects.

In summary, the combination of CBL+STEAM in architectural education offers an educational approach that prepares students for real-world challenges, promotes interdisciplinary and creative skills, and equips them with the tools necessary for modern and innovative architectural practice.

NOTES

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[12] Amyn Aga Khan interviewed in Linha da Frente: Marchand de Arte (RTP, 2024) says "Since I've been involved in creating schools (…) I've tried to get students, from a very early age, to read poetry, listen to music, make music, learn to dance, see art, learn to discuss art, because I think that expands their minds and makes them better students later"
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[15] Beckie Supiano, "One Key to Student Success? Socializing in Class," The Chronicle of Higher Education 70, no. 7 (2023), https://www.chronicle.com/issue/2023/11-24 cites Michael Brown, an associate professor of higher education and student affairs at Iowa State University who studies the social dimensions of learning, who says "If all of these students feel like an isolated individual in the classroom, they're not going to learn as effectively as if they come and feel part of a learning community". He adds "Students who form connections in one course can carry those connections into other courses, and research shows that those who do so are more successful in their majors."
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EXPERIMENTAL ANIMATION AS PEDAGOGICAL PRACTICE

Author:
OLIVER GINGRICH, MIN YOUNG OH, EMMANOUIL KANELLOS

Affiliation:
UNIVERSITY OF GREENWICH, UK. LONDON COLLEGE OF COMMUNICATION, UK

Figure 1. Experimental Movement Skills workshop - Paper Cutouts - by Min Young Oh

INTRODUCTION

The effect of animation on learning has been the subject of several studies involving undergraduate students and primary education children[1] with evidenced effects on the effect of animation on language learning.[2] While experimental animation has long been neglected as a pedagogic strategy, recent research[3] points to their inherent potential for learning and teaching. This research presents two examples of experimental animation applications for student learning across two UK universities: The MOVEMENT skills workshops series -a recent pedagogic research activity between the University of Greenwich and the University of the Arts London- investigates the potential for experimental animation to contribute to learning through experimental skills workshops (Figure 1). In combining diverse conventional and unconventional animation techniques within a non-narrative space, experimental animation practices promise to offer a rich contextual background for learning. The AHRC-funded p_ART_icipate project highlights the potential for experimental practices to bridge the gap between undergraduate research and practice-based skills development: Together, these two pedagogic activities examined the following research question:

'Are experimental animation techniques an effective instrument for teaching and learning?'

Across these two case studies, we discuss whether process-led, participatory, research and innovation-focused workshops have the potential to yield tangible learning outcomes and outputs, in that students are able to co-author their own experimental approaches. This paper presents both an analysis into the mode of the MOVEMENT workshop series and the KIMA: Noise project - part of the p_ART_icipate research - in analysing formats, outputs and outcomes and critically reflecting on the potentials and pitfalls of an experimental, process-based mode of facilitation.

Experimental Animation

Early discussion of experimental animation of the 60s and 70s in the seminal 'Experimental Animation' by Russett and Starr[4] defined experimental animation in broad terms: Experimental animation practices serve as an elemental strategy in exploring and defining new aesthetic approaches but also offer a creative and conceptual playing field beyond an explicit statement of ideas (compare: Taberham).[5] This freedom of artistic expression and animation techniques builds an ideal foundation for practice-based learning[6] and play.[7] However, research on the role of experimental animation as a learning tool remains limited.

Experimental Animation has seen recent interest in academic discourse[8] with renewed interest in the history of experimental animation through a heterogeneous mix of practices and genres. While multiple concurrent definitions of experimental animation exist and compete, several defining factors have been highlighted as emergent key characteristics in recent academic debate: Harris even goes so far to state that the absence of a clear definition, and the negation of characteristics such as non-linear, non-narrative, non-objective, non-normative forms part of the essence of what constitutes 'experimental' animation.[9] Hamlyn and Smith refer to both conceptual and aesthetic qualities of experimental animation in positing that animation is experimental "when it pursues aesthetic enquiry, is creatively daring, innovative and origin.[10] Paul Taberham[11] points to the fact that experimental animation is not per se a genre, but rather conscribes a multitude of different practices, techniques and approaches. There are however common traits that emerged, indexed by Tabermas as the following:

1. Often created by an individual or a small collective

Often self-financed or financed through a small arts grant without the ambition to result in profit

Rather than commercial distribution, they are often distributed online or via art galleries, museums or film/animation societies

Furthermore Tabermas lists a series of conceptual characteristics including:

They frequently show more than they tell

Absence of psychologically defined protagonists

Relevance of surface detail and materials employed

Lastly, Tabermas points to the preeminent role of the artist in transcending their emotions in evocative ways. It is this third element that seems to be most relevant for a pedagogical role for experimental animation as a strategy for self-expression, self-discovery, and improvisation. Taberham suggests the outline of an anthology of experimental animation, when distinguishing between several waves of early experimental animation - an early wave consisting of first pioneers exploring abstract moving image including (Richter, Ruttman and others), a second wave 20 years later around the artists Len Lye, Oscar Fischinger, Mary Ellen Bute, Jude Engels and a third wave of avant-gardists which includes Norman MacLaren, John Whitney, Harry Smith.[12] While a deeper understanding of the principles of animation can be gained from studying its pioneers and trailblazers, the communalities between these diverse practices remain more relevant to this particular discourse on experimental animation and learning. In particular the focus on aesthetic enquiry championed by Smith & Hamlyn[13] and the notion of experimental practice as learning strategy are key areas of interests presented here.

Experimental workshops are process-led and participatory in nature, in that students are able to co-author their own experimental approaches. Workshops centre on software-independent experimental skills, with the aim of improving students' employability by preparing them for an ever-changing technical landscape. Iinnovation-focused, experimental workshops emphasise creative exploration, improvisation, and practice-led research[14] investigations into artistic processes. For instance, at the MOVEMENT skills workshops presented here, artist Constantine X also known as Anth0morph was sharing their practice using AI for environment building with students at UAL's London College of Communication and University of Greenwich. Experimental Animation techniques are "a bridge (..) for transforming knowledge into practical ability".[15] Pedagogical strategies explored by the University of Greenwich's BA (H) Animation have long thought to combine 2D and 3D animation techniques with the teaching of experimental practices. Yet more insights into the effectiveness of these teaching practices are needed.

MOVEMENT EXPERIMENTAL SKILLS WORKSHOPS

Movement is an annual conference tailored to Undergraduate and Postgraduate students, but also to everyone interested in animation and contemporary visual arts in general. The first Movement took place in 2018, at the University of Greenwich, in the form of a one-day Symposium and since then it has grown to include the University of the Arts, London (UAL) and expanded to a series of events such as talks, workshops and screenings. The conference aims to bridge academia and creative industries by inviting artists, academics, and directors to inform university students and academic staff about the most up-to-date creative trends, techniques, and ideas. The talks encourage practical, political, theoretical, or technical discussions on creative projects from industries and academia. They also allow students and visitors to discuss the various animation, CG, VFX, and image-making techniques and through a series of hands-on workshops to experience directly how these can be used in meaningful and original projects. Additionally, the Movement conference provides the opportunity for the students to build professional networks and learn about early career requirements. After the panel talks and the workshops, the experts from the creative industry and academia take time to engage with the students in a relaxing environment arranged for networking needs. This post-event networking session provides students with the opportunity to ask questions, gain insights and seek guidance for the early steps of their career.

The MOVEMENT skills workshops (January 2023 - May 2023) explored experimental animation practices across four domains (performance, dynamic poses, staging and timing and AI/environment design) and measure their effectiveness as teaching instruments through Classroom Assessment Techniques (CATs). The research team consisting of researchers from the University of Greenwich's BA (Hons) Animation and UAL's London College for Communication (Dr Oliver Gingrich, Min Young Oh UoG, Emmanouil Kanellos / UAL) investigated experimental animation practices as an instrument for teaching and learning. The MOVEMENT conference team invited industry professionals to facilitate a series of experimental skills workshops at the London College of Communication (part of UAL) and University of Greenwich with the potential to explore various concepts and applications of experimental animation as a teaching and learning vehicle.

Among these series of events, an experimental paper cutout workshop facilitated by the artists and academic Min Young Oh proposed activities that centred around improvising skills for storytelling as well as learning problem-solving for storytelling. The workshop ran across three hours with around 12 student participants. Students were using their cell phones to shoot stop-motion with an existng stopmotion studio app. The workshop was organised in groups, with four groups in total and three to four students per group. Students were given just 20 minutes to choose images from various magazines,

a task that was executed individually without sharing their choices with the rest of the group. After 20 minutes, participants shared their selection with group members in order to come up with a narrative storyline, using the images that they cut from the magazines. Across the following 30 minutes, students were encouraged to create a storyline and to plan out how to shoot their story. Within their teams, students cut the images for animation purposes and planned out movements of the characters, as well as the camera. The overall production i.e. shooting the animation took one hour and half. Students created four comedic, quirky animations - from a trip to the countryside to a battle between a dinosaur against a mother hen. The most common feedback by the attendants, was that new methods of creativity had been explored, which was the aim of this experimental workshop design (see Figure 2 & Figure 3).

Figure 2. MOVEMENT Skills workshop.

Figure 3. Paper Cutout workshop

Experimental Charcoal Workshop

The second example of the MOVEMENT experimental workshop series was facilitated by artist and animator Ana Caro. The aim of the charcoal workshop was to understand the advantage and disadvantage of straight forward animation (as opposed to pose to pose animation) and to learn about the unique properties of charcoal by physically trying this approach to animation. Student worked individually in groups on a shared theme set by the artist - the concept of 'flames'. Students were given ten minutes to quickly storyboard their ideas, undermining the idea of straight forward animation. No limits were set for duration. However, the workshop ran for three hours only. The majority of students were unsure how to achieve their vision through this medium. The facilitating artist demonstrated an example, which helped the students' understanding of the process and supported their learning significantly. There were six animations created, and the final composite was screened at the Picturehouse Greenwich Cinema as part of the MOVEMENT conference Summer Festival 2023. Following the activity, students noted how important the freedom of trying new process and the physical nature of the activity were, and how these impacted their understanding of production processing and learning new techniques with an unfamiliar medium (see: Figure 4)

Figure 4. MOVEMENT Skills workshop - Charcoal workshop w. Ana Caro

Another skills workshop example is AI motion capture. Recognising the advancements of new technologies this supervised workshop brought together AI technological sophistication and human creativity in a DIY method. The participants of this workshop did voluntarily acted in a series of video-recorded experiments in a film/photography studio setting. The videos were imported in real-time into the Rokoko (www.rokoko.com) motion capture online application where the movement of the participants was captured from the recorded videos with the use of AI technology. The motion capture information was transferred into 3D rigs and subsequently into 3D characters. The last step of the process was the rendering of the mocap animations. In the remaining time, the technical support team was available to answer any questions and help the participants with troubleshooting. Overall, the workshop demonstrated the entire mocap pipeline effectively - from acting to 3D animation.

Figure 5. MOVEMENT Skills workshop - AI mocap w. Manos Kanellos

P_ART_ICIPATE - EXPERIMENTAL RESEARCH WORKSHOPS

The AHRC funded p_ART_icipate research project investigates strategies for the design and facilitation of participatory online art for health and wellbeing. Led by the University of Greenwich, and partners CNWL NHS Foundation Trust, Brunel University and collaborators, this research brings together stakeholders across artists - The Analema Group, public institutions (RNIB, National Gallery), the SME NeuroCreate and charitable partners (Jof of Sound, Noise Abatement Society); Through co-design and co-development of multi-sensory participatory art experiences, the research aims to shed new insights into the effect of such art on social connectedness and wellbeing. Across four case studies with several vulnerable groups (young people, visually impaired and participants with access needs), the team is exploring innovative facilitation and accessible design approaches for online interfaces for art experiences, such as the artwork Zeitgeist.[16] Since 2011, the art collective Analema Group created participatory, immersive experiences with a focus on visual sound. Their research practice explores the intersection between sound and matter, often involving the audience as co-author of their multi-sensory artworks. The p_ART_icipate research project furthers some of their artworks in this new participatory online context: KIMA Voice, originally commissioned by the Centre for Performance Science, and presented at the Event Two exhibition at the Royal College of Art, consists in an interface for the representation of vocal harmonies between two people. Through a series of co-design workshops with the charity Joy of Sound, the artwork is adapted for beneficiaries with access need. In a similar manner, the art collective and the research team revisited the artwork KIMA: Colour, originally conceived at a residency with the National Gallery, London. Across four focus group sessions with the Royal National Institute of the Blind, the artwork was revisited to become more accessible to visually impaired audiences. Together, these co-design workshops helped to gain new insights into good practices in the design of participatory online interfaces.

The Analema Group's artwork KIMA: Noise, originally presented at the Tate Modern, London, presents a participatory interface on the effect of urban noise on health. Under the p_ART_icipate research umbrella, this was revisited for online audiences: Through feedback sessions with students and young people at The University of Greenwich and Brunel University, the research is aimed to further the understanding of design and facilitation of participatory online art, but also to raise awareness for the effect of noise on wellbeing. In collaboration with a key expert on the effect of noise on health, Professor Stephen Stansfeld, and the Royal Borough of Greenwich, students at the University of Greenwich engaged in a series of participatory art workshops: Playfully, students learned about the interplay between urban noise and health while being invited to respond to the topic through their own creative practice. In experimental workshops, students provided feedback on the new development by the Analema Group - an online map that invites citizens to stream their noise experiences globally so to share with each other. In response to this artwork, and supported by artists, scientists and the local council, students then workshopped their own creative responses to result in a joint exhibition at London based gallery Cable Depot. The project exemplifies the potential for experimental practices to contribute to impact through awareness building around significant effects of urban noise on health.

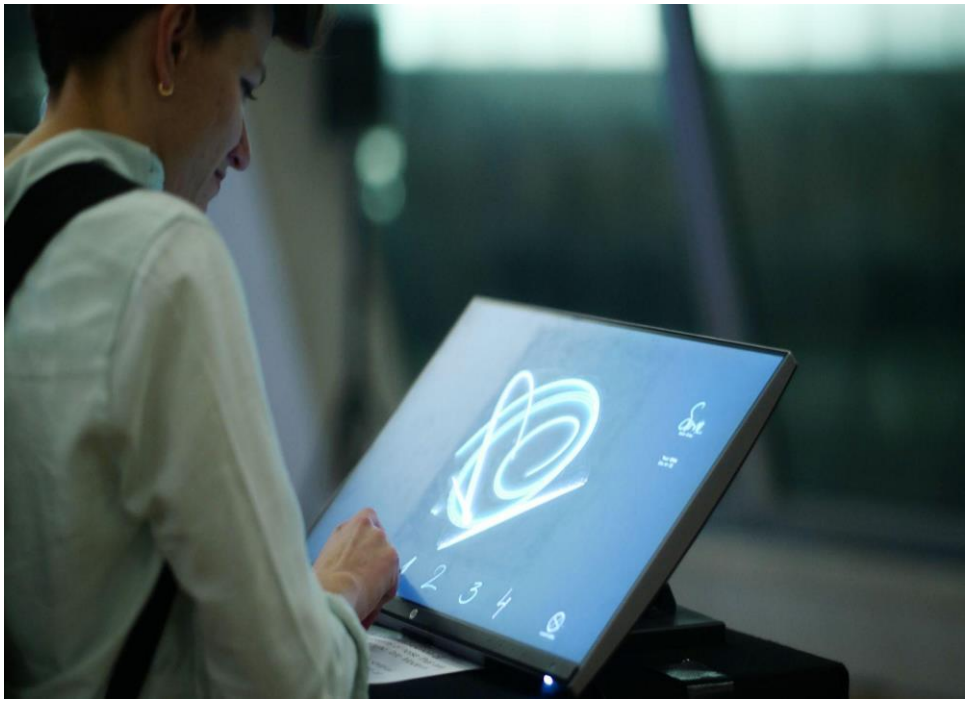

Figure 6. KIMA Noise by The Analema Group at Tate Modern. Image Sophie Le Roux.

DISCUSSION

Student feedback for both activities, experimental skills workshops and experimental research-based workshops, was resoundingly positive. In a user study with students, following the KIMA Noise workshop, a student sample of fourteen students (n=14) reporting an elevated mood with average mood values increasing from 3.79 to 4.29 following the activity. A small survey among experimental workshop participants with a sample size of six (n=6) reported that experimental practices were conducive to their learning, with 63.2% strongly in agreement and a further 31.6% reporting to be in agreement. 47.1 % strongly think that experimental practices support their creative expression, with another 35.3% agreeing with this statement. On the question about the most important thing learned within the workshops, students commented on the usefulness of these practices for their future:
"Trying new tyings which can be useful in the future, and being inspired to continue doing and learning new things." Another student report that *"..there are so many interesting pathways into animation and many different ways of doing it"* Although anecdotal due to the small sample size, both qualitative and quantitative feedback point to the effect of experimental workshops on student learning with respect to techniques, skills and research focus.

CONCLUSION

Experimental animation practices date back to the origins of animation, and intrinsically led to the development of a distinctive genre with clearly identifiable characteristics. As a pedagogical strategy, experimental animation has received little attention, despite obvious key features that make them an ideal candiate for teaching on animation practices. These include a focus on trial and error, over a product based output, the importance of play, improvisation and discovery, the decoupling of process from narrative, and the lack of need for large budgets and relative freedom from technical conventions. For students, experimental animation can be an ideal playground to explore their own styles, visual explorations, free from the need to result in a structured, narrative. As a constructivist method,

experimental workshops emphasise self-directed creative learning, supporting students artistic self-expression as well as a degree of pedagogical knowledge of learning valuable to the students.
Whether 2D, 3D, motion-capture, AI, or software based work, there are no limits to the fields of experimentation for students to choose from, with a history of heterogenous experimental animation pioneers providing inspiratino and a wealth of diverse techniques available for students to engage with. This paper exemplified some of these diverse strategies to introduce experimental animation practices to students through workshops, a conference and by combining research and practice. A constructivist learning method. ensures an emphasis on creation processes over output artefacts, which reduces upward pressures for students, ensuring a degrees of freedom across animation techniques. From a pedagogic perspective, the benefits are multifold in that students are invited to play to their own strengths, unearth new processes without the risk of failure, and emphasis creativity, concept and play over a product-based output.
While the benefits of experimental animation for pedagogy are evident, much more needs to be done to provide systematic analysis of applied case studies, including on student uses and gratification feedback, and value based learning outcomes. Future research will need to adopt a much more focused approach: Rather than providing overview of pedagogical avenues, more work is needed to understand how experimental animation can support skills transfer and software-based learning too.

Figure 7. MOVEMENT Skills workshop - Charcoal workshop w. Ana Caro

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MOVEMENT conference and workshops were funded by the Pedagogical Research Development Fund at the University of Greenwich. p_ART_icipate is funded by the AHRC research grant AH/W000598/1 and is led by Dr Oliver M Gingrich at University of Greenwich, Prof Havsteen-Franklin at Brunel University and Claire Grant at CNWL NHS Foundation Trust

MAJOR DESIGN ISSUES FOR THE ARCHITECTURAL DESIGN OF SCHOOLS IN THE 21ST CENTURY

Author:
MAHDIEH HOSSEINI, RABAH BOUSBACI

Affiliation:
UNIVERSITY OF MONTREAL, CANADA

INTRODUCTION

Education is one of the most important concerns in each society. It is only through education that a society can progress in several aspects such as economy, democracy, social and human life, and moral values. Research shows that several factors have direct impacts on students' academic performance, including teachers' professionalism and skills, family situation and income, parents' level of education, mental health and self-confidence of students, communication skills, and gender.

During the last century, the psychology of learning and educational philosophies changed significantly. The teacher-centered education and passive teaching methods were replaced by new pedagogical approaches and learning theories developed from knowledge acquisition to learning through participation. The purpose of education in this era is not only to provide students with a knowledge base but also to teach them essential life skills and to help them practice these skills in real-life situations. Critical thinking, communication, collaboration, and creativity are defined as the four main skills for education in the 21st century.

Considering these new viewpoints in pedagogy, different approaches to the design of educational spaces emerged accordingly. Furthermore, ICT advancements, safety and security, sustainability concerns, community engagement, etc. brought about new issues in the design and construction of educational spaces.

Recent research about factors that affect students' learning and teachers' performance tries to complete or deepen the previous studies or focus on new aspects of educational environments and investigates effective factors in the design of school buildings. This study explores the major issues that are considered in the architectural design of educational spaces based on recent studies to answer the question:

What are the major "design issues" for the architectural design of schools in the 21st century and how they can be addressed in the design?

In this study, a design issue is defined as "an area of concern that demands a design response"[1] from the designers during the design process such as circulation, comfort, safety, etc.

METHODOLOGY

In order to extract the major design issues that affect the design of schools, scholarly articles in this field are reviewed. Google Scholar search is performed using the keywords "architecture" AND "design" AND "schools" AND "educational spaces" between the years 2000 and 2021 to find studies

that investigate the effects of the design of educational spaces on students, teachers, and staff. Among the search results, only the articles related to the design of the schools' physical environment are considered and design issues are extracted. From the references of the selected articles, other related resources are identified to extend the references and extract other design issues at which point no new issues are found. A total of 145 articles are reviewed and analyzed through the inductive content analysis method. Each article is considered as a *unit of analysis*, and each design issue is considered as a *category*. The analysis of the selected articles results in 10 major design issues and their aspects.

DATA ANALYSIS AND RESULTS

By sorting all extracted design issues, 10 major design issues (categories) are developed as the main codes for the content analysis: Health and Comfort; Efficiency; Flexibility; Aesthetics; Safety and Security; Building Condition; Accessibility; School Size; Technology; and Pedagogy and Space.

Each major design issue may contain subcategories consisting of issues related to that major design issue. Also, through the analysis of the articles design solutions proposed to respond to these design issues are extracted to demonstrate how these issues can be addressed in the design of schools.

Health and comfort

Health and Comfort issues are related to the physical and psychological issues that affect the comfort and well-being of the occupants, physically and psychologically. Physical factors are related to the physical comfort of users such as temperature and humidity, air quality in interior spaces, lighting, etc. Studies emphasize the importance of healthy buildings and maximizing physical comfort and well-being in the design of educational spaces.

Psychological factors relate to what affects the psychological comfort of the users such as color, privacy, sense of belonging, etc. Psychological aspects of school design affect students' and teachers' interpretation of their school and their feelings toward an educational environment [Table 1].

DESIGN ISSUE	ASPECTS	SUB-ASPECTS	PROPOSED DESIGN SOLUTIONS	
Health and Comfort	**Physical Comfort, Health, and Well-Being**	Temperature and Humidity	Winter and summer interior temperature control	
		Air Quality	Air quality for interior spaces	
			Natural and mechanical ventilation and air conditioning	
			Ventilation system control	
		Lighting	Artificial Lighting	Quality and quantity of artificial lighting
				Glare control
				Light control
			Natural Lighting	Natural lighting
				Control of natural lighting and glare
		Acoustic	Indoor acoustics and control of the noise level	
		Eyes Comfort	Natural views for eye rest	
		Access to Food/Beverages	Easy access to drinking water and food	
		Scale	User-friendly scale	
		Privacy/Crowding	Areas of classroom per student, number of students per washroom	
		Ergonomic Furniture	Comfortable, ergonomic, functional furniture	
		Fenestration	Natural views	
			Visual control	
			window-to-floor area ratio	
		Odor	Prevent unpleasant smells in interior spaces	
		Visibility	Distance and line of sight between students and teacher	
	Psychological Comfort	Color	Effects walls and furniture colors furniture	
		Scale	Home-based scales	
		Privacy/Crowding	Areas of classroom per student, number of students per washroom	
		Home-Based Design	Home-like characteristics in design	
		Sense of Belonging and Ownership	Personalized space for teachers and students	
			Control over the environment for students/teachers	
			High-quality furniture	
			Personal lockers	

Table 1. Health and Comfort Design Issue

Efficiency

Efficiency considers enhancing the use of a school building in two major aspects: efficient use of school spaces and efficient use of material and energy resources.

In order to reduce the costs of facilities for schools, it is recommended to share facilities such as sports halls, libraries, classrooms, etc. among multiple schools and other social organizations. It is also recommended to use schools for lifelong learning and viewing schools as a community resource "that is accessible 24 hours a day, 7 days a week".

Community involvement in schools creates a sense of ownership toward schools in social stakeholders, which helps remove roadblocks . Also, "parent involvement in schools leads to improved student's achievement, reduced absenteeism, decreased delinquency, and reduced dropouts".[2]
Since schools are going to open their doors to communities, it is necessary to involve the users and community members in the school design process and to consider their requirements and points of view in the design. Community participation in school design is based on the idea of a democratic design, which means including educators, parents, students, citizens, senior citizens, and members of civic and business organizations, etc. in school design through an open, transparent, and collaborative process. This will foster "ongoing support" for the school design and construction of public schools.
Studies show that the sustainable design of schools has an impact on students' outcomes and contributes to environmental education [Table 2].

DESIGN ISSUE	ASPECTS	SUB-ASPECTS	PROPOSED DESIGN SOLUTIONS
Efficiency	Building/ Facilities	Connecting School to the Community and Sharing Facilities	Extended working hours of schools
			Dispersing learning environments within the community and off-site schools
			Increase stakeholders' involvement in school activities
		Collaborative Design Process	Involving stakeholders in design
			Open, transparent, and collaborative planning and design
		School Building as a 3D Textbook	Building structure, mechanical, electrical systems as learning tools
	Material/ Facilities	Recycling and Pollution	Recyclable materials
			Non-toxic materials
			Environmentally friendly materials
		Maintenance	Regular maintenance
			Resistance and durability in equipment
			Versatility
			Easy to repair
			Durable and healthy materials
	Energy and Resources	Renewable Energies/ Resources	Renewable sources of energy
			Minimize non-renewable sources
		Control Adverse Impacts of School Building	Minimize adverse impact
			Control the carbon emission
		Energy Efficiency	Energy performance assessment
			- Local climate
			Optimizing mechanical systems

Table 2. Efficiency Design Issue

Flexibility

Flexibility is a key factor in adapting the design to current and future needs . Woodman defines four types of flexibility in school design: Use Flexibility, Time Flexibility, Space Flexibility, and Movement. Use flexibility "relates to changing the use of a space without altering the space itself".[3]
Space flexibility "relates to the manipulation of elements to create different spatial arrangements and could be described as a transformational type of change".[4] Movement flexibility "relates to the movement of students, teachers, and others within and around the learning space".[5] Time flexibility

"relates to the ability of a structure to change over an extended period of time to satisfy significant changes in need".[6] The traditional itinerary for school days divided into equal times separated by break times might change to let students spend as much time as they need on a special subject.

DESIGN ISSUE	ASPECTS	SUB-ASPECTS	PROPOSED DESIGN SOLUTIONS
Flexibility	**Use**	Adaptability	Flexible furniture
			Various compositions of furniture
			Adapt to changing needs
			Possibility of performing various educational activities
		Multi-Use	Multi-purpose spaces
	Spaces	Choice/Variety	Variety of learning spaces for various group sizes
			Flexible classroom arrangements / activities
			Variations in classroom arrangements
		Expansion/ Contraction	Extendibility
		Plan on Change	Changing dimensions / function of spaces
		Open and Flow Spaces	Open and flow spaces through transparent or moveable boundaries
	Movement		Decentralized classrooms
			Mobility of furniture
	Time		Increasing hours of schools' operation
			Flexible learning times

Table 3. Flexibility Design Issue

Aesthetics

In this study, the aesthetic definition is limited to the ideas that make the total ambiance[7] of the school building and relates to the school building appearance and interior design of spaces. School design should be pleasant and comfortable for students and encourages them to spend more time in the building, reduces their stress and fatigue and creates a sense of ownership and belonging. It is advised to design schools as welcoming, warm, open, funny, and attractive buildings that integrate in their context while considering diversity.

The appearance of the school building in relation to the surrounding neighbourhood can create an identity for the school and its surrounding area. Schools should be designed as community symbols and community landmarks in harmony with their surrounding environment and "add a sense of beauty, interest, and permanence to the community"[8] to make students and teachers feel pride in their school.

DESIGN ISSUE	PROPOSED DESIGN SOLUTIONS
Aesthetics	School design in neighborhood scale using community symbols
	Familiar and user-friendly spaces
	Durable finishes
	Design styles do not look dated
	Colours and finishings to enhance aesthetic
	Consider maintenance aspects
	Contextual compatibility and diversity
	Welcoming, warm, open, funny, attractive design
	Inviting, attractive, inspiring interior design
	Spirit of place, refer to the local culture in design
	Well-defined learning spaces
	Common identities for students through common symbols to enhance sense of belonging to the group
	Home-based design

Table 4. Aesthetics Design Issue

Building Condition

Building condition considers the general conditions of interior spaces, facilities, and furniture. Several studies show the effects of old buildings and building maintenance and reparation on students' and teachers' performance [Table 5].

DESIGN ISSUE	ASPECTS	PROPOSED DESIGN SOLUTIONS
Building Condition	**Equipment**	Mechanical and electrical equipment condition
	Building Elements	Good condition of doors, walls, roofing, stairs, windows, ceilings, drain floors, stalls, seating, stage, and structural elements
	Furniture	Good condition of fixed and built-in furniture, lockers, and fixtures
	Facility Maintenance and Reparation	Furnishings maintenance and conditions
		Facility maintenance and condition
	School Building Age	Building age and physical condition

Table 5. Building Condition Design Issue

Safety and Security

Schools need to be safe and secure in three major aspects [Table 6]:

- Security against deliberate threats: threats could include bullying, assault, violence, etc.
- Safety against toxic material and physical hazards: dangerous chemicals, bacteria and viruses, accidents, and unsafe physical environments .
- Safety against natural disasters: earthquakes, floods, fires, etc.

DESIGN ISSUE	ASPECTS	PROPOSED DESIGN SOLUTIONS
Safety and Security	Deliberate Threats	Controlled access for visitors and guests
		Lighting for school courtyards
		Decentralizing administration areas
		Secure storages
		Avoid blind spots
		Passive supervision
	Material and Physical Hazards	Chemical safety, pest management, lead management, mould
		Security against toxic materials, bacteria and viruses, science lab security
		Traffic and pedestrian safety
		Safe physical environment and equipment
	Natural Disasters and Fire Safety	Fire/life safety, seismic safety

Table 6. Safety And Security Design Issue

Accessibility

Accessibility is based on the notion of universal design, which means "the design of products and environments to be usable to the greatest extent possible by people of all ages and abilities".[9] Accordingly, school facilities should be accessible for students with different abilities and schools should be locally distributed to maintain acceptable travel distances for students [Table 7].

DESIGN ISSUE	ASPECTS	PROPOSED DESIGN SOLUTIONS
Accessibility	Accessibility for Disabled Users	Equitable use
		Simple and intuitive use
		Perceptible information
		Tolerance for error
		Low physical effort
		Appropriate size and space for approach and use
		Flexibility in use
	Travel distance	Accessibility to school by public transport, walking, or bicycle

Table 7. Accessibility Design Issue

School Size

Studies show the positive effects smaller schools have on students' achievements and school attendance, students' and parents' satisfaction, efficient operation, higher graduation rates, and safer environments with a decrease in the frequency of violence and vandalism. Further, students feel more attached to small schools. Due to the prohibitively high costs of smaller schools, the creation of "schools-within-schools" is proposed, consisting of smaller learning communities that share the common facilities inside a large school.

DESIGN ISSUE	PROPOSED DESIGN SOLUTIONS
School Size	Smaller schools
	Small learning communities and neighbourhoods
	Lower ratio of students per teacher

Table 8. School Size Design Issue

Technology

Advancement in technology has already changed many of the methods and approaches in schooling systems and it is expected to continue to do so. The ideas about "virtual schools", "e-schooling" or "anytime, anywhere learning" by attending online courses are very common approaches for students and professionals today. Therefore, the infrastructure is required to accommodate new technologies. The advancements in technology have provided the opportunity to replace the massive paper-based resources to digital ones [Table 9].

DESIGN ISSUE	PROPOSED DESIGN SOLUTIONS
Technology	Access to online resources
	Integrate school design and technology
	Use of technology to enhance teaching and learning
	Anytime, anywhere learning

Table 9. Technology Design Issue

Pedagogy and Space

The roles and functions of schools and teachers have changed from delivering knowledge to mentoring students and helping them analyze and construct their own knowledge through active experiments in open-ended problems and in collaboration with other students. The new learning approaches emphasize on using various teaching and learning methods, encouraging hands-on learning, and exercising critical thinking and problem-solving skills as the basics for knowledge acquisition.

School designs need to accommodate new learning styles and educational methods based on new pedagogies, "because instructional space, teaching and learning are related in practice".[10] Studies show that the organization of a learning space affects the choice of teaching styles.[11]

The most important discussions in this area are on the necessary spaces in schools and the space arrangements. The spaces in the schools need to be designed according to the educational activities and learning approaches. Several educational spaces are proposed based on new pedagogical approaches to facilitate new learning and teaching methods, including collaboration spaces for group working and active and hands-on learning spaces, and individual learning spaces. Collaboration spaces are designed for small, medium, and large group activities. Hands-on learning spaces are spaces for job training, art studios and art performance areas, studios for project-based learning, project rooms with adequate equipment, active spaces that support movement, physical activities, laboratory spaces that support the creative process, technology design centres, and smart labs. Individual learning spaces are for more personalized learning such as private niches, individual quiet areas, and personal workstations.

Recreational spaces include leisure spaces and facilities such as physical fitness spaces that can be used during and after school hours, spaces for gatherings and performances, places for rest and meditation, food courts, and playgrounds.
Outdoor spaces are suggested as outside areas for students' play and pedagogical activities, outdoor learning, weather-protected areas between indoor and outdoor spaces and plazas and amphitheaters in outdoor areas.
Also, it is important to arrange these spaces according to their function to enhance their functionality. Practical connections among interior spaces enhance the efficiency of educational spaces and have positive effects on students' and teachers' performance[12]. It is recommended to plan for circulating spaces in schools like corridors in a way to have multiple functions, such as places for socialization with natural views. Therefore, it is required to consider how to group interior spaces and their orientation, and how to design the general layout and circulation [Table 10].

DESIGN ISSUE	ASPECTS	SUB-ASPECTS	PROPOSED DESIGN SOLUTIONS
Pedagogy and Space	**Necessary Spaces in Schools**	Educational Spaces	Hands-on and active learning spaces
			Variety of learning spaces for variety of groups
			Opportunities for peer collaboration
			Supporting various teaching and learning methods
			Multi-age learning environments
			Individual quiet areas and private niches
		Recreational Spaces	Leisure spaces and facilities
			Sustainable physical fitness spaces
			Common spaces for activities, gathering, socialization
			Opportunities for socialization
			Places for rest and meditation
			Food courts
		Outdoor Spaces	Weather protected transition areas/shelters
			Outdoor learning spaces
			Outdoor Plazas and amphitheaters
		Administration and Service Areas	Storage areas
			Separate entry for visitors, information room for parents/visitors
			Teachers' offices and collaboration spaces
			Appropriate toilets and restroom facilities
	Space Arrangement	Grouping Interior Spaces	Practical connections among related spaces
			Direct access to outdoor spaces
			Separating noisy spaces from quiet ones
		Layout	Hierarchy of spaces
		Orientation	Easy wayfinding
		Circulation	Multi-function corridors
			Meander circulation
	Anytime, Anywhere Learning		Informal learning opportunities

Table 10. Pedagogy and Space Design Issue

CONCLUSION

As the literature review shows, several studies in the field of school design try to investigate factors in the design of school buildings affect students, teachers, and staff. While some issues such as temperature or noise level are easy to measure, there are many environmental factors that are difficult to capture and compare, such as flexibility or aesthetic aspects, because they are not clearly defined. Also, new pedagogical approaches raised new concerns about the required spaces in schools and how these spaces are related to each other.

Figure 1 summarizes the major design issues and the related aspects. As the analysis of the articles demonstrate, "Design issues" are not separate units defined distinctively; rather, each design issue covers an area that overlaps with other "design issues", and they affected each other within the context of a design. Therefore, while some "design issues" might have a positive impact, when considered together in the design, they may create conflicts with other "design issues" and require the designer to decide their priority.

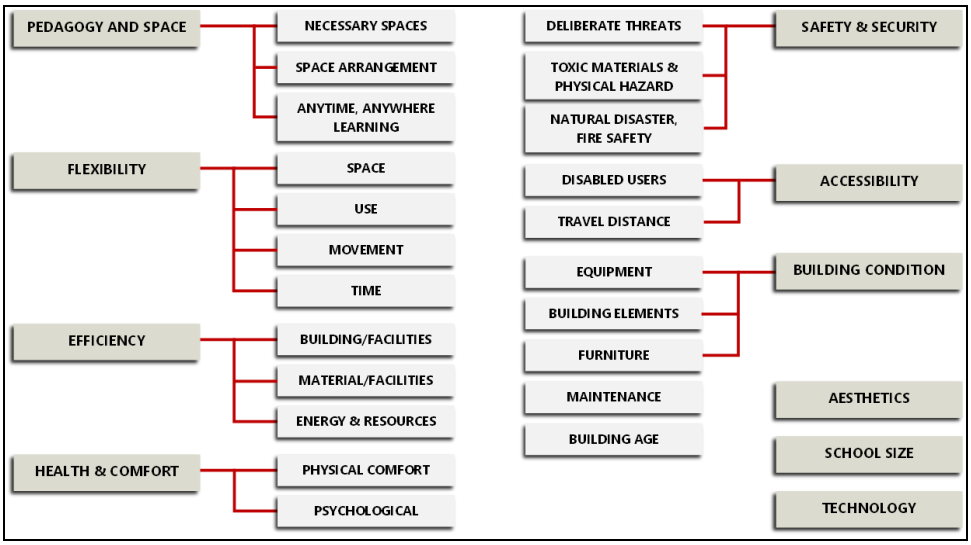

Figure 1. Major Design Issues and Related Aspects in School Design

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FIELD NOTES: AN INTUITIVE APPROACH TO WORLDBUILDING IN ILLUSTRATION

Author:
NEIL BADENHORST

Affiliation:
UNIVERSITY OF JOHANNESBURG, SOUTH AFRICA

INTRODUCTION

This article outlines a practical method for creating imaginary worlds and narratives within illustration. I do this by discussing the process of creating a wordless picture book that consists of four illustrated narratives, all set within the same fictional world. The book in question, *between worlds,* was created as a component of my MA dissertation in 2021.[1] My study was concerned with ritual spaces and heterotopian sites[2] within picture books. This article, however, is specifically focused on the process of creating imaginary worlds within wordless picture books, and an illustrator's approach to worldbuilding and storytelling. As an educator who teaches first and second year illustration and drawing, this project has also played an important role in developing content for projects and class activities which involve free play and experimentation as design process. This is however not the chief focus of the paper, which mostly focuses on the process of the book's creation. Although I briefly speak towards the end of this paper how this project has impacted my approach to teaching illustration, this will be explored at length in a second article. For the scope of this paper, only key visuals from the project have been included, see the first footnote to see more of the project.

Wordless Picture Books

Stories can help audiences make sense of the surrounding world, as well as personal thoughts and feelings[3] 'Picture books' are generally understood as books in which the narrative is primarily conveyed through imagery.[4] Although the term is often used to refer to picture books that have specifically been made for a child audience, many picture books have been made without children being the intended audience. 'Wordless picture books' then refer to picture books that have no text that conveys the narrative. Usually, the only text within a wordless picture book is the peritext on the covers and preliminary pages, but within the story itself, only images are used. Wordless picture books for children are often popular as they help children engage with stories and learn about the surrounding world before they have learned how to read. However, wordless picture books for adults have become more popular in recent years.[5] Audiences engage differently with wordless picture books, as they need to interpret the story from the images, and this may lead to different interpretations of the same story, creating interest. Low levels of literacy do not prove to be a barrier to entry, and since the story is conveyed by image,[6] readers can perhaps more accurately judge whether the contents of the book will be of interest to them upon looking at the cover or looking at the first few pages. An illustrator needs to compose the images in such a way that the sequence of illustrations can be understood as a narrative by the reader, but

illustrators can also hide all manner of details within the images that support but are not integral to the plot; encouraging readers to take their time reading or rereading the book.

Worldbuilding

In short, the term 'worldbuilding' refers to creating imaginary worlds within any medium of fiction.[7] Imaginary worlds and narratives need to feel 'real', or at least believable to their audiences. An audience are not moved by the sorrows and joys of characters and worlds if they are not able to suspend their disbelief that the fictional work is indeed fiction, for the duration of engaging with it. Tolkien[8] referred to this phenomenon as "secondary belief", saying that meticulous planning and detail is required for this to be achieved. Researchers generally echo this view, that the more saturated with detail and content an imaginary world is, the more likely the audience is to experience it as being 'real' within its context.[9] Tolkien's 'Arda' is almost uncontestably the most popular example of an imaginary world which is oversaturated with details enhancing secondary belief. Tolkien not only filled Arda with the narratives central to the plot of his many literary works that are set in this world, but also with a multitude of 'backstories', fictitious languages, histories, maps, and other lore that are referenced across timelines and books. Tolkien set a precedent that would become a popular trope in epic/high fantasy. Wolf[10] posits the term 'overflow' to describe this oversaturation of details, information and lore of an imaginary world, and that overflow is crucial for belief in the imaginary world to occur. Overflow, however, cannot be achieved in wordless picture books in quite the same way that it might be achieved in written fiction, or even film, as the medium relies on different modes of communication. Research on worldbuilding (both analysis of worlds that have already been created and methods for creating worlds) primarily considers written fiction, film and television, and video games.

The main challenge is that the medium of the wordless picture book is more open-ended than a written novel or film. Overflow is important as it allows the audience to feel that new insights or details may be gleaned upon revisiting the same work of world, enabling it to feel more real. An example of a wordless picture book that does accomplish this, despite the format of the wordless picture book, would be illustrator Shaun Tan's *The Arrival*. Tan's book contains over a hundred pages of detailed naturalistic and fantastic illustrations that tell a detailed story of an immigrant father navigating the struggles of immigrant life to provide for his family. The story spans several years, and the only text within the body of the story is in a fictitious language in a fictitious alphabet seen on signs in the streets, and in the letters written by the protagonist, from which the reader can glean no clear textual meaning.

There is not much research on worldbuilding that focuses on picture books, especially wordless picture books. Thus, developing methods for narrative illustrators to effectively create imaginary worlds in which secondary belief may occur, is necessary, as this is a largely under-researched subject. The goal of this project was thus, developing a framework for a practical approach to saturated worldbuilding in wordless picture books.

CONSTRUCTED AND EXPLORED WORLDS

Within my MA I outlined two general approaches to worldbuilding in regards to how the world and its contents are presented to the audience. The 'constructed world' refers to a world in which the audience has access to the histories, geographies, and other lore that the imaginary world consists of, even if these are not central to the plot.[11] Audiences can access this information in a multitude of appendices, author's interviews and additional material which elaborates on the imaginary world. Again, Tolkien's books, most notably *The Lord of the Rings* are a prime example hereof. The second approach, I called 'the explored' world does not provide much context or details concerning the imaginary world beyond what the audience experiences within the narrative itself. This does not mean that within this second approach

imaginary worlds are necessarily less detailed or have required less planning but rather that this is a different approach to narrative immersion. Patrick Rothfuss' *The Kingkiller Chronicles* is an example hereof. The world within Rothfuss' books is clearly meticulously planned, and readers can clearly see that much thought and planning has gone into the world including the places, cultures, and phenomena not central to the plot of the books, however all knowledge of the world is not made available to the reader. Instead, details about people and places within the world not integral to the plot are mentioned in pieces across the book and must be pieced together by the reader. The main characteristic of the explored world is that the boundaries of the world are blurred, and thus the reader needs to wait for the protagonist to travel across the world in order to learn more about it.

The constructed world works toward narrative immersion through convincing the audience that the world is 'real' by presenting them with an overflow of lore and details, making all of the world available to the audience. The explored world method presents the audience with the world that is not entirely known, and thus the narrative becomes the vessel in which an audience might explore it. Because wordless picture books do not communicate with written or spoken language, I believe that the explored world method is more suitable for the medium. It is thus, important for imaginary worlds in illustration to appear as if they extend beyond the story and the crop of the page, because details about the world must be communicated differently in wordless picture books than they are in stories communicated through written or spoken language.

EXPLORING PERSONAL WORLDS AND FIELD NOTES

Levesley and Bosward[12] write about personal worlds in illustration saying "An illustrator's practice repeatedly revisits and embodies a recognizable world across their output. Under these conditions, each new image that an illustrator produces is an additional window revealing another aspect of a familiar space. The effect is cumulative, the personal world enlarges; the illustrator's practice is continually mapping its terrain and depicting its inhabitants".

Levesley and Bosward's article would prove helpful in developing a practical approach to worldbuilding in illustration, as they position the illustrated world as personal world, that develops from the iterative process of exploring personal themes. And so, I decided that I could not hope to create an imaginary world that allows an audience to experience secondary belief, without experiencing secondary belief myself during the creative process. Thus, I began to position my method not as a conscious act of creation, but rather as an act of discovering existing imaginary worlds. In order to stay clear from conscious decisions about what the world (and its narratives) would be like, I started with a process that I would later refer to as making 'field notes'. This process involved making quite a large body of process work from early 2019 up until late 2020. The goal was to create images without the intention to portray any specific subject matter. The field notes consisted of various mediums and stylistic approaches including various traditional and digital mediums. Thus, I became an explorer of a new world, and the goal of the field notes was to document what might appear within my imagination to begin understanding the emerging world in the sum of its parts, without yet trying to interpret it as a whole or make judgements of how these pieces fit together. The only conscious decision made within the process was to avoid (as much as possible) reflecting critically on the field notes, until I had decided enough of these had been documented. Figure 1 portray some[13] of the drawings and creative exercises that my field notes consist of.

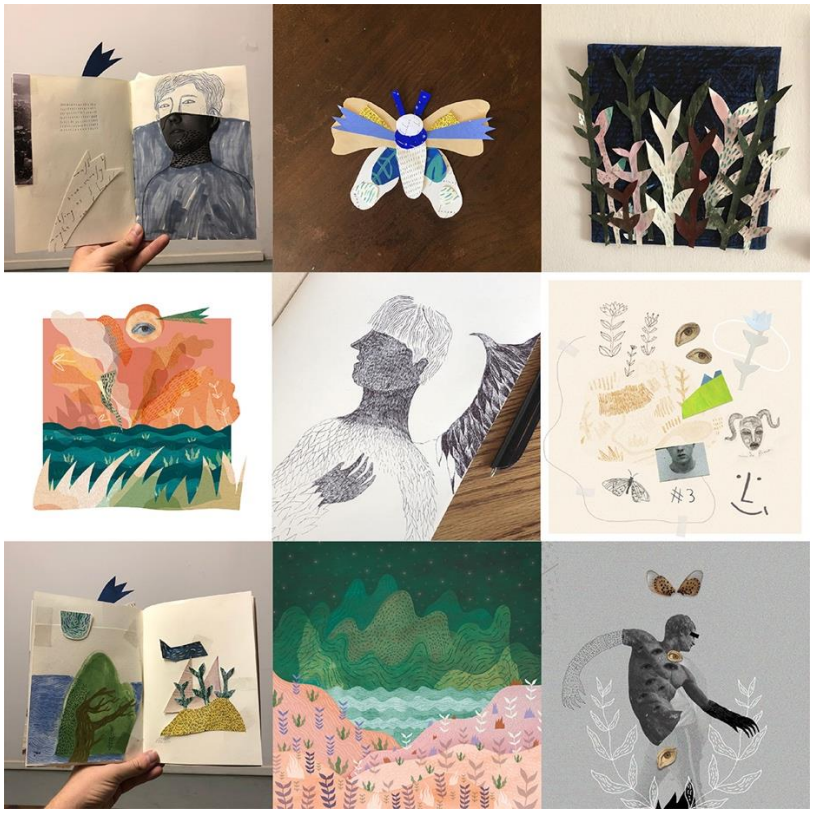

Figure 1. Select images from the field notes[14].

Only after a significant body of process work had been created over a period of nearly two years, would I begin to reflect upon the work more critically. This was not a formal theoretical reflection, but rather an intuitive introspection mainly focused on identifying recurring themes and motifs emerging from the field notes. If each of the creative responses were an impression of some part of the world, I would gauge similarities and try to understand whether I had unknowingly depicted images of a single location, object, or character in different ways, or whether different images portrayed entirely different subject matters. Figure 2 depicts some of the field notes and a part of this process. I started, quite simply by grouping together images intuitively based on visual similarities such as technique, style, and subject matter. I would then start to think of each category as being different impressions of the same part of the world that I was in the process of discovering.

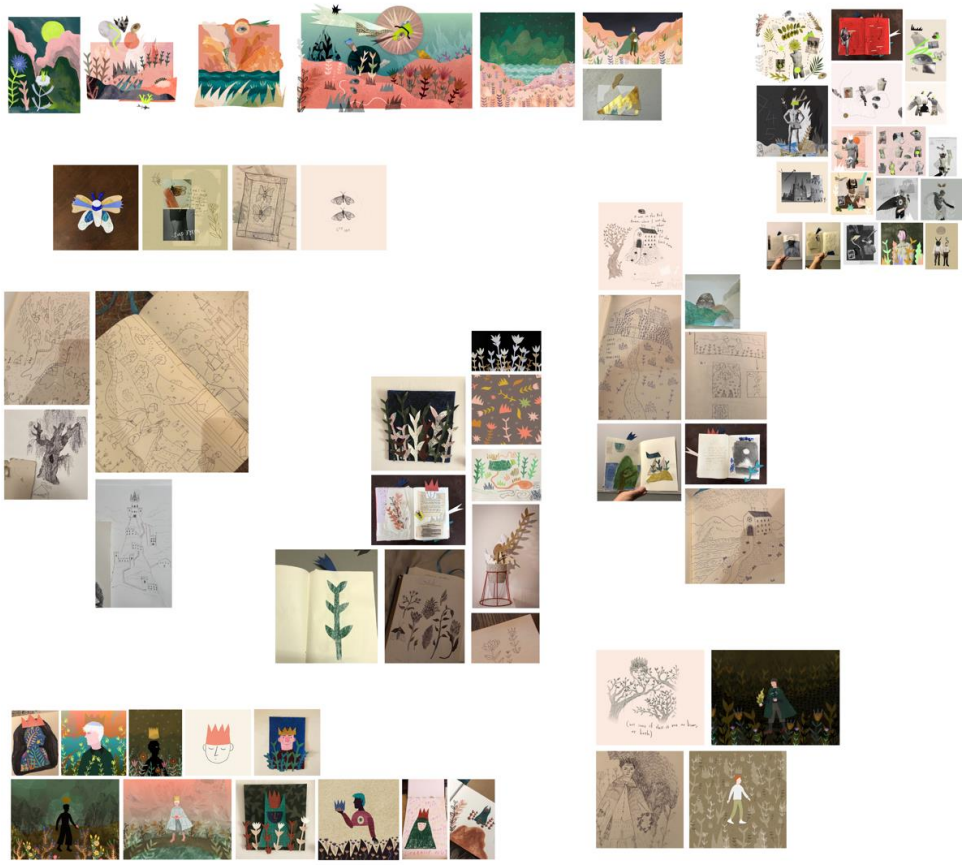

Figure 2. Starting to group together creative responses.

After this process, my impression of the emerging world began to solidify into something I could start to glimpse through the field notes. The next stage of the project would be developing a narrative. The narrative is important, as this would become the vessel through which a reader might explore the world. If developing the process work would be the documentation of field notes of the world I was exploring, then developing the narrative, and scamping out a storyboard would be my first attempts at making a map of this world. Because I had framed my creative process of creating the world as act of discovering an existing fantastic world, rather than an intentional act of creating; it was important that developing the narrative be approached in the same way. Eventually my process of developing the narrative would lead me to rediscovering old dream journals. Developing narratives based off dreams seemed the most effective method for two reasons. Firstly, without realising how fitting this would later prove to be, a considerable amount of the field notes responded to dreams that I had or tried to remember upon waking. Secondly, dreams are not conscious or intentional creations of our minds, and so also feel 'real' while we experience them. I selected four dreams from my dream journal, each I had had written and re-written at various points in my life. The goal was not to try record the dream exactly as it had been, and thus, I did not overthink what I remembered from the dream and try to avoid the bias of memory and retelling. Rather, I used an iterative process in which I read from my dream journals and tried to discover which of the field notes recorded experiences from which dreams. I had no real 'sampling criteria' for the dreams selected, other than they were among the more interesting, recorded dreams and felt as if they might contain similar themes in narrative format as was emerging from the field notes.

Figure 3. Scamps for the final picture book.

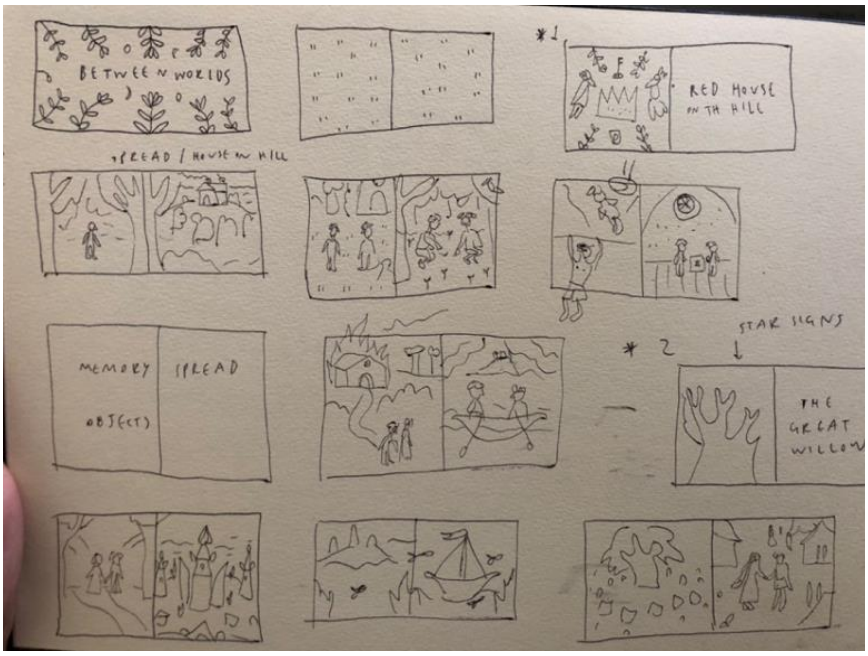

Figure 4. Scamps for the final picture book.

Next, I started with many rough scamps and thumbnail sketches of translating the field notes and narratives derived from dreams into visuals (see Figures 3-4). Again, I intentionally tried to stay clear

of interpreting the narratives or trying to uncover any meaning, and rather chiefly focused on how to compose images that effectively convey the storylines and picture the world as a place that sparks interest and feels as if it extends beyond the pages within the book.

The Book

Because I had framed my creative process as an act of discovering a different world, it felt suitable to work on the final pages of the book in sequence according to the narratives, allowing the world to reveal itself. Thus, I could pay special attention to scenes and how they might allow for narrative progression, as well as reference other parts of the world or hint towards details of the narrative not central to the plots. The story is entirely wordless except for the peritext on the front cover and title pages of each story.

Figure 5. Select pages from the story 'the red house on the hill' in the picture book between worlds.

Figure 6. Spread from the story 'the great willow' in the picture book between worlds.

Figure 7. Select pages from the story 'the pink beach' in the picture book between worlds.

Figure 8. Select pages from the story 'the castle at the roof of the world' in the picture book between worlds.

In my dissertation I write at length about intentional and often unintentional references that became clear as I examined the finished book, but I also tried to self-reference across the story, as an attempt to achieve Wolf's notion of overflow within the illustrated narratives. Because the field notes were such an important part of the creative process of discovering the world, it felt fitting to integrate these into the final illustrations (see Figure 9). If *between worlds* documents some of my adventures and journeys in the other world, including the progression from field notes, to mapping out the world, to more detailed accounts of my journeys intuitively made sense.

Figure 9. Details showing how elements from the field notes had been incorporated into the final illustrations.

Although the narratives are fairly straight-forward, I intentionally attempted for the stories to reference each other in the book. Although all stories share the same protagonist, they depict different parts of the world, and I wanted each story to feel 'real' in the context of the other. Figure 10 demonstrates visual elements meant to reference other elements of the narrative and the world in the other stories.

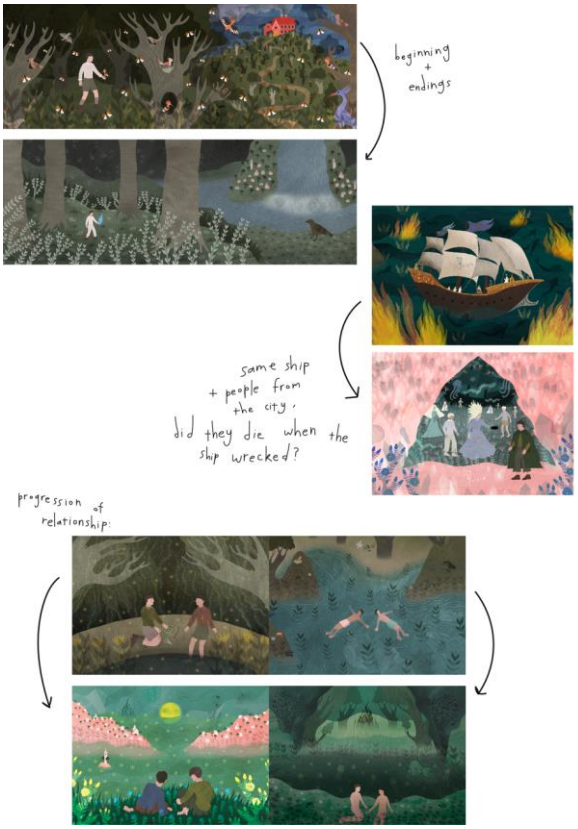

Figure 10. Sample from notes on the project.

Upon completion of the book, consistent themes throughout all four stories became apparent. All four stories centre around themes such as journey and rite of passage became apparent. This was not entirely a surprise, as my research overall tends to centre around the construct of the rite of passage, however as I attempted to illustrate the scenes and stories without trying to uncover meaning, only upon completion of the project did this become evident.

CONCLUSION

The project ended up becoming a sort of personal rite of passage. Upon completion of the book, themes related to personal experiences would become clear, despite this not having been the intention. The main challenge of the project was to 'intentionally create an imaginary world and narrative, without specific intentions. Although the intention of creating an imaginary world was known from the onset of the project, the only way in which I could develop content for this world, was to undergo a creative process that depended largely on free play and experimentation. The process of creating the field notes relied heavily on making visuals that did not mean to picture any specific visuals, something I was able to do as I would routinely rotate my use of medium, format, paper size and stylistic treatment. Using dreams recorded within my dream journal was the best way to ensure that the narratives were (for the most part) not conscious creations. This was led to ability for me, as the illustrator, to experience secondary belief by distorting the conscious decisions within the creative process, so that it would indeed feel as if I were discovering some unknown world instead of creating one.

Illustration is almost inherently related to narrative. We first encounter illustrations in children's books (both storybooks and educational material), and continue to engage with illustration in animations and other media intended for audiences of varying ages. Although our Graphic Design department at the University of Johannesburg prioritises releasing graduates to industry with portfolios that demonstrate

the diverse skills they offer to prospective employers within a commercial context; narrative visualisation is a core theme in the illustration units I teach to first and second year students. Common struggles students face during this unit is breaking away from strict naturalism into stylisation, or over-relying on references of existing work, which may flirt with plagiarism. This project has informed my approach to teaching illustration and drawing, by dedicating sufficient studio time to exploration and exercises in which students are meant to respond intuitively to supplied prompts that have largely been shaped by this project. The extent to which this project has informed by approach to teaching illustration will be explored at deeper length in future pages, but in conclusion I reflect that although as design educators it is important for us to not direct students towards specific stylistic executions or subject matter beyond what is stipulated by a brief, our own research and praxis is not separate from the work that occurs in the classroom, but rather can leads to innovative learning approaches and course structuring.

NOTES

[1] Neil Badenhorst, “Leaving Home: The Illustrated Fantasy World as a Crisis Heterotopia” (Master’s diss., University of Johannesburg, 2021)
[2] Michel Foucault, “Of Other Spaces”, translated by Jay Miskowiec. *Architecture/Movement/Continuité*. Available http://web.mit.edu/allanmc/www/foucault1.pdf
[3] Stephen Banks, Writing as Theory: In Defense of Fiction”, in *Handbook of the Arts in Qualitative Research: Perspectives, Methodologies, Examples, and Issues,* eds. J. Gary Knowles and Ardra L. Cole (Thousand Oaks: Sage Publishing, 2007) 157
Deborah O’Keefe, *Readers in Wonderland: The Liberating Worlds of Fantasy Fiction,* (London: Continuum, 2004) 11-12
[4] Evelyn Arizpe and Morag Styles, *Reading Pictures: Interpreting Visual Texts.* (London and New York: Routledge, 2003)
[5] Åse Marie Ommundsen, “Picturebooks for Adults”, in *The Routledge Companion to Picture Books,* ed. Bettina Kümmerling-Meibauer. (London and New York: Routledge, 2017) 220
[6] Adrie Haese and Elmarie Constandius, “Dithakga Tša Gobala: A Collaborative Book Creation Project”, in *Educational Research for Social Change*. 10, no.1 (2016) 53-55
[7] Mark J.P. Wolf, *Building Imaginary Worlds: The Theory and History of Subcreation*, (London and New York: Routledge, 2012)
[8] John R.R. Tolkien, “On Fairy-Stories” in *The Monsters,* in *The Critics and Other Essays* (1983) 12-17
[9] Mark J.P. Wolf, “Beyond Immersion: Absorption, Saturation, and Overflow in the Building of Imaginary Worlds”, in *World Building. Transmedia, Fans, Industries,* ed. Maria Boni, (Amsterdam: Amsterdam University Press, 2017) 206
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[10] Mark J.P. Wolf, “Beyond Immersion: Absorption, Saturation, and Overflow in the Building of Imaginary Worlds”, in *World Building. Transmedia, Fans, Industries,* ed. Maria Boni, (Amsterdam: Amsterdam University Press, 2017) 206-2017
[11] Neil Badenhorst, “Leaving Home: The Illustrated Fantasy World as a Crisis Heterotopia” (Master’s diss., University of Johannesburg, 2021) 22-24
[12] Richard Levesley and Marc Bosward, “Illustrated Worlds”, in *VaroomLab*. No. 2 (2013) 95

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FROM PILOT PROJECT TO STATEWIDE TOUR: REFLECTIONS IN REGAINING COMPOSURE AFTER COMMUNITY-BASED WORKSHOP FAIL

Author:
MEGAN KEATING, STEVEN CARSON, NIKLAVS RUBENIS, ANDREW TERHELL

Affiliation:
SCHOOL OF CREATIVE ARTS AND MEDIA, UNIVERSITY OF TASMANIA, AUSTRALIA

INTRODUCTION

The following paper has evolved from reflections on *The Pet Project* (TPP), a model of creative pedagogical enterprise that aimed to initiate sustainable creative communities of practice across regional Tasmania, an island located to the south of the Australian mainland. Established in 2020, TPP has since toured state-wide and garnered support from a range of stakeholders, organisations, funding bodies, and local government. This paper will focus on how unexpected circumstances helped refine the delivery model for a series of community-based regional visual art workshops.

Background

TPP introduced community participants to free pet portraiture workshops that were developed and delivered by a team of university academics alongside established and emerging artists. Workshops were designed to engage participants in modes of social learning within their local community using the emotional and universally binding theme of animal companionship. To connect with members of their creative community, local artists were engaged and employed on industry rates, invited to contribute to the content and implementation of the workshops, and provided with teaching resources and training. Feedback also formed part of the model and was sought from all participants/stakeholders during or after delivery to gain insights into their experiences. This approach aimed to generate additional paid employment for regional artists as well as encourage them to facilitate future creative community-based events that are beyond the academy.

While benefits to local artists were central to the goals of the project, regional/remote participants were viewed as ultimate beneficiaries. To deliver worthwhile experiences, workshops were set up to be enjoyable and delivered within a pedagogical model featuring an embedded framework advocating for creative engagement with cultural activities and opportunities for diverse participants to access mentoring, education, training, and resources. Participants learnt a host of visual art techniques and were rewarded at the end of the workshop with a painted canvas honouring their beloved pet (Figure 1). Workshops also provided academics with opportunities to teach and connect beyond the institution to broaden their creative capacity and community awareness. Linkages also introduced many community members to tertiary education and research for the first time.

Figure 1. Selection of finished pet portraits from community participants, each work is acrylic on canvas 30cm X 45cm.

Context

Tasmania has the lowest rates of literacy, numeracy, and engagement with higher education in Australia.[1] Thomas and Kilpatrick state that "Of all Australian states and territories, Tasmania has the highest rate of students who drop out of their schooling in Year 10".[2] These statistics present as barriers and are further compounded with data that claim that if students do fully complete secondary education, approximately only 30% will take up study at university one year out from school, with that engagement tapering off as the years progress.[3] A gap exists that can be addressed by training organisations to facilitate broader community engagement, especially in the Tasmanian context considering too that the entire state is defined as 'regional' in relation to mainland Australia[4] with a population of around 558,000.[5] Therefore, improving engagement with creative/cultural learning and facilitating connections with the university sector is mainstay to the project.

TPP was initiated in response to Tasmania's COVID-19 lockdowns to address a demand for public engagement with art practices that supported wellbeing, and the need to provide direct employment and support for artists. At the outset, we sought to investigate how creative activity could help establish and repair social connections and cohesion, address wellbeing factors and understand what this might look like as a pedagogical model that could provide art-based education and cultivate positive outcomes for people from diverse backgrounds and skills levels. The workshops were organised as community events that encouraged social practices, with all participants consenting to filmed interviews about their pets. Although not the focus of this paper, facilitating a space for storytelling created a therapeutic sharing of information and lived experience. Following the successful delivery of three pilot workshops (Figure 2), we secured funding to take the project further afield in a tour of regional centres across Tasmania. The funding provided payment of professional fees to local artists within each community, materials, and travel expenses. Grants enabled seven workshops in regional towns and employed fourteen locally based artists (two per workshop).

Figure 2. Pilot Workshop at the Center for the Arts, University of Tasmania, Australia.

ROLLOUT, CHALLENGES AND LESSONS

The original design of the touring workshops closely resembled the successes and learnings from the on-campus pilot workshops. We will now outline the first off-campus workshop, referred to from here on as 'the workshop', as it is this event and the unexpected compounding incidents that led to a failure to achieve the project goals and caused an overhaul of our original model. The first town we toured was more than two-hours' drive from Hobart, the state's capital city where we are located, and in 2021 had a population of less than 1000, and a median age of 62 years.[6]

Ahead of the workshop, we explored our professional networks and recruited artists. The workshop was advertised via posters throughout the town (Figure 3), social media, through networks, local publications and by word of mouth. We offered the workshops free of charge with all materials and equipment supplied to ensure inclusivity regardless of physical, social, and financial means. We secured full registration of sixteen community participants and all four project team members were also available to facilitate the event.

Prior to the workshop we made inquiries with network agencies and booked a venue. Although the venue had previously been a municipal building, it had since become privately owned. To accommodate the workshop, the venue had to allow for the instructional presentation and artmaking as well as interviews and documentation. Our booking was made without inspection, and when we arrived to set up, we were confronted by a labyrinth of rooms, none large enough to accommodate either the instruction and creative elements, nor intimate enough to conduct participant interviews. Several of the rooms were dark, damp, and in poor repair; parts of the building were dilapidated and exuded an oppressive atmosphere. We had to source additional tables and chairs to accommodate registered participants and the inadequacy of the venue, combined with the physical and psychological needs of the diverse participants (which is further detailed below), diminished the experience of the participants.

Figure 3. Posters advertising regional workshops featuring participant paintings.

The Workshop

On the morning of the workshop, one of our team members received a phone call from home regarding a family emergency and had to leave immediately. Our team of four had become three. Additionally, we had not gathered personal details such as health, age, and physical abilities of participants in the registration, and we encountered some participants for whom we needed to make special consideration. While we aimed to be inclusive, and the ethics clearance necessitated that participants were over eighteen years, we had not considered the physical or psychological requirements that we later discovered our workshop would require. Challenges posed by participants included:

- Participant A lives with a significant physical disability. They had recently lost their pet who had been a lifelong companion and attended the workshop to honour the animal's memory. They were extremely emotional and self-critical of their painting which they saw to be less-than-satisfactory.
- Participant B was an older person who joined us from a local nursing home. They lived with a profound loss of hearing and restricted mobility. They were transported to the workshop by a care-worker, who did not stay. Participant B required personalised physical support to move around the venue and were unable to go to the bathroom unassisted. Participant B was not able to keep up with the instruction and became significantly behind all other participants causing them a degree of anxiety at their ability to complete their portrait in the designated timeframe. Despite our aim to be inclusive, one of the biggest challenges included the physical constraints of the building which compromised the experience of participants with restricted physical ability and mobility issues.
- Participant C was very vivacious with a dominant personality. Their interaction with one of our team members caused discomfort and concern and came at a time when the two of them were alone in a room together. While this incident did not escalate, it served as a reminder to provide team support in community projects. The constraints of the venue made this rule difficult to adhere to as participants moved freely in and out of the smaller spaces and rooms. After this event, we took measures to ensure that two people (participants, artists, or staff) were not in the same enclosed space without a third party, like the 'two to one' rule commonly used in schools with students.

Individually the incidents described were manageable due to the experience of the core team and a desire for the workshop to succeed. However, arguably the most impactful challenge of the day was with a participant who appeared to be experiencing a mental health episode. Participant D arrived late in a distressed, disoriented, and abusive state. During presentations, they stood within the beam of the projector obstructing the group's view and used expletive language in outbursts (which continued throughout the day). They would burst into tears and wail loudly, and during moments of calm moved

around the room to strike up conversation with other participants who later reported feeling uneasy at the behaviours. When Participant D did participate, they scooped up handfuls of paint and smeared them over the canvas and at one time onto themselves.

The unexpected diversity of participants had a significant influence on the capacity to facilitate an enjoyable learning experience for everyone. As we wrapped up the workshop the owner of the building arrived, an influential community figure well known to Participant D, and frustration at their behaviour led to an altercation and an instruction to leave leading Participant D to retreat to their car in distress. With hindsight, the project team should have been more aware of this participant's behaviours and their impact on others, yet our desire to be inclusive and register as many participants as possible meant that we overlooked early warning signs.

One of the keys to successfully delivering workshop activities, and the learning and participation of attendees, is the expertise, and commitment of the team to deliver the content and meet the workshop aims. We recruited the artists based on recommendations, and one of the aims of the workshop structure is that we recognise and champion local artists within their community. The artists we choose to work with are often a drawcard to participants who want to meet and learn from leaders in their creative communities. On this occasion, compounding other difficult situations, it was unfortunate that our established artist appeared to be indifferent to being at the workshop. They seemed disinterested in supporting the participants and generally unwilling to offer encouragement or advice.

In summary, the workshop provided numerous challenges including:

- the largest number of participants we had worked with to that point, and we were a team member down.
- an unfamiliar private venue and due to the distance from our usual workplace, we relied on descriptions of the infrastructure and the facilities. There was insufficient space, with strange and oppressive configuration of rooms, poor sightlines, and an inadequate range of tables and chairs. The general feel of the venue was not conducive to a positive experience.
- a lack of awareness that we had the most diverse participant demography, including those with neurodiversity, physical disability, and a predominance of elderly persons.
- the management of a mental health episode and a core team member experiencing harassment.
- a selected artist who did not support the workshop aims.

While members of the workshop team ensured we presented the workshop to the best of our abilities, and we recognised that some participants gained new skills and knowledge, we received several emails from workshop participants post-event complaining about the disruptions and the less-than-ideal circumstances. Although complimentary about the intent of the project, resources, and workshop itself, their experience was not positive. Although ethics approval, consent forms and completed risk assessments were in place, the accumulation of these challenges in one event meant that the experience was stressful and unsatisfying to both the participants and project team.

What Was Learnt

In response, the project team agreed to clarify what constituted a meaningful, positive engagement with the workshop and outcomes for community participants. We discussed and learned about our tolerances, and within what bounds (personally and professionally) we were prepared to continue, including the non-negotiables for safety and wellbeing. We also determined parameters for what would make the project sustainable in terms of community benefit and the purpose and value of taking learning activities outside of the academy. Our first objective was developing firmer frameworks including new protocols in delivery, building strategic partnerships and selection of artists. We reworked our model and developed resources such as refined workshop running sheets, updated our website with videoed

instructions of techniques, risk assessments for the types of incidents we encountered and protocols to then manage the risk. Participant interviews were to be conducted in a public area, or in view of other team members, to protect and ameliorate the risk of harm. If we were unable to find an appropriate space to conduct interviews, we did not do them.

Another initiative was to re-address the registration process. As a pre-requisite, participants added details of emergency contacts who were available during the workshop if the participant was unable to continue or needed additional support. We also spent more time building relationships and partnerships within the communities as supporting partners. We determined to no longer use private venues and all subsequent workshops were hosted in partnership with a local institution, for example, regional galleries, local councils, or established community groups. We also tightened our criteria for the section of artists and recruited them following a semi-formal interview process that required a demonstration of their commitment to community engagement. We also reached out to local mental health support organisations, as well as local police, briefing them on the events we planned in their towns.

Importantly, by reassessing our model we clarified aspects of the project that were non-negotiable. Some of the new protocols meant that we could not always interview participants, which had implications for our data collection. Instead, we developed a short-written survey that could be handed out during the workshop. While this data is very different from recorded interviews and videos; we were still able to draw conclusions from the outcomes and that the minimum level of recording the workshop would be through photographic documentary of the painted works, as well as photographic portraits of the participants.

TO SUM UP …

The focus of TPP has always been to provide a positive experience of creative and cultural activity and build social connections between participants to facilitate learning centred around creative practice. In highlighting these aims, and refining our approaches, and building greater connections with each community, we continued and subsequently completed our regional tour without further incident. We decided that gathering interviews or data was not the main priority as we originally planned, however we have connected with over 150 participants and 22 supporting organisations across our state. We realised that small participant numbers in some communities was not a barrier to achieving good outcomes—in fact the impacts were arguably better. We have built a community of established and emerging artists that are connected to the project and have maintained their ongoing connections with our institution. All participants and artists involved in the delivery of the workshops have been given the resources and materials to continue running workshops in their communities. Our biggest achievement, through the refined model, is that we have provided opportunities for our participants to learn new skills and find a rewarding experience through art. Many of the participants had never painted before and we have ensured that every participant left the workshop feeling a great sense of achievement. The finished portrait of their pet represents the accomplishment of their creative learning within the workshop framework. For some participants, including the artists we have partnered with, the project has led to an increased recognition that their artistic skills can lead to new business opportunities, build new communities of practice, and contribute significantly to their overall wellbeing.

NOTES

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DISCIPLINARY IDENTITY IN THE FACE OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

Author:
EDWIN VAN MEERKERK, ELIZE DE MUL

Affiliation:
RADBOUD UNIVERSITY, THE NETHERLANDS

INTRODUCTION

University courses all over the world are struggling with ways to help their students prepare for an uncertain future. In a three-year project, we are working with 38 bachelor's programmes to implement sustainability as subject and attitude in education. In the first phase of this project, we conducted 45-minute interviews with a lecturer and a student from each programme. In the interview, we asked them about the nature of their programme and how it relates to sustainability challenges. We also invited them to think about the future of their programme.

With every new IPCC report, the urgency of promoting sustainable development is stressed once more. And with the need to work towards renewable energy, a circular economy, and an inclusive society, the call for including sustainability in education also gains momentum. This, however, is easier said than done. Teaching students of engineering to develop instruments that help reduce waste is one thing. More importantly, students from all disciplines need to be taught a 'sustainability mindset'.[1] This mindset includes the ability to deal with complexity, to work inter- and transdisciplinary, and to develop emotional intelligence. Such skills are more often than not absent from academic curricula.

Teaching students not 'in' or 'about', but for sustainability is generally termed (Higher) Education for Sustainable Development (HESD). Therefore, in spite of the justified criticism of the notion of Sustainable *Development*, instead of 'sustainability',[2] we will conform to the current consensus and write about HESD and sustainable development. University courses all over the world are struggling with ways to help their students prepare for an uncertain future. In a three-year project, we are working with 38 bachelor's programmes of Radboud University (the Netherlands) to investigate how sustainability as theme and 'response-ability'[3] is or could be integrated in the education of the university. We have chosen a bottom-up approach to investigate this. The project is backed-up 'top down' from our university board, who have adopted sustainability as their core mission for several years now. The goal of our project is, on the one hand, to help programmes develop their curriculum to clarify the connection of the discipline to sustainability issues (content) and to develop course goals and teaching formats to help students develop the skills to deal with the wicked problems of sustainability challenges (competence).

In the first phase of this project, we conducted 45 minute semi-structured interviews with a lecturer and a student from each programme. In the semi-structured interview, we asked them about their experience of the programme and how it relates to sustainability challenges. Moving from 'what is' to 'what if', we challenged them to think about the future of their programme. After this first interview, we continued this development in a second, in-depth interview on competencies and two workshops in which students

and teachers were challenged to think beyond the existing curriculum and articulate long term goals for improving their curriculum, as well as to work on the first steps toward that goal. This paper, however, only focuses on the results of the first phase of our research.

THEORETICAL FRAMEWORK

Sustainable Development (SD) is a "super-wicked problem".[4] multifaceted, dynamic, and complex. Addressing wicked problems in universities requires a non-linear, open approach to teaching and learning. The interconnection of the SDGs calls for a transdisciplinary, whole-institutional approach to Higher Education for Sustainable Development (HESD).[5] This is no easy task, as a recent survey of professionals in the field has shown.[6] The layered, and many-faced nature of the subject calls for a didactic approach that stays well away from lecturing the 'right' message, but instead triggers students to take up the challenges of SD themselves. Addressing the SDGs also requires a broad approach that acknowledges their interconnection.

A lot of ground still has to be covered before HESD can realise its full potential. "Initiatives to promote the concept of sustainability in higher education have so far actually had little impact on education",[7] and "no widely accepted and validated assessment instruments are currently available to examine the output levels of ESD".[8] Giangrande et al.[9] reviewed literature on competencies for sustainability education, focused on UN goal 4.7, which is aimed at global citizenship education and education for sustainable development. Their research shows that (H)ESD should be aimed at developing a wide range of competencies to deal with the intertwined Sustainable Development Goals (SDGs) and the complexity of the global challenges that underly the SDGs.

METHOD

The interview questions were based on the literature review described above. The main structure of the interview consisted of questions on views on sustainability, disciplinary identity, pedagogy and didactics, and dreams of the future of the curriculum. Teacher and student were interviewed together and were asked the same questions. The interview was semi-structured, allowing the interviewees to share their opinions and concerns freely. The interviews were recorded and transcribed, first automatically and then manually improved. We have anonymised the transcripts before analysis. Permission was granted by the ethical committee of our Faculty, as well as by interviewees to process the recordings for research.

We have coded the transcriptions using Atlas.ti (version 23), starting by coding the full paragraphs of the answers to each question and next coding full sentences with in-vivo codes of frequently occurring words and their synonyms, such as society/societal, complex/complicated. In a series of repeated rounds of coding we worked towards a saturation point before connecting the codes that appeared together. Codes that co-occurred far more often than others were marked as 'strongly connected', the others as 'connected'. In our analysis of the findings below, we focused on those codes that appear most often (frequency) and those codes that co-occur most often with other codes (density).

ANALYSIS

In the interviews overall, the same set of codes appeared as most frequent and most dense. Teachers and students associated sustainability with a societal focus. They also perceived sustainability issues as complicated and expressed doubt whether this topic would not be better understood at the master's level, as they supposed students would need a knowledge base and research skills before tackling such complex issues. In our analysis of the codes, we saw that the societal perspective is a strong node between the other codes. Other strongly embedded codes are 'important' and 'research'. Indeed, finding

a balance between a societal perspective that is often seen as 'applied' and a research perspective that is seen as the core of an academic education, is seen as difficult:

Yes, then you should actually push such a researcher, such a lecturer, you should actually also push them more and more to relate their research and teaching much more to development in society as well.[10]

And

I find that tricky with those things, in the sense that there has to be a way in which we dare to embrace more legitimacy in the social debate as a serious and long-term activity.[11]

Defining Sustainability

Across all disciplines, students and teachers are inclined to define sustainability as a 'green' (often referring to biology, ecology and green or sustainable surroundings) and fuzzy concept. That lead many of them to perceive sustainability challenges explicitly and implicitly as an area that is disconnected from their discipline, e.g. psychology or foreign languages. Both the overall relevance of their programme for sustainable and other societal issues was questioned by several interviewees. Only after discussing the scope of the 17 SDGs did they start to realise that any curriculum has a relevant contribution to make in addressing the global crises. That did not, however, mean that they had a clear image of how they should do this.

Societal relevance and academic identity

A pressing question for most teachers at our (research oriented) university is whether societal goals should even be part of the teaching. The Netherlands has a binary system of Higher Education, where universities are traditionally theory-based and research-oriented without a clear job market for students, whereas 'hogescholen', universities of applied sciences, are traditionally aimed at training for specific jobs and the application of theory. The identity of our (type of) university thus led teachers to question the validity of sustainability education for other programmes than those in which sustainability is a topic of research, such as Biology or Environmental Studies.

When asked to share how often they talk with peers about sustainability, teachers and students stress that it is a complicated issue. Teachers among each other often discuss the necessity of flying to conferences and research visits and reveal a growing consensus that this should be kept at a minimum:

Then quite a few colleagues, especially the younger ones are vegan. And yes, that always leads, it always has to be talked about. So that always provokes something. So in that sense definitely and also flying also when it comes to, ehm, flying for research. So I really did think about that very differently. I think we should really avoid that.[12]

Disciplinary identity and academic skills

Teachers and students have a clear vision of the core of their discipline. In all but one cases, this core is defined in terms of the content of the curriculum and not in terms of skills, attitudes, or competencies – with the notable exception of one student, who characterized her programme as "scientific research, skills, and academic writing". In addition, teachers and students clearly associate sustainability with climate change and mass extinction. This further strengthens the perceived gap between their discipline and sustainability.

When students and teachers talk about their disciplinary identity, once again the societal perspective is dominant, often in contrast to 'research' and 'the basis' or core of the programme:

I, I think for a lot of people it's important that, especially if they come from a secondary school and they haven't taken a philosophy subject, for example, that it's important that they are taught certain

concepts and reasoning techniques, so that they can use those there to later deal with a concept like or a problem like well, climate issues.[13]

In other words, the skills to deal with complex issues, such as sustainability, are seen as following acquired knowledge, not immediately connected to it. In this, a great difference is experienced between bachelor's and master's levels.

When explaining how their programme relates to sustainability issues, teachers and students have a variety of associations, though each of them occurs relatively infrequently compared to the answers to the other questions. They most often consider the link between their programme and society:

Because we, what I feel a little bit in your words is so that connecting with developments in society, that takes far too long before it eventually ends up in an educational environment. That also means that, in a university, research and teaching should be linked, so: hey, why do you do research and not include that in your [teaching] subjects?[14]

When asked what they would do, given free rein in the curriculum, teachers and students have many associations, far more than with other questions, and also far more frequently. Interestingly, in these (often quite lengthy) answers, the codes are linked more densely to each other than to the question itself. In other words, teachers and students started to make connections between what is considered to be the core of the programme and the skills students need to learn to deal with the wicked problems of sustainability – and whether a bachelor's programme is suited for teaching for sustainability. They also connect this to the difference with universities of applied sciences:

And I don't think you achieve that with very thorough scientific articles, but then you have to be able to hold your own in other areas. Yes, that. Without becoming a college education, right? That's always an exciting field too, but...[15]

Disciplinary differences

Even though on the whole, teachers and students from all disciplines acknowledged the importance of sustainability for society and saw the need to connect their programmes better to this domain, there are clear differences between the various academic fields. These differences are partly caused by the content of the programme, and partly by differences in educational and didactic notions. Together, these differences can be seen as expressions of disciplinary identity.

The code '(inter)disciplinary' itself is mentioned 32 times and is not very strongly connected to the other codes. Its most densely connected to the answers to the free rein-question and to the code 'Societal'. Over the whole, teachers and students seem to associate interdisciplinarity with the complexity of societal questions.

With regard to the content, there is a clear correlation between the natural sciences and sustainability, where the social sciences and especially the humanities perceive a great gap between their discipline and sustainability. The latter also feel rather helpless and useless in the face of these societal and planetary crises. Also, disciplines that take a very broad scope, such as psychology, sociology, philosophy, and law, feel that by being relevant to nearly every domain of society, sustainability for their programme is almost a background noise to all their teaching. This, however, leads to a situation where teachers are free to choose sustainability topics as case studies in their courses, or to trade them for other topics if they wish, leading to a certain degree of randomness in the presence of sustainability topics in their curricula.

With regard to the educational and didactic culture in the various disciplines, we observed that most teachers and students tend to think about education from the content and are sometimes at a loss when pushed to think about pedagogy or competencies. They also tend to emphasise the importance of a core curriculum of knowledge (not skills) that every student should possess, especially in the bachelor phase.

When thinking of alternative approaches, both the humanities and the natural sciences showed a tendency to colour neatly between the lines, where the social sciences showed an openness to new approaches to education.
So, it feels like that, like thinking beyond those existing structures and thinking about other possibilities is a really big part of actually being able to make the change, because you have to be able to like think and imagine the change so I feel like with the urgency of the change, changes that need to happen, I feel like that I would probably want to focus on that because so much of what we do really is that, you know, it's all, it's so much about critical thinking really.[16]

CONCLUSION

In conclusion, sustainability is a fuzzy concept in the eyes of students and teachers. It is so in two ways: first as a notion that is associated with a vaguely described "green" area of expertise – one that the interviewees most often regarded as different from their own. Secondly, because sustainability is associated with complexity, a term that teachers have a hard time understanding as being part of the learning outcomes of their curriculum. Together, this triggered thoughts and discussions on the societal role of a university and the difference between research universities and universities of applied sciences. By engaging with societal challenges, the academic objectivity and neutrality may be at stake. Several teachers reported that they themselves or some of their colleagues felt reluctant to address sustainability in class precisely because of this.
A further complicating factor in this was the strong commitment, among both teachers and students, to their academic discipline. Partly out of insecurity perhaps, but mainly from a passion for their chosen studies (the students) and their profession (the teachers), interviewees were hesitant to endorse sustainability as a focus point in education. This, they felt, was not what they had chosen to do, or what they were trained for. Yet, during the interview, some of our participants started questioning their own point of view, as we have seen above. This is likely to cause tensions with their prior beliefs and those of their colleagues.
Furthermore, the question arose whether the wicked problems of climate change and other sustainability challenges can even be taught at a bachelor's or undergraduate level. This question is fundamental to any vision on (higher) education: do students need a 'knowledge base' in order to be able to deal with complex societal issues? Or, rather, will confronting them with these issues be motivational for them and show them the relevance of their studies for the future of society? Or, perhaps even more fundamentally, is education primarily about content or is it about competency building?

DISCUSSION

When inviting academic staff and students to talk about sustainability, we were confronted with the dilemma of representativity and sample size. By choosing the latter, we created a bias among the population. Yet, given the likely prevalence of sustainability preferences among the teachers and staff, discussions mostly revolved around the question whether an academic bachelor's programme is suitable for addressing this topic. This happened for two reasons: one was the connection of the content of the programme with sustainability, especially when the latter is perceived as 'mere' environmental sustainability. The other was the question whether such a societal issue would be suitable for a research oriented curriculum.
This brings us to a paradoxical final conclusion. While students and staff alike feel that the challenges underlying UN's Sustainable Development Goals are incredibly important and call for immediate action, most of them feel that they in their role are not able, equipped, or allowed to do that in their work or studies. This means that for change towards a true Higher Education for Sustainable

Development to happen, a dialogue on disciplinary professional identity must be organised. This is what we will be starting to do in the coming years.

NOTES

[1] Ekaterina Ivanova and Isabel Rimanoczy, eds. *Revolutionizing Sustainability Education. Stories and Tools of Mindset Transformation*. (New York, London: Routledge, 2022).
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[3] Donna Haraway, *Staying with the Trouble. Making Kin in the Chthulucene*. (Durham: Duke University Press, 2016).
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[11] Interview 20, ¶156.
[12] Interview 15, ¶181.
[13] Interview 7, ¶48.
[14] Interview 24, ¶81.
[15] Interview 19, ¶230.
[16] Interview 27, ¶ 174.

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WHAT DO STUDENTS LEARN IN THE CLASS? THE MICRO-STUDY OF ONE DEPARTMENT

Author:
MIROSLAV DOPITA, HELENA KUBÁTOVÁ

Affiliation:
PALACKÝ UNIVERSITY OLOMOUC, CZECH REPUBLIC

INTRODUCTION

The underlying assumption of the article is that university teachers believe that they teach with students' expectations in mind, i.e., that they teach independent searching, evaluating, and presenting information in addition to educational content. They teach students to argue, to question, to think critically, and to use digital technology effectively. They also believe that they motivate students, activate them, and lead them in teamwork. A survey of teachers' perspective on this topic is therefore meaningless. Even by analysing documents (teaching materials or course curricula), it is not possible to find out what is behind the educational content. Therefore, it seems that the only way to find out how and what university teachers teach and what students gain, besides the knowledge and skills declared in the curriculum, is to ask students directly.

In the first part of the article, we briefly introduce a background on higher education in the Czech Republic. In the second part, we will focus on the results of the survey we conducted among a target group of students in Social Studies and the Humanities in a department at a Faculty of Arts. Our aim was to determine what students actually learn in their courses, which may be formulated as the main research question: What do students learn in class? We were particularly interested in what students learn beyond the curriculum, i.e., other than the knowledge and skills declared in the curriculum. In order to narrow the scope, we formulated three research sub-questions: 1. Do they gain the knowledge and skills declared in the curriculum? 2. Do their expectations of the knowledge and skills acquired in the classroom match the curriculum? 3. Do students gain anything else from the learning experience other than the knowledge and skills declared in the curriculum?

THE CONTEXT OF THE CZECH HIGHER EDUCATION

The Czech system of tertiary education was transformation after 1989, involving an increase in the number of tertiary students.[1] After 1992, university education for elites was transformed into universal tertiary education (see Table 1), also thanks to the implementation of the Bologna Process, which changed the design of curricula at tertiary education institutions.[2]

Year	Number of tertiary institutions	Number of students	Number of students - Palacký University (PU)	Number of students – PU Faculty of Arts	Proportion of tertiary students in the age cohort by Trow's theory
1992	26	117,637	7,058	1,757	12% (elite)
2002	55	220,177	13,798	3,442	12% (elite)
2012	71	380,891	21,717	5,618	67% (universal)
2022	60	304,518	22,716	5,262	58% (universal)

Table 1. Basic facts about tertiary education institutions in the Czech Republic (1992–2022)

The strategic plan of the Ministry for Higher Education for the period after 2021 details the general priorities that have been formulated by overarching documents, especially the 2030+ Education Policy Strategy and the Innovation Strategy of the Czech Republic: Country for the Future, and it brings additional relevant topics specific to the higher education sector.[3]

The document sets out six priority objectives for higher education. Given the theme of our article, we will focus on "Goal One: Develop competencies directly relevant to life and practice in the 21st century." The challenge for higher education is to strike the right balance between two principles – training practical skills that can be applied in practice immediately after the completion of study and developing more general intellectual and social competencies to enable graduates to respond to new situations in the labour market and in society in the future.

These two principles are not in contradiction: on the contrary. Developing general competencies and soft skills in isolation, with no links to specific problems and situations, is only possible to a limited extent. It is therefore possible, if not necessary, to combine teaching such competencies while also addressing specific professional tasks, whether aimed at deepening the theoretical understanding of a given field or acquiring practical professional skills. The purpose of higher education is to educate professionals who – through work aimed at obtaining a profound understanding of several specific problems (whether intradisciplinary or interdisciplinary) – will acquire a wide range of broader competencies that will prepare them for addressing new, unexpected problems in the future.

In order to support this Strategic Plan, the Ministry of Education, Youth, and Sports launched the Programme to Support the Strategic Management of Higher Education Institutions for the Years 2022–2025.[4] Within the Programme, the ministry provides public higher education institutions with a contribution from the state budget towards the fulfilment of the objectives of the strategic plans of public HEIs in the period from 2022 onwards.

In 2014, the university under investigation established a department focused on development of teachers' competences. In the last two academic years, the total of 283 PU academic workers, i.e., 14%, enrolled in courses supporting the development and innovation of educational competences. From this number, 65 members of academic staff, i.e., 16.6% of the faculty who work at the Faculty of Arts. Out of this number, 12 are employed at the department under investigation, which is 50% of the department's staff. We may say that in the context of the entire faculty, courses promoting the development of educational competences are not very popular. In our department, however, the situation is better, which may have a certain impact on positive evaluations from students, as documented by the results of our research.

WHAT STUDENTS LEARN

According to a meta-analysis of published studies, what tertiary students expect to learn in the course of their study are in particular: stakeholder connection, individual and social development, teachers as mentors, sense of belonging, innovative and effective methods and technologies, dynamic curriculum,

communication and feedback, getting qualification (employability), college life support, economic and financial conditions, built image and reputation, facilities and infrastructure, mobility (academic and social), internationalization, and intercultural learning.[5] Other research projects also document similar responses from students. According to research conducted at Polish universities enhancement and empowerment are manifested by multiple facets of transformation that the students look for at an ideal university, including intellectual, critical, personal, emotional, and physical development.[6] The context of quality culture here includes the teaching climate, teacher leadership, communication and shared values of the university and the field of study. Quality culture and transformative learning are important enablers for operationalising quality as transformation. Relevant data from the systematic review was extracted and a narrative synthesis was conducted, revealing four key themes: additional study, learning self-management, teaching and learning activities, and accessibility.[7] Students expect to complete additional study and take responsibility for their own learning, but may be unsure how to do this. They expect to have to attend all sessions and commonly expect lectures, but thoughts on other methods of teaching and learning vary. Students also have high expectations of teaching staff, particularly with regards to access and resources. Now a wide range of competences are sought after: the ability to communicate easily, negotiate, provide leadership, to possess e-skills and the ability to 'read' others, be empathetic, reliable, imaginative, likeable, capable of developing good and durable working relations, be tolerant of diversity, and so on all become desirable assets, and to exercise them in relation to those of a broadly similar educational level.[8] The acquisition of some or all of these skills is most commonly gained in higher education, not in lectures but through living, discussing, and organising life with fellow students, as Soskice states.

THE SURVEY

The target group were almost all full-time students in study programmes offered by PU Faculty of Arts' Department of Sociology, Andragogy and Cultural Anthropology. The survey did not involve first-year bachelor students. There are 303 students in the remaining four years studying at the department: 237 of them in bachelor's study programmes, and 66 in the continuing master's degree study programs.

Data collection was conducted in the form of an online questionnaire. A link to the questionnaire was disseminated via e-mail. The majority of respondents responded on the first day after receiving the link in their inbox. An intervention was done five days later; the researchers visited students during their lessons, asking them to complete the questionnaire. As a result of the intervention, 25 more students provided answers. In total, the link was opened by 126 students. The questionnaires were completed by 87 students – 57 of them were students of bachelor's study programmes, and 30 were continuing master's students. The return rate was 29%, which was very low, although our research was conducted at our home workplace. All students know us personally, so we should be trustworthy to them, yet we did not succeed in increasing the return rate to a substantial extent.

This situation corresponds to the very unsatisfactory situation occurring in social science research. A number of studies have addressed the very low return rate in online surveys.[9] Lozar Manfreda, Berzelak and Vehovar conducted an analysis of return rate of 37 online surveys and discovered that the average return rate was 27%, which considerably differs from the obsolete standard of 70%.[10] In their publication *Web Survey Methodology*, Callegaro, Lozar Manfreda and Vehovar also state that a return rate of 30-40% may only be hoped for if the survey addresses an important topic, is distributed by a trustworthy author, and has a professional design – otherwise it is much lower.[11] The degree of bias in the results is not determined primarily by the return rate itself, but rather by the fact whether and to what extent the respondents providing valid answers differ from respondents not providing any answers.[12] Some meta-analyses show that there is in fact no relation between the return rate and the

sample bias rate.[13] In our case, we have no data to disprove the risk of biased results due to return rate, but this bias should be no more substantial or significant than in other studies.

THE RESULTS OF A QUESTIONNAIRE SURVEY

Answers to the first research sub-question ("Do they gain the knowledge and skills declared in the curriculum?") are related to the variable of curriculum focusing on preparation for a profession in Trow's framework for universal tertiary education. Table 2 documents that for bachelor students, there is not a big difference between declared and acquired knowledge and skills. A difference has been identified concerning master's degree students, who claimed that they acquire fewer skills than knowledge. Master's degree students call for a greater extent of practical skills, as documented by the research data.

	yes		no	
	skills	knowledge	skills	knowledge
Bachelor's degree	91%	94%	9%	6%
Master's degree	74%	90%	26%	10%

Table 2. Gained knowledge and skills declared in the curriculum

The second question inquired whether the students believe they acquire competences (i.e., knowledge and skills) related to their field of study. Students answered on a four-point scale. The answers showed a greater satisfaction with the acquired competences among master's degree students compared to bachelor's degree students (see Figure 1).

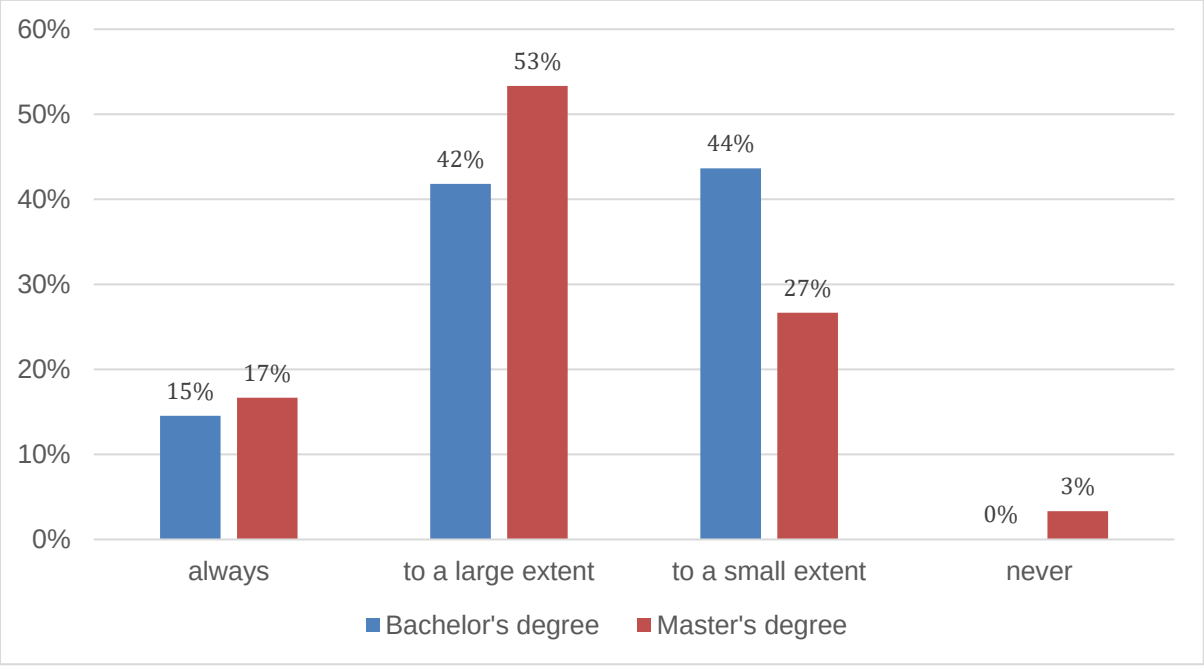

Figure 1. Are you gaining competences related to your field of study?

Two fifths of bachelor's degree students (44%) believe that competences acquired in the course of their study programme are related to their field of study only to a negligible extent or not at all. The same opinion was presented by one third of continuing master's degree students (30%). The difference may be caused by a more purposeful choice of a study programme on the part of master's

degree students or their greater experience with study of the particular field and a deeper comprehension of the interdisciplinary background.

The first research sub-question is complemented by the second research sub-question: "Do their expectations of the knowledge and skills acquired in the classroom match the curriculum?" The fulfilment of expectations regarding the representation of knowledge and skills in the curricula of bachelor's and continuing master's degree programs was identified to a greater extent in the group of master's degree students.

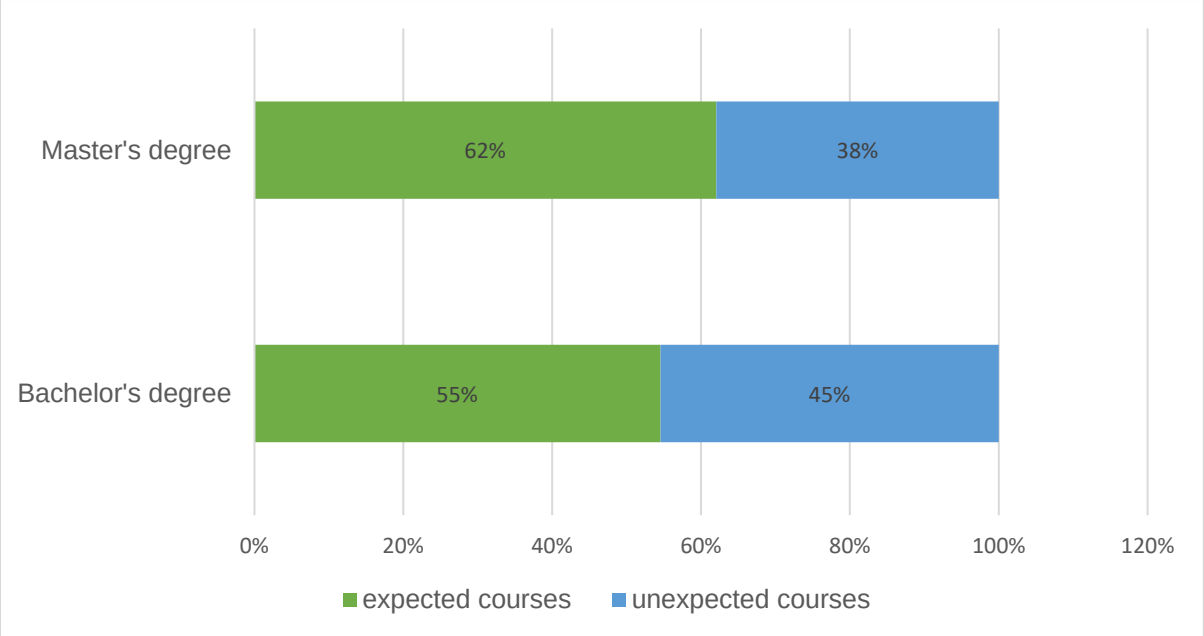

Figure 2. Does your study programme consist of the courses you expected?

Figure 2 illustrates that for 45% of bachelor's degree students, the study programme is not fulfilled by subjects they expected to be studying. In our opinion, these students do not have any particular idea about the fields they study. The fields studied in the study programmes attended by the students under investigation are not represented as individual subjects in secondary-school curricula. As a result, the students' expectations were derived rather from common sense. Almost two fifths (38%) of students of the master's degree study programmes also believe that the studied programme does not contain subjects they expected to be studying. This fact cannot be explained with common sense as the basis of their expectations. What is more likely is that continuing master's degree students expected that their practical skills would be enhanced, rather than their theoretical knowledge.

This fact is documented by their answers to the following question, where the students were asked whether there is something missing in their study programmes, and if so, what is missing. The first part of the question received a positive answer by 56% of students. As to the follow-up open question inquiring about what in particular is missing, the topics identified in the students' responses are shown in Figure 3.

Figure 3. Topics missing in the curriculum (teaching)

From the Scheme 1 we can see that students lack: more “practical" knowledge, more practical subjects, exercises, more focus on Human Resources, management, legislation, economics, practical personnel work, social etiquette, self-development, mental health care, mental hygiene, evaluation, recruitment, tutoring, coaching, informal education, more psychology, methodology, basics of pedagogy and educational policy, community education, education in developing countries, didactics, and tourism. The answers listed support the validity of our assumption that students miss a greater extent of practical skills in their curricula (in teaching), as documented by interpretation of Figure 2.

The third research sub-question inquired whether students learn something else in their lessons apart from knowledge and skills declared in the curriculum. On the basis of a generalization of the studies presented above, we identified that the content of tertiary education is directed towards transversal competences.[14] For this reason, we created our own list of transversal competences that students believed students actually learnt and considered important to learn.

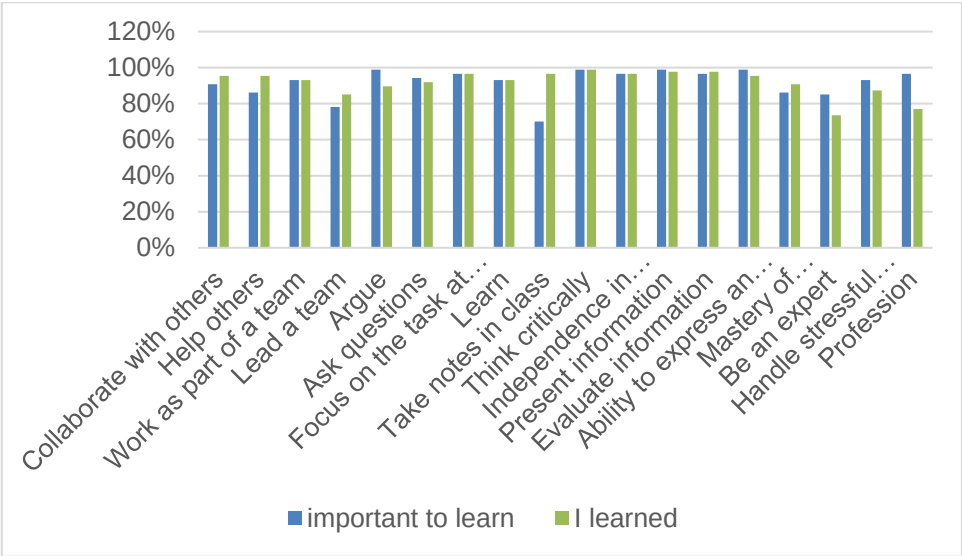

Figure 4. Important to learn versus learnt

What is noteworthy in Figure 4 is the situation where the blue column is higher than the grey one; this shows that the teacher does not teach what students regard as important (e. g. profession, being an expert, or argumentation). However, it is also worth noting the opposite situation, i.e., a teacher teaches something students do not regard as very important, such as taking notes, collaboration with others, helping others, or leading a team.

Concerning this research sub-question, another point of interest for us was which approaches the teachers used while teaching. Figure 5 shows that teachers used motivational, individual, and supportive approaches in education less frequently.

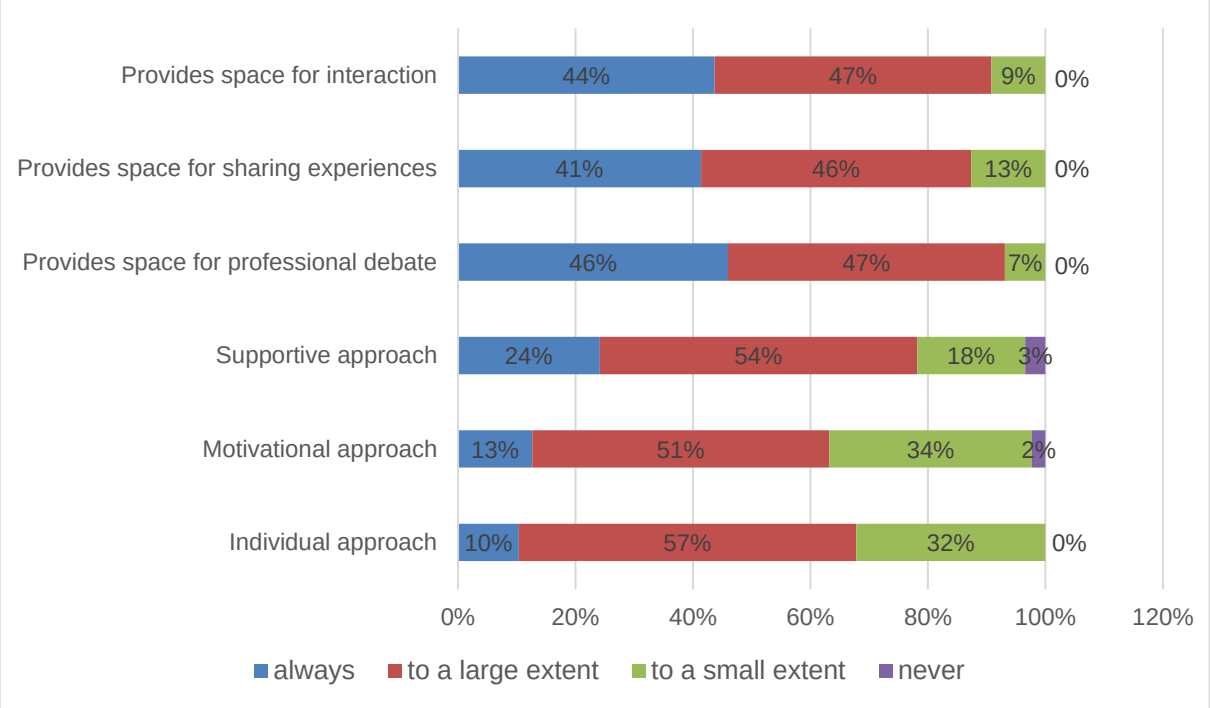

Figure 5. Important to learn versus learned

At the end of the questionnaire, the students were asked the following open question: "If you could say that one of the teachers is an inspiration for your life, please write in what." The themes identified in these responses are shown in the figure 6.

Figure 6. What do students appreciate about their teachers?

From the Figure 6 we can see what students appreciate most about their teachers: experience, inspiration, passion for their subject, passion for the cause, interesting life story, own experience, interaction with students, rich experience also from practice, and an equal approach to all students. Additionally, there is: professionalism, tolerance, empathy, critical thinking, motivating in studies and in life, understanding students, non-judgmental approach, supportive approach, desire to move forward, open and understanding approach to people, communication skills, argumentation, expertise, clarity, modern approach to teaching, practical teaching, personal self-development, positive thinking, the ability to convey information clearly, and simply, an overview of many issues, very good knowledge, human approach, and "normality". They are not afraid to experiment and try new things in teaching, insight, humanity, and interest. They know how to deal with situations. They are open to discussion and sharing opinions. They can excellently formulation of thoughts. They can affect students and leave impressions and emotions in them.

The presented conclusions correspond to the results of research into student expectations and suggest that the students' expectations are universal across various study programmes, fields of study, and countries.[15]

CONCLUSION

Let us return to our main research question: "What do students learn in the class? What is beyond the curriculum?" The obtained data showed that students of continuing master's degree programmes learn, in their view, fewer skills compared to bachelor's degree students, which is related to the fact that master's degree students expect more subjects focused on practical skills in their curriculum. Nevertheless, continuing master's degree students acquire more competences in the course of their study compared to bachelor's degree students. The reason for this fact may be a deeper interest in the field at the master's level of study, as documented by the fact that in the case of master's degree students, the subjects taught correspond to a greater extent to their expectations, in contrast to bachelor's degree students. An important aspect for students at both levels of study are transversal competences. The students expect that teaching will focus to a greater extent on argumentation, expressing ideas, and expertise. An interesting finding is that although they study academic kinds of study programmes, the

students call for a greater focus on practical skills and a professional focus. Students indicated that teachers use individual, motivational, and supportive approach to study to a lesser extent, which was reflected in the aspects the students appreciate on their teachers. The most appreciated aspects included an inspiring approach, the passion for the field of study, understanding students and their problems as well as openness to discussion. Students also appreciate communicative skills and the ability to explain a problem clearly and to link theory and practice.

The results of the present research correspond to those presented foreign studies reviewed within our research project; their common ground are transversal competences which should be addressed in teaching and curriculums without omitting field-specific knowledge and skills that build the basis of graduates' expertise.

NOTES

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GRAB THE COLOR AND RUN: UTILIZING A DIGITAL COLOR PICKING APP TO TEACH COLOR THEORY

Author:
BETTY TORRELL

Affiliation:
MORGAN STATE UNIVERSITY, USA

INTRODUCTION

"Grab the Color and Run" is a digital exercise used to teach color theory as a means of graphic communication in a design studio. It is currently employed in the Morgan State University SA+P's (School of Architecture and Planning) Interior Design Program's design studios. The exercise utilizes a digital color picking app to assist the design student in creating a color palette for their studio project based on the psychology of color. This color palette then becomes the basis for a more nuanced color scheme supporting the design concept of the student's studio project. The digital app replaces a traditional method of using paint swatches to explore the application of color theory.

This paper describes the exercise and begins to evaluate the selection and use of the app in the exercise through the lens of UNESCO's *Global Education Monitoring (GEM) Report, 2023: technology in education: a tool on whose terms?* According to the *2023 GEM* report, "The first question should be: How can we improve education? And only then: Can technology be one of the tools, among others, that help us achieve this goal?"[1]

The *2023 GEM* report outlines four uses of technology in education:

1. The operation and maintenance of technology,
2. A means of delivery for teaching and learning,
3. A digital skill,
4. A planning tool to improve the efficiency and effectiveness of educational systems.[2]

The goal of this paper is to evaluate the technology used as a means of delivery of teaching and learning. The four metrics from the *2023 GEM* report to evaluate the use of the digital app in the exercise are:

1. "Appropriateness,"
2. "Equity,"
3. "Scalability,"
4. "Sustainability."[3]

The report calls for instructors as decision makers to ensure that we prioritize students' needs after asking ourselves if the use of the technology satisfies these four key metrics.[4]

Adapting traditional teaching methods to incorporate digital apps acknowledges the evolving nature of today's student population. Marc Prensky has coined the word "Digital Natives" in his article "Digital Natives, Digital Immigrants" to describe this student population.[5] These "Digital Natives" have grown up immersed in technology, demonstrating a high level of proficiency and comfort with various digital tools. And as Diana Oblinger notes in her work "Boomers, Gen-Xers, and Millennials: Understanding

the New Students," this generation approaches information processing differently from previous cohorts, preferring multimedia experiences over traditional print materials.[6] Prensky further notes that educators must adjust their teaching strategies to effectively engage with this tech-savvy student demographic and prevent potential disconnection from their students.[7] As Russell Baker, Erika Matulich, and Raymond Pap explain in their article "Teach Me in the Way I Learn: Education and the Internet Generation," the prevalence of technology in higher education further underscores the importance of integrating digital resources into instructional practices.[8]

Considering this shift, incorporating apps into teaching can serve as an effective supplement to traditional methods. However, assessing the appropriateness of any app usage poses a pertinent question: how can we evaluate their use? The *2023 GEM* report offers this framework for evaluating app usage based on the four key metrics, providing educators with a structured approach to selecting and assessing the effectiveness of educational apps in the modern classroom.

DESCRIPTION OF THE COLOR PICKING EXERCISE, "GRAB THE COLOR AND RUN"

This exercise was originally developed with a series of step-by-step tasks as part of the students' design process in which the students create a color scheme to support their design concept for their design studio project.

Exercise Goals

Background

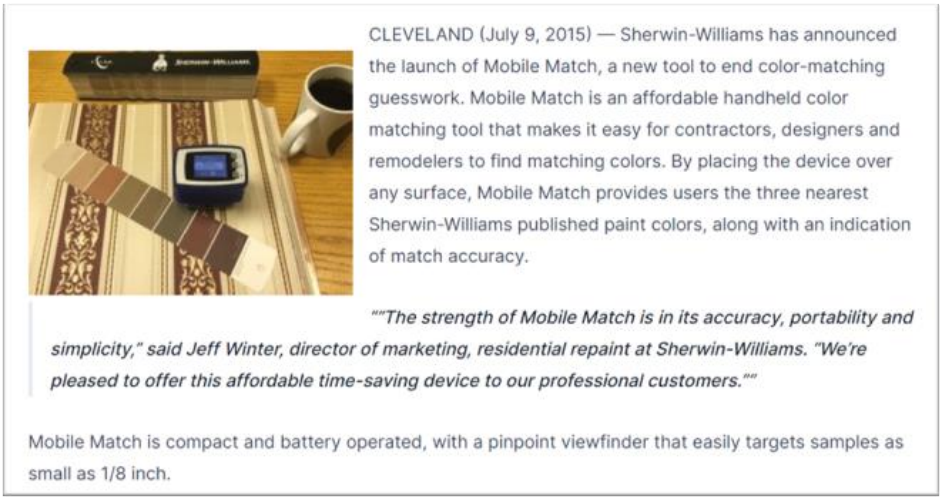
The intent of the exercise was to find an objective methodology for students to understand and apply an innovative, effective, and impactful use of color theory in the design process. Students working on design projects in the studio setting had shared with me that they often picked the color schemes for their projects by choosing colors randomly, using personal color preferences, or reusing color schemes from previous design projects; none of which utilized color theory as a design tool. The intent was then to create an exercise to lead them through the process of creating a color scheme for their projects utilizing one aspect of color theory, the psychology of color.

Substituting a digital modality

As digital technology evolved, I realized I could replace the traditional method of hand mixing and painting physical color chips with tempera to learn and apply color theory, and I began thinking of ways to reduce the cost and the availability of paint tools and paper, drying time involved in hand mixing tempera, and the mess created for classes often held in a computer lab. Since students used their personal laptops for their computer-aided design (CAD) work, I searched for digital tools that would replace the traditional use of paint color chips.

Selecting an app

I first became aware of color picking apps in 2015 when Sherwin-Williams launched *Mobile Match* (later replaced with *ColorSnap* on a cell phone) "a new tool to end color-matching guesswork for homeowners." It was an affordable handheld digital color matching tool that made it easy for contractors, designers and remodelers to find matching colors. By placing the device over any surface, *Mobile Match* provided users the three nearest Sherwin-Williams published paint colors, along with an indication of match accuracy."[9.] However, it required the purchase and use of a proprietary device that was used to digitally target physical samples for color picking.



CLEVELAND (July 9, 2015) — Sherwin-Williams has announced the launch of Mobile Match, a new tool to end color-matching guesswork. Mobile Match is an affordable handheld color matching tool that makes it easy for contractors, designers and remodelers to find matching colors. By placing the device over any surface, Mobile Match provides users the three nearest Sherwin-Williams published paint colors, along with an indication of match accuracy.

""The strength of Mobile Match is in its accuracy, portability and simplicity," said Jeff Winter, director of marketing, residential repaint at Sherwin-Williams. "We're pleased to offer this affordable time-saving device to our professional customers.""

Mobile Match is compact and battery operated, with a pinpoint viewfinder that easily targets samples as small as 1/8 inch.

Figure 1. Sherwin-Williams Launches a Handheld Color-Matching Device

Later, knowing that other apps had been developed to pick colors, I looked for a color picking app that would manipulate as well as pick colors, and that could be used by students to create a color palette for their design projects. I found the phone app *Irodori,* which was an early smart phone app that created a color palette from an image. The color palette could be saved to a digital library or shared to a computer. However, the app required a smartphone, which many students did not own at that time. When *Irodori* was no longer supported by its developer, the students experimented with several hand-held and computer-based apps, and "Adobe Color: Color Palette Generator" became the overwhelming choice for its user-friendly function, variety of tools and availability.

Currently, the steps of the exercise continue to use "Adobe Color: Color Palette Generator," (part of the *Adobe Creative Cloud* suite). This presentation will take you through the process with the app, however, it is important to note here that it is possible to use a myriad of other color picking apps. This presentation is not intended as an endorsement of the *Adobe* app, which stands here as nonspecialized app for this case study.

Color psychology

Students use the "Grab the Color and Run" exercise to create and apply a color palette for their projects using the app to select colors from an inspirational image that reflects the emotions the student hopes to elicit in the users of the space physiologically and psychologically. The color palette is then manipulated by the student to create a specific nuanced color scheme for the project.

The Exercise Process

The student follows the steps below to complete the exercise:

Step 1: Creating a word list

Students begin by creating a list of key words or "qualifiers" that elicit an earmarked emotional response that aligns and supports the design concept for their specific project type. For example, a design concept for a pediatric dental clinic that is inviting, comfortable, and welcoming might use the following qualifiers:

1. "Secure,"
2. "Positive mental energy,"
3. "Fun,"

4. "Calm."

Step 2: Associating the qualifiers with specific colors

Specifically referencing J. Oleson's "Color Meanings – The Power and Symbolism of Colors"[10] students then associate these qualifiers with specific colors utilizing the psychology of color:

1. Black for "secure,"
2. Blue for "positive mental energy,"
3. Yellow for "fun,"
4. Gray for "calm."

Figure 3. The Effects of the Color Gray from J. Oleson's "Color Meanings – The Power and Symbolism of Colors."

Step 3: Selecting an inspirational image

Students then select an inspirational image that reflects the desired emotions' qualifiers, and which incorporates the specific colors based on the psychology of color.

Step 4: Using the app to pick colors

Students then use the app to select the specific colors from the image. The fact that the colors are chosen by the app forces the students out of their comfort zone into innovative and unique color schemes which respond to their qualifiers and thereby support their design concept.

Step 5: Using an app to manipulate the color palette to create a color scheme

While it possible to use the original colors picked by the app, the students are not strictly tied to the specific color selected by the app from their inspirational image. They can continue to manipulate the color palette in several ways through the app functions in order to create nuanced color schemes to support their design concept, using the app's "Color Mood" function, for example, "Colorful," "Muted," or "Bright."[11]

Step 6: Using an app to manipulate specific color hues for their color scheme

Students can continue to manipulate any single color in their color palette using other color labeling and manipulation apps as well. Students can use the *ColorHexa, Color Encyclopedia* website to explore shades, tints, and tones of each of the individual color hues in their color palette.[12]

Step 7: Using an app to evaluate the colors in terms of accessibility of the user

Students can also use the "Color-Blind Safe*"* tool in *Adobe Color*'s "Accessibility Tools"[13] function to ensure that the color scheme is "color blind safe" that is, the color scheme is distinguishable by users with color-blind aspects of vision impairment.

Step 8: Identifying and labeling the colors with color labeling systems

The students also use color labeling apps to identify and label the colors in their color scheme as part of the exercise to become familiar with, understand and apply color labeling systems. Although the *Pantone* system is more widely recognized in many of the design professions, this exercise uses a HEX system as it is free and is also widely used by consultants in the industry such as graphic designers and vendors such as signage suppliers. Students explore and apply a hexadecimal (HEX) color labeling system through the *ColorHexa*, "Color Encyclopedia, Information and Conversion" [14] function to identify and label their colors. HEX codes use a hexadecimal format for identifying colors and each HEX code refers to a very specific color, which allows two designers, or any group of team members, to be on the same page about the exact light blue (or any other color) they are referring to.

Examples of Student Outcomes

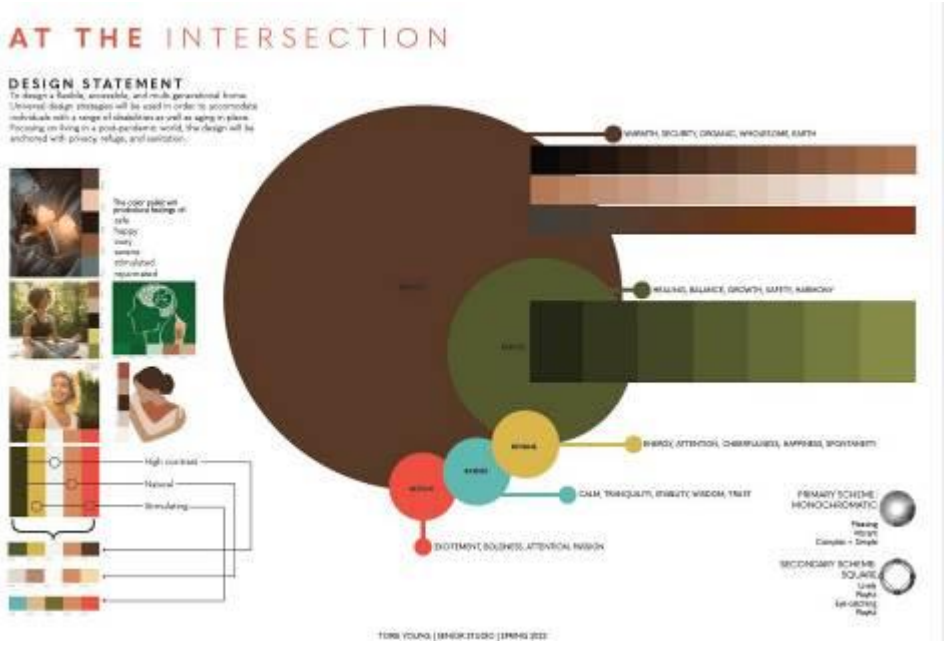


Figure 3. A Student Outcome from a 300-Level Interior Design Studio at Morgan State University

THE USE OF AN APP FOR A COLOR PICKING EXERCISE AS A CASE STUDY

As highlighted in the 2023 *GEM* report, digital technology is increasingly pervasive in individuals' everyday experiences, and its impact on education is inevitable. The report underscores the challenge posed by the rapid evolution of technology and the limited access to evidence, controlled largely by technology providers, which makes it challenging to determine the most effective technologies, their suitability in different contexts, and the conditions under which they are most beneficial.[15]

The aim of this paper is not to assess the precise digital competencies acquired by students, but rather to appraise the app's effective use based on the four metrics outlined in the *2023 GEM* report:

1. "Appropriateness,"

2. “Equity,”
3. “Scalability,”
4. “Sustainability.”

The *2023 GEM* report underscores the challenge of assessing digital literacy comprehensively due to its multidimensional nature, making it challenging to gauge all aspects through a single evaluation.[16] Measuring digital skills acquired through technology often poses difficulties, however, this could be the aim of a parallel study.

This paper aims to examine the effective application and use of the technology in an educational environment through a case study approach using the four metrics outlined in the *2023 GEM* report. According to Robert Stake, a case study is characterized by its focus on an individual case rather than the specific research methods employed, and it centers on analyzing a distinct, well-defined system.[17] Despite potential criticisms of the case study model, it remains a valuable research strategy.

Is it Appropriate?

“Especially suitable or compatible; fitting”[18]

The utilization of technology in this exercise was considered appropriate for several reasons. Firstly, the selection of apps for the exercise was primarily based on their compatibility with students' personal laptops, ensuring they did not require excessive memory or RAM. Changes to the apps used were also based on student-centered requirements for enhancing the exercise in terms of the students’ current skill set. Additionally, the appropriateness of the digital technology evolved over time to incorporate emerging advancements as the capabilities and outcomes of the technology progressed. Revisions were only made when the technology enhanced the student-centered process.

Is it Equitable?

“Dealing fairly and equally with all concerned”[19]

Initially, some apps lacked equity as they demanded specific technology or devices to participate in the exercise. For instance, the early *Irodori* app necessitated the use of a smartphone. Transitioning to the *Adobe Colo*r app’s “Color Palette Generator” function represented a step towards increased equity in the interior design studio. This shift was motivated by the fact that the *Adobe Creative Cloud* software is included in the students' computer applications package provided by the institution, eliminating the need for an additional specialized app.

Is it Scalable?

“Capable of being easily expanded or upgraded on demand”[20]

Given that the *Adobe Creative Cloud* suite is included in the institutions's computer software package, incorporating the "Adobe Color: Color Palette Generator" ensures the scalability of its technology across various courses and studio sequences within the interior design program. By utilizing this app for the color picking exercise, interior design students acquire digital skills applicable to color theory in other courses throughout their curriculum. Furthermore, these skills are transferable to their professional endeavors, as the *Adobe Creative Cloud* suite is widely utilized in professional design settings. Additionally, the technology's scalability extends to effortless upgrades for each student, facilitated by its adaptability as a multifunctional app for specific tasks. Although "Adobe Color: Color Palette Generator" is proprietary, it aligns with design industry standards and is not stored on students' laptops but rather maintained by their respective organizations, thus ensuring easy expansion or upgrades as needed.

Is It Sustainable?

"Maintained at length without interruption or weakening"[21]

Utilizing a multifunctional app for a specific purpose ensures its sustainability, as it is accessible through the institution's *Adobe Creative Cloud* package for students and does not necessitate individual sign-ins, sign-ups, or upgrades. Since it is included in the students' software package and not based on a subscription model, its functionality remains uninterrupted and does not expire like specialized app "student editions." This aspect is crucial for our students, as it guarantees continuous access and functionality without disruptions.

CONCLUSION: "A TOOL ON WHOSE TERMS?"[22]

The *2023 GEM* report emphasizes the increasing integration of digital technology into everyday life, noting its inevitable impact on education. While technology offers potential benefits for teaching and learning delivery, the rapid evolution of digital tools presents challenges in determining their effectiveness across different contexts. Moreover, the emphasis on developing digital skills prompts discussions on the suitability of specific technologies within educational systems.

The insights gleaned from this case study indicate that design education exercises can benefit from a versatile approach that incorporates both evolving digital modalities and traditional physical modalities. Effective utilization of digital technology in design education does not need to hinge upon reliance on a single specialized application or software. Instead, there is value in creatively adapting and leveraging various multifunctional software and apps for teaching purposes in design education. The emphasis should be on selecting apps in the students' best interests that align with the educational objectives rather than focusing solely on teaching to a specific app.

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THE UNIVERSAL DESIGN GAME: A 'SERIOUS GAME' FOR TEACHING AND LEARNING ABOUT ACCESSIBILITY IN URBAN DESIGN

Author:
JAMES BERGHAN, CRYSTAL OLIN

Affiliation:
TE HERENGA WAKA – VICTORIA UNIVERSITY OF WELLINGTON, NEW ZEALAND

INTRODUCTION

Universal design is foundational to ensuring diverse populations can safely and comfortably navigate the built environment. Imparting universal design knowledge to students in higher education can pose challenges though, especially where students might lack their own lived experiences of access and mobility challenges. This paper introduces *The Universal Design Game*, an innovative in Aotearoa New Zealand (NZ) to address this pedagogical need. As an example of a 'serious game', this board game introduces participants to real-life scenarios and challenges faced by communities with lived experiences of temporary and long-term impairments. By prompting participants to embody a design persona as they play, the game encourages negotiation and reflection on universal design principles and goals through various urban scenarios. Taking an autoethnographic-inspired approach, this paper draws from teacher reflections over three years of designing, deploying, and refining the game through annual trials with successive cohorts of undergraduate students. Feedback and insights gleaned from these trials underscore the game's effectiveness in fostering understanding and learner empowerment, alongside appreciation for the everyday importance of universal design. The game emerges as a compelling pedagogical tool, bridging theory with practical scenarios, and offering valuable insights for educators in architecture, urban design, surveying, and related domains. Our consideration of this 'serious game' concludes with recommendations for future iterations and use.

Principles and goals of universal design

Principles and goals of universal design are critical for creating inclusive urban areas, which historically have been designed by and for a narrow demographic; namely, well-resourced, able-bodied men.[1] Universal design aims to "improve human performance, health, and social participation"[2] through the creation of environments, spaces and systems that are accessible and usable by all members of society, regardless of age, gender, ability, or other factors. Under a universal design approach, an alert adult who can see clearly, walk confidently in any environment, and react quickly, particularly to cars, is considered the exception rather than the norm. When built environments, spaces and transport systems are designed with universal principles and goals in mind, they help to ensure accessibility for everyone including children, older people, and people with mobility or cognitive impairments (whether permanent or temporary).

Seven principles of universal design – equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, size and space – were established in the 1980s by architect Ronald Mace, and they have since been globally disseminated. As with any principles, they are not without limitations. While a detailed discussion of these limitations is beyond the scope of this paper, it is worth noting that Steinfeld and Maisel compiled a list of nine critiques of the principles, then reflected on these critiques and responded by developing eight universal design goals.[3] These goals relate to the principles and extend consideration of universal design into wider realms like social integration and cultural appropriateness. Figure 1 depicts the eight goals as together making up a wheel whose usability and forward momentum depend on an integrated approach incorporating all goals. The seven principles are color-coded around the edge and referred to by colored dots at the center of the wheel, placed next to each goal they are interconnected with. These interconnections were specified by Steinfeld and Maisel.[4]

Figure 1. The universal design goals and principles as an integrated wheel (graphic by author).

One of the universal design goals derived by Steinfeld and Maisel is health and wellness.[5] Indeed, evidence verifies that inclusive built environments, spaces and transport systems are important from a health perspective, particularly in terms of access and wellbeing.[6] Environmental barriers can impede accessibility, reduce mobility, and hinder participation in health-enhancing activities. When universally designed, the environments, spaces and systems that shape a person's everyday navigation become more inclusive, support mobility and bolster participation in health-promoting activities.[7] A comprehensive understanding of health extends beyond the physical realm and underscores the

significance of universal design. For instance, a transport system that embodies universal design principles can foster inclusion and participation in society – and, thereby, enhance wellbeing – by ensuring people can physically move around and access different parts of the built environment.[8] Moreover, universally-designed transport systems help to alleviate stigmatization and improve equity, as individuals no longer require special accommodations to move in and around their environment.[9]

Teaching universal design

As future designers of urban environments, it is important that students in relevant fields like architecture, surveying, and urban design, are well-acquainted with universal design. Approximately 15% of the global population experience disability.[10] In NZ, up to 24% of the population self-reported disability in 2013.[11] For tāngata whaikaha Māori (Indigenous Māori with lived experiences of disability), this figure is higher again where the prevalence of self-reported disability is 32%, once the younger Māori population age structure is accounted for.[12] These figures are all increasing due to ageing populations.[13]

Recognizing the complex and multifaceted nature of universal design, 'serious games' emerge as an engaging tool for students to learn and apply key principles and goals. Serious games are games (digital or analogue) designed for purposes beyond entertainment; they aim primarily to educate, inform, or train players on particular skills or topics.[14] Studies have found serious games have potential to improve learning in educational settings.[15] However, literature varies on the perceived influence of certain serious game attributes on learning. For instance, scholars like Crookall stress the importance of debriefing alongside gameplay to maximize the effectiveness of a serious game.[16] Grund and Schelkle advance this notion, contending that in-game debriefing can offer even more impactful learning.[17] Some studies go further to coalesce game attributes into frameworks of effective serious game factors, such as Watt and Smith's model combining social learning and motivational factors.[18]

A range of both digital and analogue games have emerged in urban design and transport contexts. For instance, König and colleagues developed a game to educate users about the potential of on-demand public transport, hypothesizing that it improved players' understanding.[19] In a later study, they evaluated the game with high school student participants and found students' knowledge (and retention) improved after playing.[20] Others have used digital or virtual game elements such as simulation to place learners in different environments and embodying different perspectives, including from that of a wheelchair user.[21] To date, though, the inclusion of universal design for urban environments, spaces and transport (both from a usability and a policy perspective) in serious games is limited, and needs further exploration.

Research aims

This paper has two aims. The first is to introduce *The Universal Design Game*, an educational board game exposing students to a range of everyday scenarios and challenges faced by people with a disability or mobility impairment. The second aim is to critically reflect on the effectiveness of this game as a pedagogical tool as implemented in an undergraduate teaching module about critical urbanism.

The remainder of this paper outlines how to construct and play *The Universal Design Game*, followed by an autoethnographic-inspired research reflection on lessons learnt in testing the game with undergraduate university students in NZ between 2021-2023.

THE UNIVERSAL DESIGN GAME

The Universal Design Game is a simple roll-and-move board game, where players roll a die and move a playing counter the corresponding number of spaces around a board. As with other board games, all players begin on the 'start' square; the first player to reach the square labelled 'finish' is the winner. As players move around the board, they are exposed to photographs or graphic depictions and scenarios of real-life examples where universal design has (or has not) been effectively integrated in an urban environment. As each scenario is encountered, the player interacts with that scenario as prompted by 'scenario' or 'spectrum' cards (as detailed below).

Materials

To ensure the game is accessible to a wide range of people in educational settings, the materials required are simple and can be easily sourced and/or printed on simple paper (a set of printable files are available on request from the corresponding author). Those administering and playing the game need only the following:

1. *The Universal Design Game* board (Figure 2);
2. A die;
3. Playing counters for each player;
4. One set of 24 'scenario' cards, signified with an exclamation mark (Figure 3); and
5. One set of 24 'spectrum' cards, signified with a two-ended arrow (Figure 4).

Figure 2. Board for The Universal Design Game (image by author).

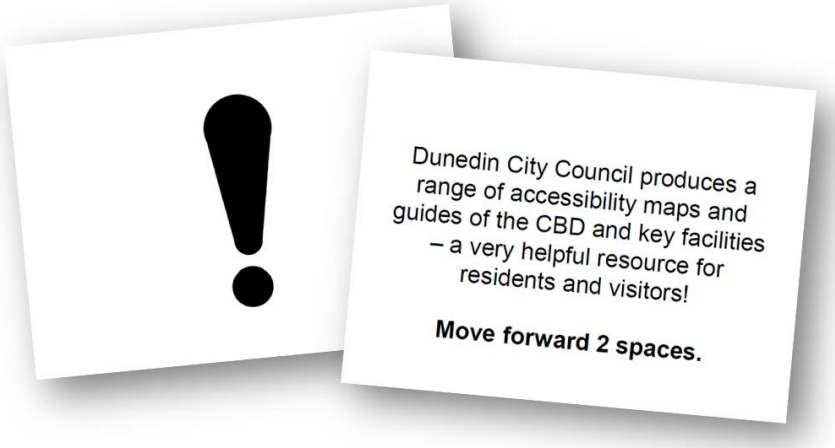

Figure 3. Front and back of a 'scenario' card (image by author).

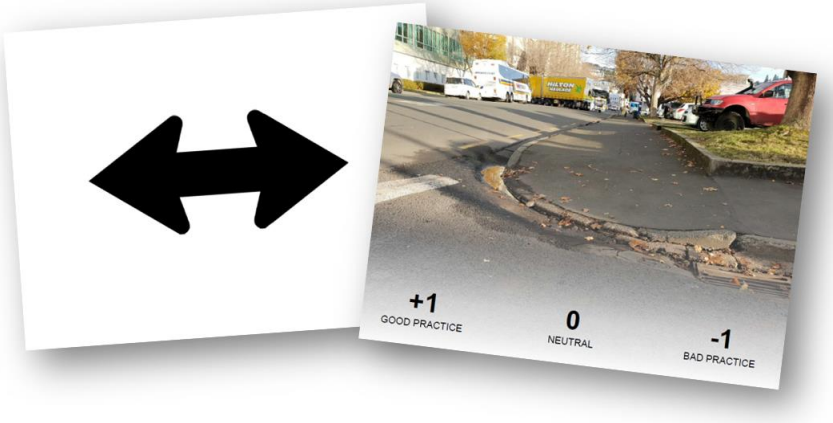

Figure 4. Front and back of a 'spectrum' card (image by author).

Instructions

As with the materials, instructions for the game are relatively simple and echo the familiar landscape of everyday board games familiar to most. Essentially, the game involves three easy steps, as outlined below.

Step one: Set up the board

- Place the board on a level surface (after printing the board, if not otherwise acquired).
- Collate the two sets of cards (again after printing, if not otherwise acquired): the 'scenario' and 'spectrum' cards should be placed face down in two separate piles near the board (i.e., with the exclamation mark or double-arrow showing).

Step two: Allocate design personas

- Pedagogical intent: if we create situations which are good for personas that represent those facing particular access and mobility challenges, then those situations will also be good for everyone else.
- Caveat: we have blinkers. Not all players will have the life experience or empathy to look through the lens of specified personas; it is a starting point, but not a replacement for engagement with people who have the lived experiences summarized for each persona).

Step three: Begin play!

- The youngest player begins, rolling the die and moving their playing counter the corresponding number of spaces on the board.
- Players take turns, in a clockwise order.
- Landing on a marked square:

○ If a player lands on an exclamation mark, they pick up a 'scenario' card and read aloud the scenario. The card has instructions on how the player should proceed, depending on whether the scenario is positive (i.e., move forward X spaces), negative (i.e., go back Y spaces) or neutral (i.e., remain on the square for another round).

○ If a player lands on a two-headed arrow, they pick up a 'spectrum' card. The card features a photograph or graphic depiction of an element of urban infrastructure. Based on that player's design persona, they negotiate whether the infrastructure shown is supportive (move forward one space), detrimental (move back one space), or neither (remain on that playing square).

- While only one player is active at a time, others are encouraged to discuss how the infrastructure shown relates to their respective personas, and whether they would have moved (and in what direction) should they have landed on that card.

Figure 5. Players negotiate how to respond to a spectrum card (image: Daniel Adams)

TESTING THE GAME

The first version of *The Universal Design Game* was produced in 2021 and played with third-year undergraduate students at the University of Otago in Dunedin, NZ. It was played during a scheduled class session for 'SURV303 Urban Design 1', a 12-week introductory course about principles of urban design, for students pursuing a surveying degree.[22] (Note: in NZ, surveyors are often tasked with urban design projects, such as laying out new developments or designing streets.) The game was repeated with subsequent student cohorts in the same course the following year (2022) and then again in 2023. Class sizes varied between 58-63 students across the three years, and males are typically over-represented (approximately 80-85% students in the course each year are male, whereas males make up only 39% of students across the university as a whole[23]).

The next part of this paper summarizes our critical reflections of trialling the game across the three years in a surveying educational context, in preparation for further trials of the game in a 2024 urban

design course with a larger cohort of approximately 130 third-year undergraduate architecture, interior architecture, landscape architecture, and building science students at Te Herenga Waka – Victoria University of Wellington, in NZ.

Placing students at the center of their own learning

Playing *The Universal Design Game* enables students to take control of their own learning and contribute to their peers' learning. In contrast to conventional lecture-based lessons, content for the universal design component of this course was predominantly delivered through the game itself (following a brief introduction explaining to students how to play the game). Having students negotiate with one another about how their respective personas respond to different scenarios and urban infrastructure as they moved around the board sparked lively discussions about positive and negative design features, and for all players, not just the person whose turn it was at that time. This is consistent with gamification literature, reinforcing that "[g]ames teach by not telling students what to do".[24]

Building learner confidence

Informal feedback from students indicated the game's capacity to build learner confidence. Most students in our trials started the exercise with little or no knowledge about universal design, and they tended to also lack confidence in pursuing design that is responsive to people with access and mobility challenges. Nevertheless, these students gave positive feedback about exploring new concepts through the non-judgemental context of gameplay. They described being on the same 'level' as their peers and felt comfortable learning challenging concepts alongside others who were also learning.

Highlighting barriers in the built environment

In addition to placing students at the center of their own learning and building their confidence to explore new concepts in the company of peers, the game also highlighted the striking shortfall of our urban environments, spaces and transport systems to accommodate individuals with disabilities. Across the three years, students consistently noted that they were "constantly going backwards"; when students drew a card that presented them with a scenario in the built environment, that scenario usually featured barriers for their personas, meaning students were often moving back spaces on the board. This effect tended to be even stronger for students whose persona involved a person in a wheelchair. Many able-bodied students who participated took aspects of their mobility for granted; by playing the game, they gained an important awareness of the range and frequency of barriers in the built environment that could regularly impact their persona in the game (contrasting with their own relatively barrier-free lived experiences).

Next steps

There are a range of directions for further trialing of *The Universal Design Game* and research into its pedagogical effectiveness. While this paper introduces the game, and summarizes our critical reflection on initial trials, follow-up empirical testing with participants playing the game (through pre- and post-game surveys and/or focus group interviews), alongside linked analyses of overall course grades could help to garner insights on effectiveness, level of engagement, and knowledge transfer from the game. Potential also exists beyond the classroom and explore how the game could be used as a pedagogical tool with built environment practitioners and policymakers as a form of continuing education.

Alongside testing, further iterations of the game could better represent lived experiences of disability communities. In this first version, images and hypothetical scenarios have been drawn from literature, best practice guidelines, and self-generated from the local built environment, photographed or

graphically depicted through the eyes of able-bodied staff and students. Whilst these scenarios are academically reputable, there is opportunity to work with disability communities whose lived experiences would be invaluable in revising or co-designing future game iterations. Benefits of experiential knowledge cannot be understated; reliance on only professional knowledge of universal design is a limitation of this first version of the game.

Similarly, most game elements in this first version focus on aspects of physical access and mobility. Future iterations of the game could further include design strategies that consider neurodiversity or non-visual elements, such as areas of retreat or respite from loud noises or social contact in public spaces. Co-designing game elements with diverse members of society would help ensure the game captures a wider variety of experiences and interactions with potential barriers in the built environment. In fact, future iterations of the game should aspire to educate players on a wider, integrated approach to universal design through consideration of the eight goals identified by Steinfeld and Maisel.[25] Notably in NZ, Auckland Council has adopted these goals "to provide a clear and holistic picture" that underpins their approach to universal design.[26]

In the NZ context, any revision or co-design of the game should place tāngata whaikaha Māori perspectives and experiences at the heart of the game, in line with the 'cultural appropriateness' universal design goal. Tāngata whaikaha Māori experience disability at higher rates than their non-Indigenous counterparts in NZ and are thus more likely to experience poorer social, cultural and economic outcomes.[27] Furthermore, ways in which Māori and Western-centric communities conceptualize 'disability' vary. Western approaches to disability have tended to take a deficit approach, whereas examples of pre-colonial Māori perceptions showed the opposite where individuals with 'impairments' were often highly-revered or had "god-like power and god-like status".[28] Despite this, disability knowledge and services in NZ have largely been shaped by Western perspectives,[29] underscoring the need for future games and other tools used to educate built environment professionals to recognize and highlight the compounding impacts of disabling design alongside colonization, coloniality and racism.

CONCLUSION

In this paper, we introduced *The Universal Design Game*, a board game trialed since 2021 with undergraduate students in NZ, to build their awareness and understanding of universal design through gameplay. Design is never neutral; decisions that designers make can enhance or reduce the quality of life for different people in different ways. By prompting student players to engage with the various implications of design decisions for diverse individuals, the hope is that these students will go on to help design and advocate for more inclusive urban environments, spaces and transport systems. Further testing and revision or co-design are needed to evaluate and expand the game's efficacy beyond its initial novelty and to gauge its lasting impact on students' awareness and understanding of universal design approaches.

NOTES

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COMMUNITY-BASED LEARNING IN THE DESIGN CLASSROOM: A SPACE FOR EXPLORING IDENTITY, CLASS, RACE, GENDER, AND CULTURE.

Author:
ANGELICA SIBRIAN

Affiliation:
UNIVERSITY OF ILLINOIS, USA

INTRODUCTION

Graphic design is no longer simply about graphics, aesthetics, type and image. In today's visual landscape, identity, race, class, gender, and culture need to be taken under consideration. With an increased diverse student body—which bring a wealth of knowledge, skills, and experiences into the classrooms—new strategies need to be incorporated to better prepare students for the field of design.

In *Capslock*, Ruben Pater denotes designers as Scribers, Branders, Engineers, Salespersons, Entrepreneurs, Hackers, Activists, Futurists and Educators.[1] Graphic design is no longer just about packaging, advertising, and sales—that is only a portion of the job—designers must ultimately, learn to engage in, think about, and articulate their experiences, so they can better understand their surroundings and clients' needs. Conversely, the traditional Eurocentric ways of learning are no longer sufficient for a globalized industry. As a result, graphic design educators must work to transform the curriculum. As bell hooks points out, professors need to be willing to take the risk that engaged pedagogy requires to make their teaching practices a site of resistance to encourage students to explore new ways of *knowing*, *learning*, *doing*, *being* and *making* "rather than embodying the conventional false assumption that university setting is the "real world". [2] The democratic educator seeks to re-envision schooling as part of the real-world experience.[3]

Drawing upon several theories such as Paulo Freire's *Pedagogy of the Oppressed*. Gloria Anzaldúa's *Outsider Within Theory*—where the basic concept embraces multiple social perspectives while fighting against the material forms of oppression[4]—and *Critical Race Theory,*[5] this approach aims to bring depth and complexity into the design classroom. This paper will explain how community-based learning, intersectionality, and positionality were integrated into the design coursework. It will share the outcome of the assignments, discuss the limitations and implications of the exercises, and conclude with some final thoughts on the value of using community-based approaches to invigorate the design curriculum.

COMMUNITY BUILDING AND LEARNING

Although educational institutions are at the forefront of expanding knowledge and empowering individuals, they are also contributors to the distress.[6] It is in educational spaces where students begin to identify with race, class, nationality, religion, gender, sexual orientation, and social background. However, they are rarely discussed in design classrooms. Addressing race and racism, human rights, gender inequality and diversity are initial steps to shifting the classroom from an institutionalized

system of domination to a community-centered environment. Acknowledging this basic reality allows for certain theories to come to the forefront.

Community-based learning

Community-based learning, as a liberating pedagogical approach, aims to amplify the cultural richness that students bring to the classroom.[7] It is a teaching and learning strategy used in the educational field that integrates meaningful community engagement with instruction and reflection to enrich the learning experience for all students.[8] It acknowledges the students' communities and interests to engage them in learning. It gives an opportunity to apply and connect with what they are learning in classroom to real-life settings. A second concept that enhances the design classroom culture is unds of knowledge, a framework which underscores the importance of valuing the multifaceted forms of information that students bring to the classroom.[9] Rather than assuming a deficit in knowledge, educators must find ways to honor the cultural and familial experiences that students bring to their projects.[10]

Mestiza consciousness

Mestiza consciousness originates from Gloria Anzaldúa's Borderlands, it interprets the experiences of mixed-race individuals navigating multiple cultures and identities. "[It] is a product of the transfer of the cultural and spiritual values of one group to another. Being tricultural, monolingual, bilingual, or multilingual, speaking a patois, and in a state of perpetual transition"[11] … which results in indecisiveness and insecurities. By addressing this multiplicity, the individual can learn to navigate various spaces. This concept is rooted in W.E.B. Dubois's double consciousness, wherein individuals grapple with the duality of their existence within oppressive structures.[12] Paolo Freire's concept of critical consciousness further contextualizes oppressive structures,[13] providing a framework to challenge societal norms and an opportunity for new and innovative self-exploratory exercises within the design curriculum.

Positionality and Intersectionality

In designing classroom assignments, principles of positionality and intersectionality serve as guiding frameworks. These concepts help illustrate the multiplicity of social forces that shape situated experiences and identities. Positionality refers to the understanding of one's identity/position amongst different, larger societal group and systems.[14] Helping students understand their positionality allows them to explore and express their own values, views, and locality. It fosters a sense of place—a sense of empowerment to slowly give rise to new ways of *being*, *learning*, *doing*, and *making*.

The term "intersectionality"—has its roots in Black feminist activism and was originally coined by civil rights activist and critical legal race scholar Kimberlé Williams Crenshaw in 1989—describes the complex ways and multiple forms of discrimination experienced by marginalized individuals.[15]

Crenshaw used the term intersectionality to refer to the double discrimination of racism and sexism faced by Black women.[16] Aware of these oppressive structures, the author includes activities and exercises that explore identities, structures and positionality. The author values the acknowledgement of positionality and how these identities affect the ways of being, learning, doing and making. With that in mind, she shares her positionality.

Positionality Acknowledgement

I am a Guatemalan woman teaching graphic design in a non-tenured position in a predominately white institution. I grew up in inner-city L.A. I was taught that Americanization meant assimilation, causing me to lose my identity, my culture, and my way of being and doing during the process. My childhood

educational experience gives me a nuanced perspective as I critique learning spaces in higher education. I draw upon my personal experiences in addition to research.

Community-based teaching

What does building community in a design classroom look like? How do you begin to navigate and address these sensitive socio-economic and political topics? How does this model begin to build classroom community through the explorations of class, race, gender, and culture? Does it create a divide or does it unify? As hooks points out in her book Teaching Community, "Family is the first community that most of us know."[17] When the family unit is fractured, those experiencing this conflict lose faith not only in their relatives, but in every human bond. Students coming into the design classroom from typical American educational systems are also suffering from this "break-up".[18] In the context of design—a discipline which requires divergent and convergent thinking principles and where students need to learn the graceful dance of rhythm and harmony—it is imperative that conversations about gender, class, oppression, culture, etc. are brought into the design classroom.

In response to this, new design principles were created for Ethics of a Designer in a Global course. These guiding principles reflect on identity, raise critical consciousness, and help students explore their curiosities.

1. **History as an Opportunity:** This principle seeks to uncover one's own identity, and respect that knowledge as a way of understanding one's biases, surroundings and social class.[19]
2. **A Tolerance for Ambiguity:** Allowing pluralistic modes of making which embraces the good, the bad and the ugly—a movement away from set standards and singularity.[20]
3. **Invoking Art:** In traditional Native-American cultures, the artistic and functional were not considered as separate entities, art and everyday life were intertwined. Dance, music, poetry, singing were playful yet functional activities.[21] Evoking play and critical consciousness.

Similarly, the design curriculum needs to be in a dance with self-awareness and aesthetically pleasing visuals. Beginning with investigations of the self, others and the social environment. In connecting with the self, the body and mind need to be in harmony with one another to generate self-reflective moments. In connecting with others, the designer must examine the axial relationship with the client while mediating dialogue for the objective. Finally, in connecting with the environment, the designer needs to bring dimensionality and plurality to the forefront. These principles work towards a new consciousness. It offers an opportunity to *not* automatically start designing, but truly embrace the process of making.

CLASSROOM STRUCTURE AND ASSIGNMENTS

Ethics of a Designer in a Global Economy course begins with discussions of the principles presented. To construct a community-centered, inclusive classroom, students are shown a diagram of the course structure. Figure 1 aims to articulate this design process to further expand the traditional design process. It illustrates how personal beliefs, values, and lived experiences play a role in how one navigates and interacts with the world.

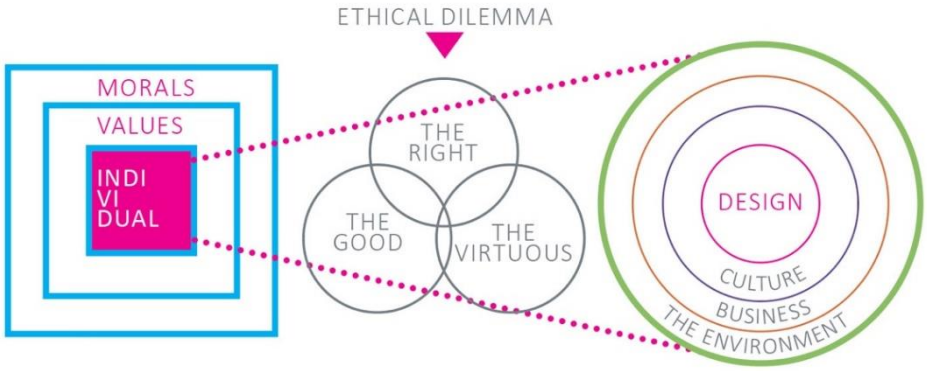

Figure 1. Ethics of a designer in a global economy diagram, ethical dilemma.

Self-exploratory exercises

The first six weeks of the semester are spent on working on exercises that unpack personal values, culture, and identity. The first module explores personal values and are *ungraded* icebreaker exercises that ask students easy questions about their favorite music, bands, colors, hobbies—once they are comfortable with that—they are prompted to create a values pyramid as shown in figure 2. Students are handed a list of values to help them develop their own. These exercises are shared with their peers, both in small and larger groups, to help them get comfortable with one another—and with me—the transition from ungraded to graded assignments is subtle as the first graded assignment asks them to use the content from the previous exercises to design a visual artifact.

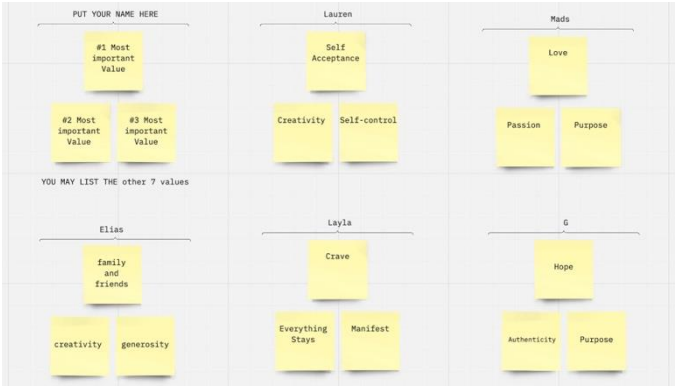

Figure 2. Values Pyramid Exercise

Discussions of positionality and intersectionality are introduced with a matrix that allows them to choose certain aspects of their identity. As they deconstruct certain beliefs—whether real or perceive—they begin to understand that positionality and context inform how they relate to others, but it can also lead to biases. Although, these exercises may seem disconnected, students begin to understand the complexity of their own ethical dilemma. When they embark on the actual design process, they are better prepared to connect with others.

Students work on individual reflections which turn into visuals. They design individual manifestos, and also a community agreement for the class. These manifestos are transformed into visuals as illustrated in figures 7 and 8. When they finally transition to the design challenge, discussions of decentering design automatically come to the forefront. The class begins to deconstruct the traditional design process to find a new way of thinking about people, community, society. They realize the importance

of connection and empathy. The conversation then moves from the personal to the universal with an awareness of intentionality.

A brief history lesson is sprinkled in the process—illustrated in figure 3. It is imperative for the educator to make themselves vulnerable. I, for instance, give a design lecture from a Latino perspective. But before getting into the "official" lecture, I share a bit about my personal experience, my country, family dynamics, challenges, and the politics that forced my family to move to the States. I showcase all the languages spoken in America because America IS NOT just the United States. A list of scholars from Latin America are shared, resources for typefaces from Latino designers are introduced; and a broader, pluralistic, perspective is presented.

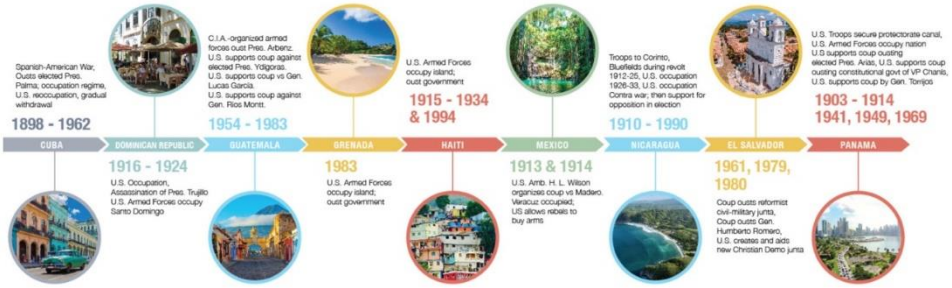

Figure 3. A timeline of the conflicts in Latin America

So how do these exercises become design projects? As students explore their own community within the classroom, they are assigned research topics. They choose a topic of interest within four themes: community, architecture, sustainability or education and begin to decenter design, illustrated in figure 4. The results that come out of that class are thoughtful. Students are mindful, critically aware, and respectful of their audience, clients, and other human beings. They acknowledge their own positionality in a way that changes their own ways of *learning*, *doing*, *understanding*, and *making*.

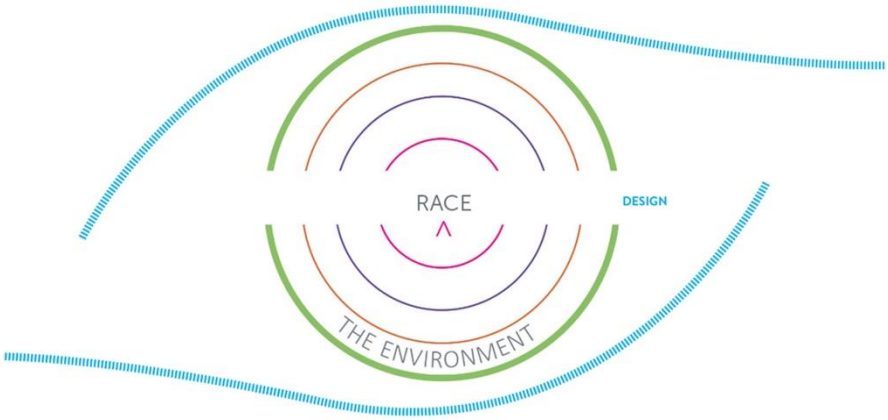

Figure 4. Decentering Design

Design Projects

After the low-stakes exercises, students are given semester-long assignments. To keep the lessons in mind throughout the assignment, students are given a quadrant so they can analyze where their design interventions fall into. The Quadrant was drawn from Lisa Mercer and Terresa Moses' book, Racism Untaught.[22] However, the language was slightly changed. The original quadrant had oppresive thought

without (the action) and anti-oppressive thought with action on it. Students felt that oppressive thought should also have *an action* because they felt narrow thinking and unconscious thought do have effects in society. A Miro board is created for students to interact, communicate, and work through the complexity of the design process, research, and practice as showcased in figure 5.

Figure 5. Miro Board, Brainstorming

Featured assignments

This particular example is a poster which was designed by one of the EDGE students by Mason, figure 6. He decided to visually represent the community agreement as a manifesto. The meaning behind the 404 was truly powerful because the class was held in room 404. But code 404 in the digital world means "not found". This cohort really wanted to bring to the forefront the voices that are typically unheard in our society. For those who felt unwelcomed, marginalized and did not fit in certain spaces. They were intentional on creating a learning space where the "invisible" was visible.

Figure 6. Community agreement as manifesto by Mason

Manifestos designed by students

Figures 7 and 8 showcase the complexity and depth of the assignment.

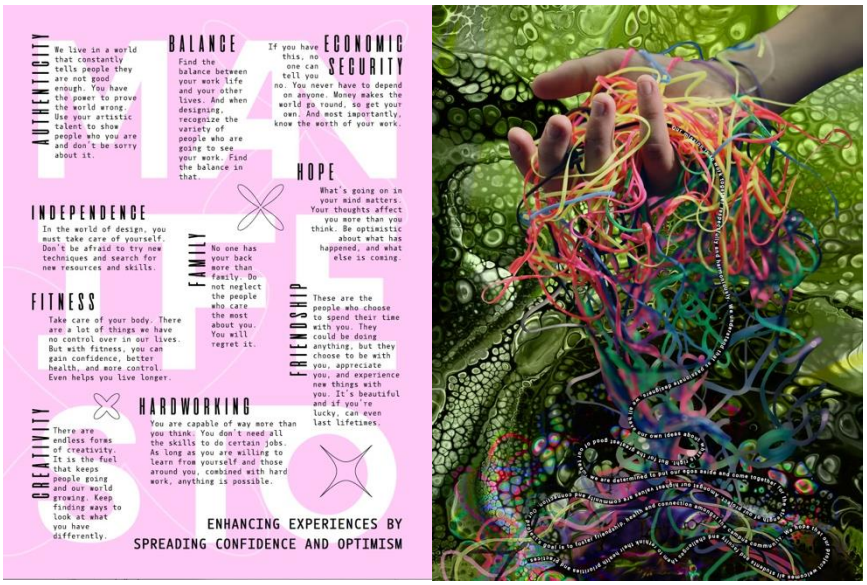

Figure 7 and 8. Manifestos by Natalie and Kristina

The Round Table shown in Figure 9 is an art initiative that supports marginalized students on campus. The student's research was inspired by her heritage and the Rasquachismo art movement. The intervention was designed to promote healing through activism. Here the student is not only designing a visual narrative, but is also trying to change the system within the institution.

Figure 9. Semester-long Assignment by Rosie

Student's quote that encapsulates the experience of this new approach to learning graphic design.

"I enjoyed this project, it pushed me out of my comfort zone having to reflect on my present self and contemplate my future. I feel really good about my poster as well as the content, it took a lot of revising but I finally found the right words. I tried my hardest to make my values actionable and uplifting!" (Sydney)

CONCLUSION

In conclusion, although, there are challenges in navigating a self-expressive, self-reflective and vulnerable classroom space, the new approach to the design curriculum is rewading. Students leave the class feeling uplifted with an understanding of *designs for a pluriverse*. The three guiding principles—History as an Opportunity, A Tolerance for Ambiguity, Invoking Art—encourage both the educator and student to become engaged and self-aware while embracing people, places and spaces. It provides students with transferable skills and prepares them for complex futures.

NOTES

[1] Ruben Pater, *Caps lock: How Capitalism Took Hold of Graphic Design, And How to Escape It* (Amsterdam: Valiz, 2021).
[2] bell hooks, *Teaching Community: A Pedagogy of Hope* (Great Britain: Routledge, 2019), 21.
[3] hooks, 41.
[4] Gloria Anzaldúa, *Borderlands: La Frontera, The New Mestiza* (San Francisco: Aunt Lute Book Company, 1987),41.
[5] Britannica.com, s.v. “Critical Race Theory” accessed January 30, 2023, https://www.britannica.com/topic/critical-race-theory
[6] Lisa Mercer, Angelica Sibrian, Nekita Thomas, Therresa Moses, “Designing Collective Racial Healing Spaces,” *International Journal of Diversity in Education*, 23(1), 67-86. https://doi.org/10.18848/2327-0020/CGP/v23i01/67-86
[7] hooks, 41.
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[12] W.E.B. Dubois, *The Souls of Black* Folk (Chicago: Dover Publications, Inc., 1994).
[13] Paulo Freire, *Pedagogy of the Oppressed* (New York: The Continuum Publishing Company, 1996)
[14]Dictionary.com, s.v. “Positionality” accessed January 30, 2023, https://www.dictionary.com/e/gender-sexuality/positionality/.
[15]Merriam-webster.com, s.v. “Intersectionality” accessed January 30, 2023, https://www.merriam-webster.com/dictionary/intersectionality
[16] Columbia Law School, “*Kimberlé Crenshaw on Intersectionality, more than two decades later*” last updated June 8, 2017, https://www.law.columbia.edu/news/archive/kimberle-crenshaw-intersectionality-more-two-decades-later
[17] hooks, 17.
[18] Jonathan Kozol, *The Shame of the Nation* (New York: Three Rivers Press, 2005).
[19] Paulo Freire, *Pedagogy of the Oppressed* (New York: The Continuum Publishing Company, 1996).
[20] Gloria Anzaldúa, *Borderlands: La Frontera, The New Mestiza* (San Francisco: Aunt Lute Book Company, 1987).
[21] Anzaldúa, 78
[22]Lisa Mercer and Terresa Moses, *Racism Untaught: Revealing and Unlearning Racialized Design* (Massachusetts: MIT Press, 2023).

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HOW TO TEACH CRITICAL GEOINFORMATICS?

Author:
KEVIN KAMINSKI[1], STEPHAN PIETSCH[2], MARKUS SCHAFFERT[1]

Affiliation:
[1]MAINZ UNIVERSITY OF APLLIED SCIENCE, GERMANY, [2]UNIVERSITY OF LEIPZIG, GERMANY

INTRODUCTION

In "How to Lie with Maps" Monmonier explains the use and abuse of maps and guides readers to evaluate maps critically. He emphasizes that maps distort reality to some extent, whether intentionally or unintentionally. However, Monmonier's concept of distortion can be interpreted differently depending on the ontological perspective of readers. They can range from beliefs that maps are socially embedded in the zeitgeist and inevitably simplify "realities" to maps represent an objective "reality" and get distorted when made by non-experts from News Agencies or by agents of (a different) political agenda.[1] Maps are our daily companions, whether they are guiding us through physical environments, or determining our knowledge about geopolitics. Therefore, cartographers define map conventions regarding completeness, appropriation, comprehensibility, precision and accuracy in labelling.[2] However, these methodologies reflect space as a system of positional relationships between material objects and reduces social reality as an existing entity of distances. It is important to recognize these reductions, when representing complex social and cultural issues, and the potential of hiding or overemphasizing certain aspects. In this regard, cartographic literacy is necessary for the interpretation and ability to explain maps,[3] especially as they can be interpreted as powerful media, which are actively (re-)creating geographical knowledge[4] and materializing cartographic "truth", "reality" and "domination".[5]

Scholars in Human geography, Cartography and Geoinformatics commonly acknowledge that maps simplify real-world complexities.[6] Thus, social theory is increasingly seen as an opportunity for academic cartographic pursuits.[7] "Traditional" educational material covers topics related to quantitative and mathematical (land) surveying, map design and production, GIS architectures, and processing chain (acquisition, management, analysis, presentation).[8] In contrast, "non-traditional" approaches include qualitative research, mixed methods, participatory approaches and critical-cartographic epistemologies. Students learn to employ participatory research and empowerment, as well as recognize the (re-)production of specific worldviews, biases and positionality[9] in maps, along with "traditional" processes involved in mapping.[10] In educational sciences, current debates about learning (in terms of learning by doing) is understood as an active, experimental and social process.[11] Therefore, students are encouraged to actively engage with material, which is often described as discovery.[12] This can be regarded to the formation of a "Geographic Media Literacy",[13] which is highly demanded, in terms of gaining competences of orienting and estimating in a confusing overabundance of potential sources of information. Following this, skills can be developed with regard to everyday lives of learners while using reflexive handling strategies.[14] By fostering active, reflexive, and participative skills, students

acknowledge that map simplifications are not necessarily intentional censorships by its producers, but rather a result of inherent limitations of map mediums.[15]

Despite methodological approximations, applied courses in Cartography and Geoinformatics mainly teach "technical" educational content. In contrast, human geography has a just small section dedicated to applied cartography in its curriculum. Consequently, Orlowski and Geiselhardt suggest integrating critical lessons into cartography of human geography.[16] In cartography, Campbell and Shin define map conventions as based on the experience of users, and suggest further development of tools to incorporate the user experience for better analysis.[17] In contrast, human geography rejects oversimplifications as a technical attempt to collect objective knowledge. A reference to theoretical under-complexity is not identical to a call to abandon a methodological discussion, but in contrast, it is an invitation to preserve and develop methods.

A critical education of cartography goes beyond teaching flawless techniques; it is about understanding social processes of map-making,[18] while maintaining legibility and comprehensibility. This is an important link between critical scholarship and education, since maps, as Strüver mentioned, are embedded in performative discourses that can be didactically deconstructed and reconstructed, while they are produced, reproduced, mediated, and used.[19] Therefore, this contribution, which is directed to students and staff in geosciences and offers a suggestion for a one-week course, discusses basic principles of cartography and its embeddedness in social praxis, strata, groups, power relations and (non-)privileges creating "realities" on maps. Hence, a comprehensive textbook must include advancements in technical mapping methodologies as well as concepts of maps based on people's environment experiences as power-knowledge complexes.[20] This paper starts with a lecture about genealogy of maps leading into a practical and critical exercise of participatory mapping.

GENEALOGY OF MAPS

Initially two maps are going to be compared to discuss changes and consistencies in methodology after the "scientific shift" in Western society. Crampton and Harley refer to the Enlightenment as a historical turning point in Western societies, characterized by ideals such as reason and science, which led to a changed view of cartography and maps in general.[21]

Cartography also underwent a transformation during this period, becoming a "fact-based" science employing coordinate systems, true-to-scale maps, and precise measurements.[22] The teacher can discuss the "shift" showing "a genealogy of maps", providing an example before and after the "scientific shift" for comparisons. It is important to question the non-scientific nature of pre-scientific maps and the truthfulness of contemporary maps. The historical maps presented may include thematic maps (display non-naturally visible features: temperature and population), topographic maps (display naturally visible features: rivers, roads, and buildings), mixed versions. The scientific, technical, and cultural dimensions of the maps are more important than their specific types. Therefore, these examples are not exhaustive, but allow students to contextualize current methodologies while analyzing forms of socio-technological developments and constancies in cartography.

Maps before "scientific shift"

As starting example, one of the earliest western printed travel maps, such as the "Roman Way" maps created by cartographer Erhard Etzlaub can be used as an example. It was the first map to represent distances between cities using dotted lines, with each dotted step representing a German mile of 7400 meters – see Figure 1. The map was created to celebrate the 1500th birthday of Jesus, intended for pilgrims traveling the Holy See. Interviews with pilgrims and merchants influenced mapmaking for a century through the creation of maps. They normalized the South as the top, in contrast to the current use of geographical North Pole.[23]

Figure 1. Distance Representation on 'Roman Way' Map by Erhard Etzlaub by dotted line style.[24]

After the presentation, an open discussion should be facilitated to explore scientific, technical, and cultural aspects of the map, which could include the following questions:

1. What information does the map communicate?
2. Where is the "center" of the map?
3. Which (colors, symbols, icons) where used and why?
4. Why would people consider this map non-scientific nowadays (why not)?
5. What could be improved regarding modern mapping conventions?
6. What idea of space conveys this map?
7. What information does the map show and what information does it hide?
8. (How) could this map be adapted for different user groups or purposes)?
9. (How) does the map reflect cultural perspectives or biases?
10. (How) can this map contribute to understand the European society before the 17th century (and today)?

Maps after "scientific shift"

Comparing a government topographic map with a community-generated map like OpenStreetMap (OSM) allows us to show mapping after the "scientific shift". Various State survey offices produce topographic maps (Germany: TK) and geodata with detailed and accurate information about the terrain, settlements, water areas, and aerial imagery. This official geodata is widely used for government tasks,

economic and political decision-making processes by planners, researchers, and students.[25] OSM utilizes local knowledge, aerial imagery, official and GPS data to provided geodata for various applications. While both sources are used in classroom exercises, government geodata is still considered better "quality" and "ground truth" for benchmarking OSM geodata. On the contrary, OSM often complements “official” geospatial data because of its "poor" thematic coverage.

Glasze and Perkins during a case study comparing OSM with the official topographical map (TK 1:25:0000) of Mannheim discovered that the official map failed to include a symbol of a mosque. The map was using a cross symbol as a universally recognized symbol also for an Islamic place of worship. In contrast, the mosque was assigned its own symbol in OSM form – see Figure 2. Despite its widespread expected technical credibility based on authoritative quality controls, official geospatial data does not necessarily reflect evolving social and cultural realities.[26]

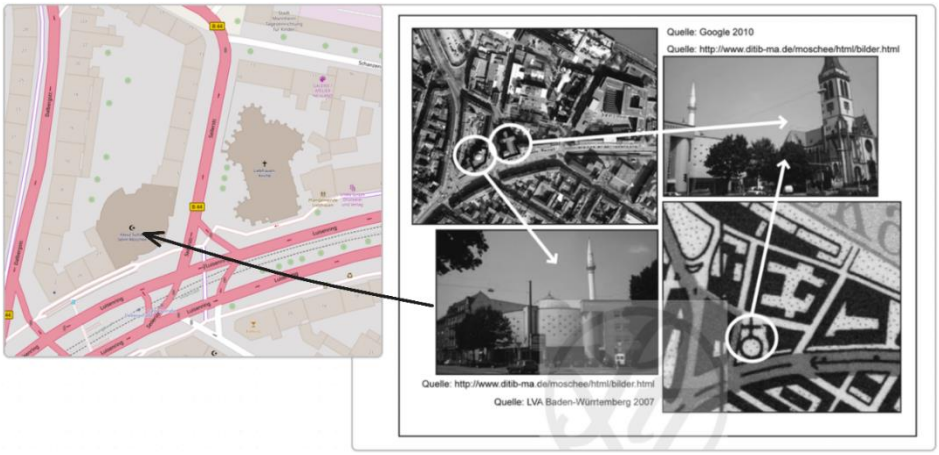

Figure 2. Comparison of cultural/icon representation: Crescent symbol on an OSM topographic map (left) and the absence of a mosque icon on authoritative map (right).[27]

From the example above, questions 1-3 and 6 can be supplemented by following open-ended questions:

4. What could be improved regarding modern conventions?
5. Why would scholars in GIS consider this map (TK 25) scientific (why OSM not)?
7. What information does the map show and what information does it hide?
8. How do social influences (or authorities) affect simplifications of landscapes on maps?
9. (How) do such maps influence the way we think about the world?
10. Can you identify the differences (similarities) between pre-scientific and modern example?

DECONSTRUCTING CARTOGRAPHIC NARRATIVES: AN ADAPTED VERSION OF PANOFSKY'S FRAMEWORK

Using historical comparison allows deconstructing maps as representative artifacts of their time. This enabled students a reception of continuities in cultural and technical (cartographic) dimensions with the map (production). However, it is important to note that this deconstruction is limited to a level of representations. Therefore, the following guide presents GIS related participation and deconstruction of students' cultural, technical experiences in relation to social discourse covert by technical and authoritative arguments.[28]

Expanding upon a critical discourse on genealogy of maps, the subsequent exercise entails students’ mapping everyday perceptions of familiar locations. In terms of methodology, this participatory mapping exercise aligned with considerations of Kaminski and Schaffert and the methodology of Orlowski and Geiselhardt. It uses cartographic techniques, including map conventions, to examine

social and personal geographical imaginaries[29] through symbolic narratives. Students will learn critical cartographic theory through hands-on cartographic analysis based on Erwin Panofsky's semiological and iconological approach as well as on an adapted version of Anke Strüvers' concept on "interpretative deconstruction" of map(ping) discourses. This includes employing mapping conventions and scrutinize structural and personal geographical imaginaries represented in symbolic narratives embedded in maps. Therefore, teaching beyond Geoinformatics has to take into account abstract socio-spatial experiences (of students) and continually developing methodologies (from Cartography to GIS etc.) to develop an educational program (show and discuss) regarding (dis)continuities of cartographic imaginations- see Figure 3.

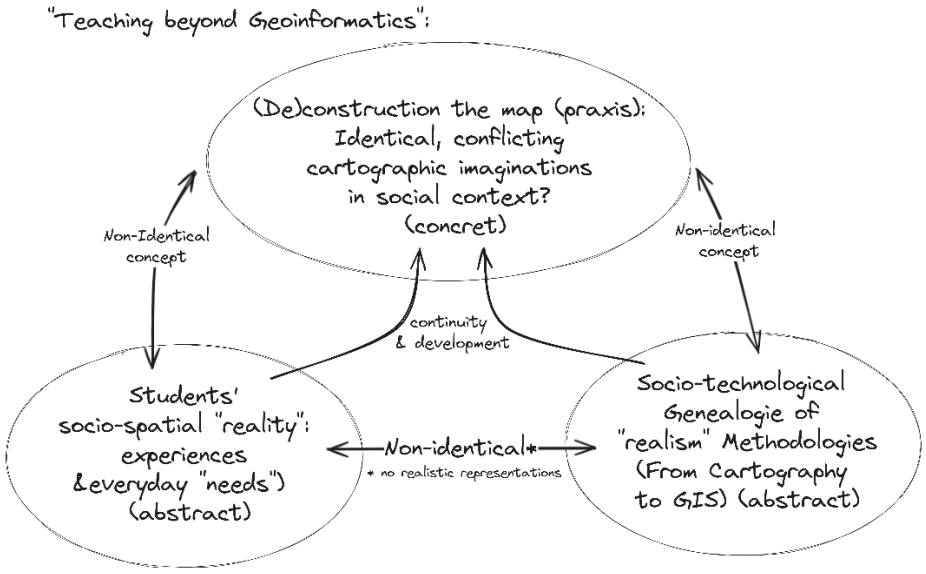

Figure 3. Dialectics of teaching beyond the Geoinformatics curriculum.[30]

Cartographic set up in a GIS

The exercise begins with a cartographic setup for a sketch map. We recommend the use of the FOSS-GIS QGIS, due to its cost-effectiveness, potential for customization and community support while it can be used cross-platform. Students are encouraged to map points in areas where they often spend their time, with accompanying descriptors regarding the perceived significance. Potential areas of focus could include the vicinity of the university, the main train station, or recreational locations as shown by Kaminski and Schaffert.[31] Alternatively, following Orlowski and Geiselhardt, the focus could be on a park or the university courtyard.

In QGIS the student must load a base map, such as OSM, Google Maps, or official topographic maps, to establish the foundation for the sketch map. Subsequently, the student should create a Geopackage (geodata-file with feature layers and an associated table). The table contains geometric attributes (points, polygons, and lines) along with corresponding properties (coordinates and text fields e.g. name). To "sketch" (set) the first point on the base map, the zoom and pan tool can be used to navigate to the desired location on the map. After selecting the "Edit" mode the point can be set and saved. After all points are set, students should customize the map's appearance by selecting an appropriate visualization and adjusting color schemes for the layout and labels. To enhance comparability, it is recommended to pre-define the thematic focus (e.g. public spaces) in advance, to facilitate the comparison of different iconographies among the student. However, the decision of appropriate

visualizations (e.g. area cartograms, heat maps, labeling, texts and diagrams) across different scales should remain to the group's members.
Depending on the methodological skills of the students, the tutorial can be enhanced by teaching various mapping principles such as statistics (e.g. class boundaries), layout rules, color selection and conventions. Furthermore, differences between large- and small-scale ratios may need explanation, such as a 1:10,000 large-scale map (map unit corresponds to 10,000 ground units) refer to small areas (e.g. neighborhood), a large-scale map (1:1,000,000) shows less detail (e.g. countries).[32]

Teacher preparations

After completing the mapping exercise, each group is required to submit its GIS-project (including used base map, feature layers and layer-definition-file). After receiving the student projects, the lecturer starts with the preparations. This involves creating new alternative feature layers with contrasting themes related to the submitted projects. It is noteworthy that designing an alternative visualization (color schemes, contrast, symbols, labeling, scales, and hierarchies) relies on the submitted student projects. Alternative layers need to be added to existing student projects, facilitating a structured and insightful analysis during the following group discussions.
In addition to this, the preparation of each group's GIS project to conducting Panofsky's three-stage iconological method is crucial. Originally designed for art students, this method helps students to recognize and comprehend complex meanings within visual art. Adopted for GIS students this approach provides a foundation for a practical and critical (self-) analysis of their projects helping to understand their technical and cultural embeddedness as map users and producers. The first stage involves a detailed "Pre-iconographic" description (without interpreting meaning) of visual elements, including subject matter, composition, and stylistic features. The second step includes an "Iconographic analysis" to identify symbols, themes, and subjects in order to explore their significance. The final step, the "Iconological interpretation", aims to uncover deeper meaning in the image e.g. analyzing the underlying ideas, values, and cultural and historical context, including symbolic, philosophical, and psychological aspects.[33]

Adapted Version of Panofsky's' "Descriptions"

Starting with the "Pre-iconographic" description, the emphasis lies on the motifs and symbol choices in a straightforward delineation of observable elements on the map.[34] Each group will have approximately 12 minutes to present their maps on a large screen. Each group member is expected to articulate his or her individual contribution (thematic and symbolic) to the design. The presentation should initially address adequacy of the map elements and graphics, along with identifying potential areas for technical improvements, serving as the preliminary phase of the pre-iconographic description. Afterwards, each group should describe "technical aspects" of other projects and interpreting the use of visual elements. This involves considerations of enlargement, scale, color utilization, contrast, hierarchies within the layers, the selection of the map section/center, lettering, and incorporation of symbols and decorative elements.[35] At the end, each group should have created a mapping scheme (cartographic features: meaning) to compare differences and similarities with traditional mapping conventions.

Adapted Version of Panofsky's' "Imaginations"

In the second section, the teacher provides different cartographic perspective on the student's project by offering an alternative set of cartographic features. This should create awareness of "generalizations"[36] and the process of selecting, abstraction and categorization[37] constituting the image of the map.[38] Thus,

it is important to note that any omissions are not deliberate and the absence of a map element is neither a deliberate exclusion nor a matter of scale or a technical consideration to prevent overlapping. Generalization is an act that imparts special significance to certain elements.[39] The added feature layers should provide a base to critically examine intended and unintended map narratives (e.g. due to level of detail in cartographic features) not just determined by a technical require necessity but hinge on self-evident aspects.

The teacher should alter the map's scale in subsequent steps and show different cartographic features.[40] For instance, if the initial project centers a park, the lecturer alters the scale progressively and inquires at each juncture, whether a particular object is significant enough to be included on the map.

Examples: A student's feature-layer with a scale of 1:1.000 and portrays trash bins and benches. In advance, another feature layer with bollards could be added (Discussing Relevance for students and/or disabled people). Another feature layer with a scale of 1:500 could include slopes (Discussing Walkability and its relevance for students, disabled and/or elderly people). Another feature layer (small scale) could display different outside sport places across symbolized by a football icon. Therefore, the lecturer could discuss accuracy for genders (not all men but women like football).

The teacher could criticize the "technical" necessity of hiding elements by scale (in a GIS, it is possible to hide features). Students should be asked if they would include something "trivial" on intermediate scale, e.g. a tree leaf on 1:10,000.[41] After the layer activation, different sizes of tree leaves could be displayed symbolizing the amount of ground foliage that protects soil and plant roots and serves as a food source for various animal species. The purpose of discussing 'multilayered' and 'trivial' map features is to demonstrate that use or concealment of symbols as not solely technical, but a means of interpreting map motives and its social meanings.

Adapted Version of Panofsky's "Conflicts"

The last step of "Iconographic interpretation" requires being familiar (teacher) with social-geographical concepts to read the map as an intrinsic artifact.[42] As Harley explains, maps codify, legitimize, and promote the prevailing worldviews of its era and place.[43] This involves discussing the (geo)political conditions under which the map was created. and needs reviewing the students' project maps, providing "official" map products (authoritative, commercial). The students compare if their map projects are conflicting with the "official" maps.

The aim is a comparative analysis, to encourage reflections on representation and potential biases in official maps, as well as in one's own maps. Critical inquiry encourages students to question the suitability of maps for their specific needs and promotes the exploration of potential conflicts in a broader context of a "Cartographic Literacy". This is an open-ended process, but the teacher could switch "map user groups" and ask about use conflicts from the perspective of parents with young children, seniors, people with physical disabilities, bicyclists, car owners, businesses, and homeless individuals. Given these considerations, defensive public furniture could be reflected to discuss public safety concerns. Henceforth, conflict topics could be discussed in terms of gentrification, entrepreneurial cities, festivalization, car-centric spatial planning, and security or regulatory policies. Therefore, conflicts of use are not only temporary obstacles, but also structural dysfunctional problems of political control.[44]

CONCLUSION

The paper emphasized the integration of critical thinking in Geoinformatics. Therefore, we suggest a one-week course, based on deconstructing (the history of) cartographic narratives and using an adapted iconic analysis and participatory GIS approach. Based on this practical approach, a "Cartographic Literacy" similar to Lukinbeal's "Geographic Media Literacy"[45] could be developed.

Whereas the article contributed to a field of critical Geoinformatics by encompassing diverse cartographic practices cater to both traditional and emerging perspectives in the field, there is a continuing need for broader coverage. Our paper can only be a starting point to immerse in the field of critical Geoinformatics. With the emerging field of artificial intelligence and the technical procedures used to process the formal representation and content interpretation of geospatial data, the barriers are rather more technical in nature. In this context, a critical perspective becomes even more important, considering possibilities of generating AI-based maps and the consolidation of digital elitism in Geoinformatics. Users, scholars and students must even more refrain from romanticizing or demonizing technology[46] and see maps, mapping and mapping technology as arbitrary, thus oppressive when rendering people and social conditions invisible due to a deemed appropriate methodology and as well as full of appropriation potentials. It is worth mentioning, whether before or after the 'scientific shift, the introduction of IT-systems, or of Artificial Intelligence, maps were, are and will be created exclusively by and for privileged groups. We discuss Geoinformatics as a set of rules for accurate representations of discursive fragments that should not be followed mindlessly.[47]

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EXPANSIVE CREATIVITY IS BEYOND THE VISUAL[1]

Author:
GREIG BURGOYNE, LAURA LEUZZI

Affiliation:
UNIVERSITY OF CREATIVE ARTS, UK. GRAY'S SCHOOL OF ART, UK

EXPANSIVE CREATIVITY IS BEYOND THE VISUAL

Expansive creativity starts with how we navigate language, in its plethora of manifestations and contexts. Increasing hegemonic and unwieldy systems of imposed synchronicities and rationality abound leading to our submergence as opposed to emergence as human beings far less creatives.

Symptomatic of an age of rapid obsolescence and distraction, we neither know nor care what is beyond the surface of things. Day to day relations with materials and things is increasingly one of attachment and estrangement, determined by function, enslaved in conformity. Learning to be innovative is driven by the desire to adapt to new demands, whilst simultaneously being pulled apart in that meeting with unknown challenges that transformation of language and being brings about as a result.

Expansive creativity denotes an event, not simply an object of matter, but a phenomenological field no less of absence and withdrawal, from place, actions - in effect, resulting in a site that is estranged from all forms, for maker and viewer, student, and teacher alike. This is to say, artworks and by that, creativity may be in, but not of the world.

This is the paradox of arts materiality being as it is between the physical, intimate, and sensed and that effervescence of the visual, virtual, and distant. Paradoxical, because in making this thing called 'art' we are concealing something by default. Indeed, that creative drive is not a Heideggerian project, in that our survival is not dependent upon it. Instead, it a means to immerse in that being for-its-self.

This concealment may be where we can say teaching and dialogue traverse, akin to a gap, of the kind discussed in *art and experience* by John Dewey. An invisibility indicative of that expansive actual and implosive virtual and the distinction between the aesthetic object and the experience of the work. Assemblages of an expressed world, not structures of a predetermined one, symptomatic of that incessant state of a coming into appearance. As such like us, in a condition of midst. Virtual in part by the reflective knowledge that brings about that actuality, whilst also symptomatic of an ongoing state of becoming, distinct from that virtuality. As embodied beings, we are between what Levinas termed the living contradiction. Simultaneously we traverse a past, present future trajectory indicative of intentioned creative aims, as well as a future, present, past orientation corresponding to the will of our consciousness to express ourselves. This is because our consciousness is always ahead of us, in contrast to the causality of the former which works from a past as it becomes aims for our future. The pre-reflective state is already engaged with that raw facticity of the work and world, and the making of that world within us.

Hence whilst it is not non-visible, any attempt to make it visual results in that concealment of its dasein-which Heidegger referred to as the clearing.

The clearing is when the art/work unconceals its being. In this, all seeing is elemental first and constituted as things second, after all the intellect only defines the work and its contents as objects or by function.

As such making art is an event of materiality consumed by action, in this the pre reflective brings into appearance that which is the interiority of the interior. M/Ponty stated the visible is pregnant with the invisible. By that, artworks are not simply Heideggerian projects of life or striving, but instead thresholds between the what-is, and the possible akin to a dasein. In doing so, allowing appearance and reality to co-compose, and subsequently emerge from within, in that act of disclosure.

Artworks if we are to teach what they are and critique that level of innovation, we can't assume we are all talking about the same thing, nor assume we're all going to interpret or critique it in the same manner. Husserl said, the voice that will do that interpreting is outside the empirical straight jacket, but speech reduces it to signifying content. However, in that discourse, language also discloses the other, indeed without the other, there would be no exteriority to seek to unconceal. For creativity to engage in this unconcealment, is to unlearn the way we see and seek to embrace that sensorial field that is not Infront of us, but all around us.

Artworks are not invisible, but meaning is. By their aesthetic appearance, artworks make that state of unconcealment- of what is sensed, available to us. In this the sensorial field is the being of the work as the thing- in- itself, all the while that which we encounter with our eyes serves only to register the symbolic and make more distant the being or that worlding of the work. In this the real is not reproducing the world but illuminating the real by unveiling its world in isolation. In not defining the work, its being is inexhaustible.

With so much appearing there is so much being, creative innovation is instead a shared not assumed intersubjectivity to what is possible. Shifting from language as a production of surfaces, to an opening up of that corporeal glue between viewer and maker,

creative production is spread across the visual, the physical and the mental. The visual the thing we see, the physical the experience we sense, and the mental, that meandering under, below or within that thingness estranged as it is from the actuality of time and space, in our will of consciousness. According to Husserl, the world is not what I think but what I live through.

Unless we appreciate these frameworks, we may be stating what creativity is not, as such merely teaching / acknowledging what we know, and not conceding the sensorial field that transcends that seeing. It is both in historical time and space by our perception but also in its own unique time and space by that awareness of its dasein in-itself-for-us. In this there is a freedom through that immersion in the creative event that manifest to each of us as unique.

In representation, we eliminate the body that conceived the work from the centre from which it preceded- but being as we are embodied, means to be at the centre of world- after all senses are not exposed to the world, but the body is and by default the art we make also.

Mikel Dufrenne stated creative work is a "a coalescence of sensuous elements".[2] Instead of hanging meanings and implied narratives upon artworks, it may help to reclaim that hapticity instead of intensifying that ongoing distancing.

Beyond its material strata "the genuine work of art spares us the expense of (or need of) an exuberant imagination" said Dufrenne.[3] In place of understanding and reception of the work, we can engage in feeling our way in that "reciprocity of two depths…the depth of the expressed world and the depth of the beholder".[4] The very means we employ to comprehend the work, may be the means that eludes it from us. From reality to depth is when the actual (illusion of the work) disperses and the dis-illusion, where one's evidencing becomes the acquisition of another.

Merleau-Ponty said "It would be naïve to seek solidity in the heaven of ideas, or in the fond(ground) of meaning, it is neither above nor below appearances but at their joints".[5] This is that interior envelope as he called it, between an interior we sense and an inexhaustible depth of surface that we see. In this situation, we are wrestling with a presumption that when we talk about art and what it means to create, we are all talking about the same thing. In fact, we either abstract it or assume we all see the same way. In doing so, that encounter with the work in-itself-for-us escapes us.

If it is invisible, how do we know it's truly innovative, far less any good? It may be to what degree it activates inner discordance, its capacity for amplification and rupture. American artist Barry La Va said "if you aren't making art that challenges you, you aren't making art that challenges anyone".[6] In this it is an emergence, intensification, and resonance of that thing in-itself. We are connecting to that thingness and withdrawing from its appearance simultaneously.

This otherness is beyond appearance, but not outside the work but that encounter with its interior being in that state of becoming. In the presence of an artwork, it is the same object to all who gaze upon it, but its content can never be so. Existing as we do, in unique positions in time and space, the art object we perceive is not the content that overflows it that we experience.

In its emergent real, that indeterminate dialogue between artist and student is where invisibility is visibility. This is to say, between the infinite nature of learning and innovation with regard to ideas, that synergy as new realities form. Beyond those conflicts of perception or hegemonies of interpretation, this realisation of instability can ascend, instead of a broader "ephemerality masquerading as stability".[7] When we produce art, we co-create, between a pre-reflective situation of art's raw facticity, and the application of artistic languages and methodologies which may conceal it.

Being innovative is rhizomic but also paradoxical, beyond knowledge at that interspace between past and future that is present through its dispersal. Indeed, as Levinas suggests this "non representability is the surplus of the lived body over the representation of it"[8] as the creative potential of other is where one set of assemblage unforms and another emerges in that reterritorialization and future forming that result from that creative production.

This inchoate state is that opening up to an expansive creativity whereby a concealment (this is to say - a consciousness of the real) occurs alongside a withdrawal from that which was not (i.e. Representation). This we shall say is an actuality akin to an inverted magic trick. The rabbit won't be pulled out of the magician's hat, because it was there all along, if only we would stop looking for it.

OF PERFORMANCE, TEACHING AND NOT KNOWING

Teaching students as well as researching and writing about performance art leave the academic and teacher able to know and discuss no more than a small proportion of the original artworks. Most of the germinal performances of the 60s and 70s have left just a handful of images and limited descriptions. Theorists such as Cindy Nemsser and Peggy Phelan have pointed out the ontological problem posed by a documenting of performance that is opposed to the nature of the medium itself, while Amelia Jones and Philip Ausslander have suggested that acts of looking at the photographs of performances are "phenomenological experiences in their own right, and are not tied to an objective originary experience".[9]

Keeping these theoretical elements in mind, the images documenting any performance that are circulated are limited and carefully chosen and edited by the artists. The descriptions of the actions too are sometimes very limited and often do not record in any detail crucial aspects: how the performer behaved, the reaction of the audience and the counter-reaction of the performer to the audience. The accounts by the artists are carefully crafted to convey a specific meaning and to offer us a specific interpretation of the work.

As pointed out by Santone, some media-based art forms are preserved by performative documentation that is meant to be replayed or reread.[10]

This paper will discuss on the basis of the author's own teaching (and research) experience and related theory, some of the challenges of presenting performance art to students. In my experience, this implies to some extent filling in the gaps left by the paucity of documentation and creating a narration on the basis of a narration. Teaching performance art history from the author's perspective can be depicted as an exercise that fills the gaps in the unknown by necessarily using a degree of imagination (even if relatively very small), with the aim of evoking a series of moments, to capture their aura. A storytelling that seeks to engage, to enable students to make what is in the end the same leap of the imagination. To fill that gap in knowledge, that gap in experience. A narration that needs to be grounded and to acknowledge (to oneself and openly to the students) this impossibility of knowing. That it is of the teacher and students, of course, at different levels – even at the risk of placing the teachers in the eyes of some of the students in a relative position of fragility.

A very interesting example of the challenges of teaching (and of course researching) performance art is provided by *Action Pants: Genital Panic* by VALIE EXPORT. The action was devised by the artist in a *kino* in Munich in 1968. No documentation was captured and to date no witnesses or audience accounts have been found. The event was not publicised beforehand, therefore no audience attended. What survives are simply several different accounts by the artist herself, following the action. If this kind of performance with its rejection of documentation could be considered the epitome of performance, adhering to those elements of ephemerality that Nemsser and Phelan outlined, to date there is no absolute certainty that the event ever happened. A photo staged the year after (1969) and captured by Peter Hassmann, conveys some elements of the artist's narrations as to how the performance might have unfolded.[11]

In the image, we can see the artist sitting on a bench, her legs apart to expose her nudity with crotchless pants, and a shotgun. The artist emulates a posture that is usually associated with men. Besides the hint that the action included these elements, nothing really tells us much about how the performance developed. The image is static (despite the title), and no context or audience can be seen.

In some accounts VALIE EXPORT says that she went to a porn cinema where there were some filmmakers projecting their work, and her displaying her body parts lead them to leave. Other accounts involve a shotgun and the offer of sex.[12]

From the author's experience, while discussing the piece with students, the first step is acknowledging its status: the lack of documentation and the element of the unknown.

A focus on the words in the description might allow to evoke the 'aura' of the original event, its uniqueness by virtue of its having existed at a certain moment in space and time. Benjamin wrote: "Words, too, can have an aura of their own This is how Karl Kraus described it: "the closer one looks at a word, the greater the distance from which it looks back."[13]

We could doubtless argue that VALIE EXPORT's action is an extreme case, but a similar situation applies to much performance art and the accounts available are in any case limited.

The need to understand embodiment and the "lived experience of the body" when attempting to grasp a key element in performance, as noted by Shusterman[14] and confirmed by countless examples,[15] leaves many who research – and, indeed, many who teach about performance - in the dark. Therefore, from the author's perspective, it is crucial that we incorporate this acknowledgement of the impossibility of knowing to some degree and the lived experience.

In the wake of new research about performance[16] and – we could assume - as a strategy to confront this unknown, there has been a tendency over the past twenty years to adopt re-enactment. We could argue that this strategy could have the aim or the ambition to attain a glimpse of the embodiment and of that

unknown. A re-enactment, though, will always be different from what originally happened, a different experience: sometimes a different performer (and we could argue that although the performer might through the passing of time have changed to a certain degree), a difference audience, and therefore especially for participatory work or works that involve an audience at some level it might give rise to a totally different event. Nonetheless, from the author's perspective, it might provide useful insight into the original event and help to grasp something of that unknown.

It is interesting to notice that *Genital Panic* was one of the performance pieces selected and re-enacted by Marina Abramović in her famous exhibition and performance series *Seven Easy Pieces*.[17] At the time Abramović - who became in this case a "researcher of performance art's history"[18] - complained about the lack of documentation for that specific piece. In any case, instead of re-performing a recollection or narration of the performance, Abramović engaged with the mentioned image of the poster and activated some specific elements and themes it sought to convey.[19]

Another issue is raised by performances documented by the camera which provide an illusion of knowing it all, while leaving much unknown, out of shot. And that can apply even to performance to camera.

In a re-enactment of *Doppelgänger* (1979-81, Fig. 1) a performance to camera by Elaine Shemilt curated by Leuzzi, precisely this occurred. The artist was able to remember what was behind the camera through the rehearsals in preparation for the event.[20] The initial sequence in the work was made possible by a monitor with feedback that reflected the image of the artist on the mirror where Shemilt was making her own portrait: which provided a precious guideline for the creating of the image. Before that moment, although interviewed several times, in her accounts of the event Shemilt had been missing a major element.

This was a pivotal moment for the author, and one that has informed her practice-based research method. In other words, she came to realise that there was a measure of the unknown even when the event was recorded.

Figure 1. Elaine Shemilt, Doppelganger Redux, Nunnery Gallery, Bow Arts, London, 2016. Courtesy of the artist. Photo Courtesy Orlando Myxx.

Teaching performance in the 70s, an interesting point is comparing the actions of artists such as Marina Abramović & Ulay, Gilbert&George, VALIE EXPORT and Chris Burden to the re-enactments on Second Life by Italian artists Eva and Franco Mattes (2007-2010). With their videos the latter seem to show so much more - sometimes - than the few images available from the original pieces. And yet at that point another part of the unknown surfaces: the experience of a performance through an avatar, a virtual body. Made of code that we cannot see and therefore that remains to us unknown. Yet again something that talks about an experience that might be unfamiliar to my audience: the building of a virtual body, an identity and experience of a sociality that differs from that of the real body. In this capacity, although it might seem at first glance to be all there, the work lays bare a quantity of the unknown to most people. The decision to choose Marina or Ulay in the re-enactment of *Imponderabilia* (few anecdotical accounts of the 1977 original are available[21]), Eva or Franco, remains unknown, both in the real and in the virtual world. Or the experience of seeing someone getting shot. The sound of the bullet leaving the barrel of the gun and exploding in the air. The smell of the gunpowder. Or the sound in a virtual space of an element made up of intangible pixels that has no victim but yet is visually compelling as it retains an element of surprise.
No matter how many re-enactments, the original will always remain unknown to some degree. And an agency – the status of which I must acknowledge – of not knowing.

NOTES

[1] The first section of this paper was authored by Greig Burgoyne. The second section was authored by Laura Leuzzi.
[2] Mikel Dufrenne, *The Phenomenology of Aesthetic Experience* (Evanston, Illinois: Northwestern University Press, 1973), 13.
[3] Dufrenne, *The Phenomenology of Aesthetic Experience* 366.
[4] Dufrenne, *The Phenomenology of Aesthetic Experience* 483.
[5] Maurice-Merleau Ponty, *The visible and the invisible followed by working notes* (Evanston, Illinois, Northwestern University Press, 1968), 168
[6] Ingrid Schaffner, *Accumulated vision and violence, Barry La Va*, (Philadelphia: Institute of contemporary art, University of Pennsylvania, 2005), 83.
[7] Henri Lefebvre, *The production of space* (Victoria Australia; Oxford Massachusetts USA: Blackwell publishing, 1991), 309.
[8] James R. Mensch, *Levinas's Existential analytic* (Illinois: Northwestern University Press Evanston, 2015), 43.
[9] Michael J.H. Woolley, "Documenting performance art: documentation in practice," *International Journal of Performance Arts and Digital Media* 10:1, 48-66, (2014): 50, accessed January, 23, 2024, doi: 10.1080/14794713.2014.912501
[10] Jessica Santone, "Marina Abramović's 'Seven Easy Pieces': Critical Documentation Strategies for Preserving Art's History," *Leonardo* 41, no. 2 (2008): 147–52, accessed January, 23, http://www.jstor.org/stable/20206555.
[11] See for example R. Askey, "VALIE EXPORT," *High Performance* 4:1 (Spring 1981); Elizabeth Manchester, "VALIE EXPORT, Action Pants: Genital Panic, 1969," *Tate*, 2007, accessed January 23, 2014, https://www.tate.org.uk/art/artworks/export-action-pants-genital-panic-p79233
[12] Askey, "VALIE EXPORT", 80.
[13] Michelle Ty, *On Self-Forgetting: Receptivity and the Inhuman Encounter in the Modernist Moment*, thesis, UC Berkley University of California, 2016: 48-49, accessed January 23, 2014, https://escholarship.org/uc/item/3hs6637j
[14] Richard Shusterman, *Performing Live: Aesthetic Alternatives for the Ends of Art* (New York: Cornell University Press, 2000).
[15] Bryan S. Turner, "Introduction – Bodily Performance: On Aura and Reproducibility," *Body & Society* 11:4, (2005), 1-17. https://doi.org/10.1177/1357034X050
[16] Domenico Quaranta, "RE:akt! Things That Happen Twice", in A. Caronia, J. Janša, D. Quaranta, eds., *RE:akt! Reconstruction, Re-enactment, Re-reporting* (Brescia: FPEditions 2009), 45.
[17] Marina Abramović, Attilio Maranzano, Babette Mangolte, *Marina Abramović: 7 easy* pieces (Milano: Charta, 2007).
[18] Jessica Santone, "Marina Abramović's 'Seven Easy Pieces', 148.
[19] Santone, "Marina Abramović's".
[20] Laura Leuzzi, "Re-enacting Early Video Art as a Research Tool for Media Art Histories", in Oliver Grau, O., Janina Hoth, Evelin Wandl-Vogt, eds., *Digital Art through the Looking Glass: New strategies for archiving, collecting and preserving in Digital* (Krems: Danube University Press, 2019), 169-172.
[21] Laura Leuzzi, "Interview with Renato Barilli", *Rewind.ac.uk*, 2011, accessed January 23, 2024 https://rewind.ac.uk/people/renato-barilli/

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INTEGRATING STRUCTURES AND ARCHITECTURE IN THE DESIGN STUDIO: THREE PEDAGOGICAL APPROACHES

Author:
ROBERTO CASTILLO M.

Affiliation:
AMERICAN UNIVERSITY OF SHARJAH. UAE

INTRODUCTION

Integrating architecture and structures is a fundamental and complex challenge inherent to any standing building and is achieved by the interdisciplinary collaboration of architects and engineers.[1] However, the lack of multidisciplinary interaction in the education of architects and engineers reinforces the boundaries between disciplines and can negatively impact pedagogies by promoting the decline of attention to the structural system in the architectural design studio. In the context of architecture schools, including National Architectural Accrediting Board (NAAB) accredited institutions, curriculum development often implements the learning of structures and other building systems in a sequential manner. Thus, earlier studio projects focus on formal and spatial systems, and mid to upper-level studios add layers of complexity, including the need to define a structural system. Similarly, a single studio learning sequence can consider the design and definition of a structural system late in the process or as part of the final deliverables, increasing the challenges in integrating structures and architecture.

This educational model mirrors, to a certain extent, the professional environment, where engineers are usually involved in the design process after the architect has digested and defined a solution. Usually, the architectural concept is followed by a *structural solution* as an afterthought, overlaying existing design documentation. Indeed, the relationship between structures and architecture can have an array of different approaches,[2] spanning from buildings that hide any evidence of the structural system to others that emphasize the structural system as a driving force. But within this spectrum and in the context of the architectural design studio, faculty and students can explore possibilities and gain a deeper understanding of the structure's impact on the definition of formal and spatial systems. In this scenario, the architecture school could be the place to introduce and promote interdisciplinary thinking, laying out the foundations for better collaboration between architects and engineers in the future. Can design studio projects integrate structures in a more predominant role? How can faculty incorporate the structural system as a generative component? By examining the forces behind the current divergence between architecture and engineering, this paper assesses the pedagogical challenges instructors and students face when incorporating the structural system into the architectural design studio and outlines three approaches based on analyzing the outcomes of a third-year studio in a Bachelor of Architecture program in a NAAB accredited institution.

Architecture and engineering as disciplinary silos

Current preconceptions about the roles of the architect and the engineer are influenced by the definition of their disciplinary silos and the lack of interdisciplinary exposure during and after architecture school. This split has been reinforced by an educational model that separated architects and engineers from a shared path.[3] According to Clare Olsen and Sinead McNamara, "Although architects and engineers alike are fundamentally engaged in problem-solving and design, the pedagogical methods employed in their training could not be more different."[4] Architects and engineers shared a similar approach to education in the past, but their radically different methods of approaching problems created and reinforced the separation.[5] The creation of the polytechnic system in the nineteenth century further opened the gap between learners and practitioners of both disciplines[6] with an educational paradigm that is still predominant. Interdisciplinary collaboration between architecture and engineering students is also challenging to implement;[7] still, architects are required to engage and apply *some* knowledge about structural design. According to Andrew Saint, "one of the many tasks of an architectural education is to promote an informed attitude towards structure."[8] However, future architects are partially exposed to the complexities of structures, materials, and building systems through a handful of courses in their curriculum and only a few design studios with opportunities for application.

Convergence and Divergence

The current divergence between engineering and architecture is a relatively recent condition, propelled by the advances in construction technologies, including the expansion of iron construction during the Industrial Revolution.[9] The conception of the architectural discipline and the development of early theories consider architecture and its structural system as a single issue. Vitruvius's triad considered the necessary alignment of beauty, function, and support as the fundamental goal of architecture.[10] When analyzing the Greek Parthenon, for example, structure, form, and space are embedded into each other, bonded by a geometry that simultaneously establishes spatial and structural order. According to Unwin,[11] this inseparable relationship between architecture and structure has been a force throughout history as builders and architects considered structural integrity the "fundamental form-giving force in architecture."[12] This stance continued until the Renaissance when architects and theorists such as Palladio and Alberti revised but maintained the Vitruvian integration in developing architectural treatises.[13] The demand for new infrastructure and technological advances opened a wider field of experimentation, generating and enhancing the distinction between engineers and architects, with the former taking charge of construction challenges that required the implementation of advanced technologies and logical thinking but also maintaining influence on the architecture discipline. According to Sandaker, Eggen, and Cruvellier[14] while architecture needs a structural system, there are structures that do not need architecture.[15] While engineers focused on technical and logical problems during the mid-nineteenth century, architects embraced big-picture issues, including building typologies and aesthetical questions.

This divergence has been challenged since the inception of the modern movement. At the end of the nineteenth century, buildings such as the Crystal Palace in London, designed by the gardener John Paxton, showcased alternative construction technologies based on metal and following a modular system challenging traditional approaches to architecture.[16] The technical progress that followed the Crystal Palace in the second half of the nineteenth century eventually propelled the Avant Garde movement at the beginning of the twentieth century. Le Corbusier's early manifesto highlighted the need for architects and engineers to collaborate and learn from each other.[17] The *five points* reflected new possibilities stemming from advances in construction that phase out load-bearing walls and replace them with a lighter structural framing system. Later, in 1948, Le Corbusier delivered a diagram (Figure

1) illustrating the ideal synergy between the architect and the engineer, balancing knowledge about humanities and physics laws.[18] According to the diagram, architects and engineers should have a small domain in each other's fields. This idealized model challenges the excessive definition of disciplinary boundaries between architects and engineers. However, a true collaboration between architects and engineers in the development of relevant buildings has been the exception rather than the rule. Some notable examples of close collaboration include Louis Kahn and August Komendant and the ongoing partnership between Norman Foster and Ove Arup.[19] In these cases, architects and engineers work together to conceptualize buildings where the structural system has a dual purpose by providing physical support and contributing to the architectural character.

Still, the current model of interdisciplinary cooperation favors a sequential rather than a simultaneous process, where engineers usually start their contribution when architects have already developed the conceptual phase. This sequential model is also evident in the education of architects when the role of the structural system in early studios is ignored or diminished until a late introduction in mid-level studios or when the structural system is only considered at the end of a studio project. In this context, architectural design instructors in mid and upper-level studios are challenged to introduce the relevance and value of the structural system as a significant component of the design process.

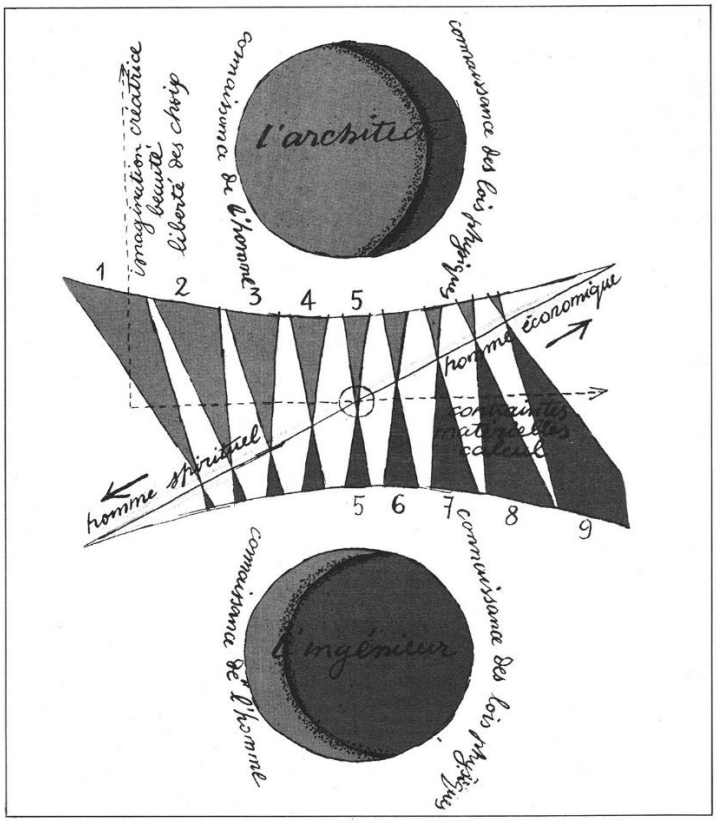

Figure 1. Le Corbusier and François De Pierrefeu. Diagrammatic picture of the "master of works" Source: (L. D. Corbusier 1948)

Case Study: Third-Year Architectural Design Studio

The case study is a third-year design studio at the American University of Sharjah, UAE, where the Department of Architecture follows a curriculum accredited by the NAAB. In recent years, before students reach their third-year spring semester, design studios focus on compositional issues in the

foundations year, then transition to cover architectural content in the second year with small-scale residential and hospitality projects. In the third-year fall studio, students usually develop the first multi-story public building, where they design a structural diagram and include aspects about materiality in their design narratives later in the process. Third-year students take a structures course in the fall semester, where they learn fundamental concepts of structural design, reinforce principles learned in previous technical courses, and are exposed to diverse types of structural systems. Students are expected to reflect on their learning about structural systems and other technical aspects in the following spring semester design studio.

Design Studio Learning Objectives

The third-year spring semester architectural design studio current course learning outcomes (CLOs) emphasize the focus on the "understanding of structural systems and their application into design outcomes"[20] while applying "research as a part of the design process as it relates to structure, materials, and assemblies."[21] In response to these CLOs, we built a narrative for the studio experience that foregrounded issues about the relationship between tectonics, structures, and architecture. The studio's design project leveraged the School's existing pedagogical emphasis on design-build projects, asking students to design an annex to house additional facilities for fabrication and material experimentation. The new building design should include studio space, labs, and fabrication spaces, reflecting the current Department's need for additional prototyping space. In addition to the course learning outcomes, we asked students to consider the building itself as a pedagogical device, as another learning facilitator for architecture and design students. Similar to other schools of architecture,[22] the building that houses the architecture school can potentially provide not just an adequate learning environment but also a proof of concept for design ideas. In this case, the design agenda emphasized the harmonic relationship between architecture and structures, looking for a project design that provides evidence of this quality for users to enhance their learning experiences.

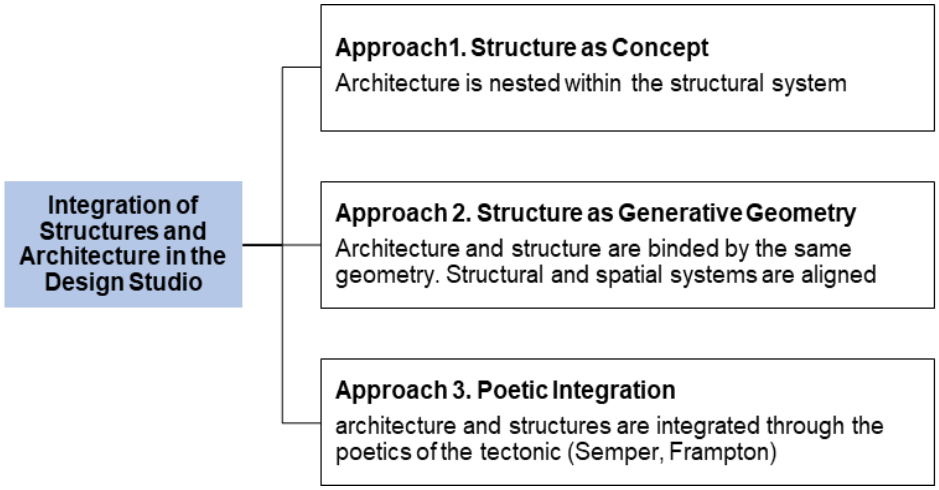

Figure 2. Three approaches to integrate structures and architecture in the design studio, based on the analysis of the outcomes of the third-year design studio

INTEGRATING STRUCTURES AND ARCHITECTURE IN THE DESIGN STUDIO

By analyzing the outcomes of the studio, including students' preliminary and final work and the narratives put forward during discussions and final reviews, it is possible to outline three distinct approaches to the design project as a response to the studio's focus on structures and tectonics. All of

the approaches consider structures as the generative force of the architectural project by either considering it as a problem detached from specific functional requirements or as intertwined with the development of formal and spatial systems. In addition, some projects considered the dialectic and articulation between the tectonic frame and the stereotomic mass -as described by Gottfried Semper and Kenneth Frampton-[23] as a conceptual direction for the design process.

In general, design schemes in the studio conceived the structural system earlier in the process or as a starting point, making more specific decisions about program organization as secondary. Within the implications of this method, it is possible to identify two approaches. The first approach considers the structural solution as a predominant *container*, where spatial and programmatic systems are *nested* as secondary and tertiary elements. This approach is exemplified by the project for a concert hall developed by David Brenner under the mentorship of Mies Van der Rohe in 1946. Two images illustrate the project; the first is a photograph of an aircraft factory designed by Albert Kahn in 1937, showing the ample space covered by a long-spanning structure. The second image is a collage that uses the first as background (See Figure 3. Project for a concert hall. David Brenner and Mies Van der Rohe. Illinois Institute of Technology, 1946. Discreet planes are nested within the hangar designed by Albert Kahn in 1937 (Source: Art Institute of Chicago) and places diverse horizontal and vertical planes to define specific zones and spaces. If taken to an extreme form, this approach could consider the architectural components as an afterthought, clearly counteracting the structures-follows-architecture model.

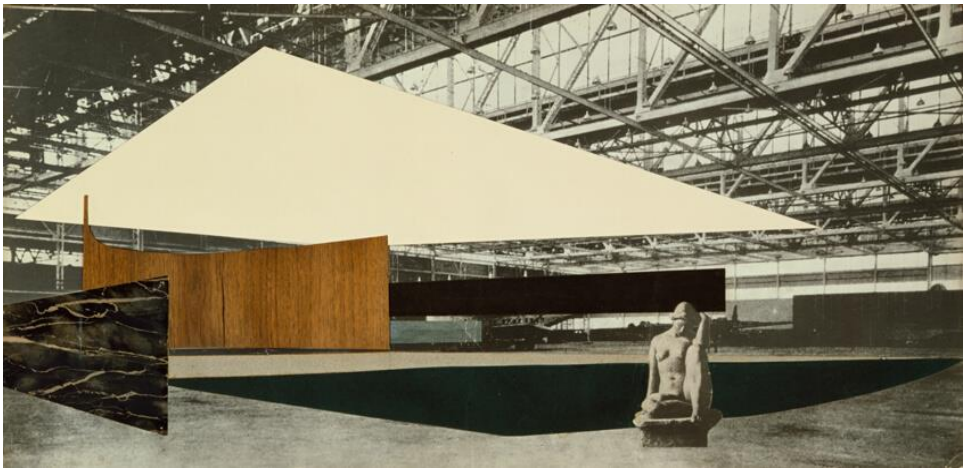

Figure 3. Project for a concert hall. David Brenner and Mies Van der Rohe. Illinois Institute of Technology, 1946. Discreet planes are nested within the hangar designed by Albert Kahn in 1937 (Source: Art Institute of Chicago[24])

The second approach also recognizes the structural system as a primary force. Still, instead of conceiving it in advance to spatial and programmatic systems, it considers both simultaneously and pursues a more precise fit by using geometry as a binding component. While the elements that define programmatic activities are nested in the first approach, architectural functions and structure will be aligned here. This *fit* between architecture and structure is a common characteristic in modular buildings, where the cellular components of a structural frame match the spatial requirements. Other buildings may exemplify this alignment without using a strictly modular design. For example, the classrooms suspended between the long-spanning trusses in Alejandro de La Sota's Gymnasium in Madrid, Spain (1961), where the classroom's functional section matches the truss's curved geometry (Figure 4).

These two approaches were evident in most studio projects. Overall, students understood the requirement of a project driven by structural design as the need to establish a framing system and a more rational approach to a floorplan and sectional diagram that identified the large zone for fabrication and secondary areas for the rest of the program. The design of large canopies (Figure 5) to Modular approaches that emphasized repetition and alignment of structural and spatial system (Figure 6) produced complex projects that highlighted the structural design in both the exterior and the exterior, foregrounding the tectonic aspects that would contribute to building construction learning.

Figure 4. Alejandro de La Sota. Gymnasium in Madrid, 1961. The classrooms are "hanging" in between the trusses, showing coordination between the structure system and the required functions. (Source: Fundación Alejandro de la Sota)

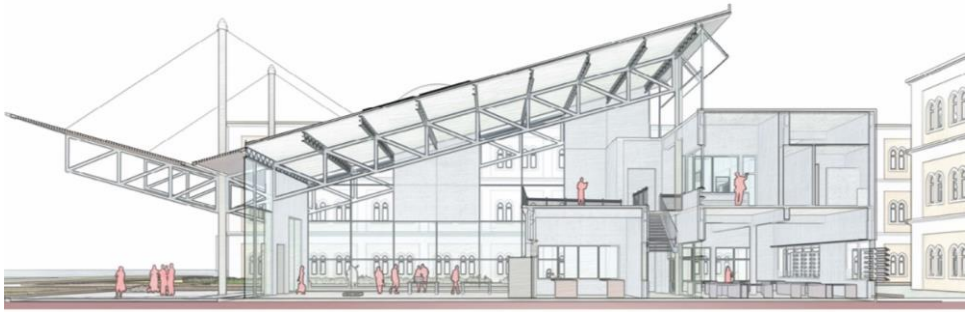

Figure 5. Proposal by Nada Barqawi. The design emphasizes the purpose of the building with a large canopy. Secondary elements of the program are nested inside the space or organized in the perimeter.

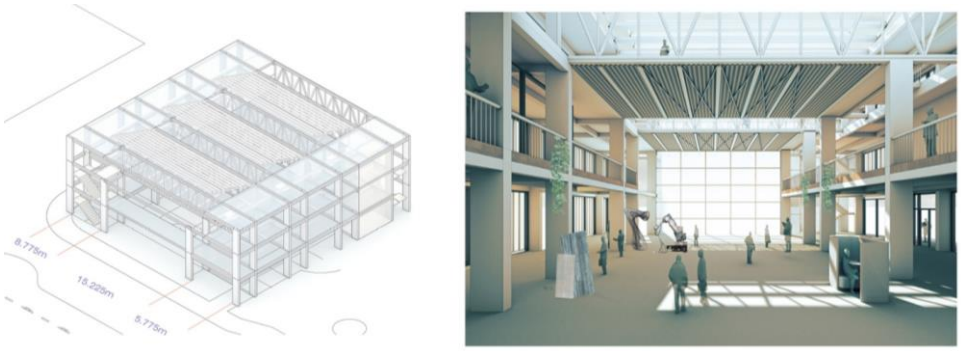

Figure 6. Proposal by Tala Amini. The project reflects an intention to align the structural frame with the program's main components. The studio spaces bridge above the fabrication space, letting daylight pass in between

A third approach incorporates the tectonic aspects with more intensity by increasing the interest in material contrast and articulation. Building on Gottfried Semper's four elements of architecture,[25] Kenneth Frampton highlights how the dialectic between the tectonic form and the stereotomic mass and the analysis of the joint between these two offer a path forward in understanding the true nature of the architectural discipline. According to Frampton, "Architecture must of necessity be embodied in structural and constructional form."[26] Frampton explains the contrast between the tectonic frame and stereotomic mass: the "framework tends toward the aerial and the dematerialization of mass, whereas the mass form is telluric, embedding itself deeper in the earth."[27] Semper defines the joint (as a transition from the tectonic to the stereotomic) as the fundamental essence of architecture, "whereby one culture of building differentiates itself from the next."[28] Frampton suggests buildings such as the Larkin factory in Buffalo by Frank Lloyd Wright (1904) and H. P. Berlage's Stock Exchange in Amsterdam (1897-1904) as evidence of tectonic articulation. Two examples in the studio highlighted the contrast between the tectonic and the stereotomic mass as driving forces. One of the projects contrasts heavy mass support with a lighter roof and envelop system (Figure 7. Proposal by Meera Lootah. The design intent contrast the heavy mass of the perimetral walls with the lightness of the roof that acts like a cloak to filter daylight.), and the other manipulates the landscape and the required retaining walls as stereotomic mass supporting a curved canopy that is perceived as blending landscape in the exterior (Figure 8. Proposal by Yara Soliman. The project mediates between a topography and the canopy.) and as a tectonic frame in the interior (Figure 9).

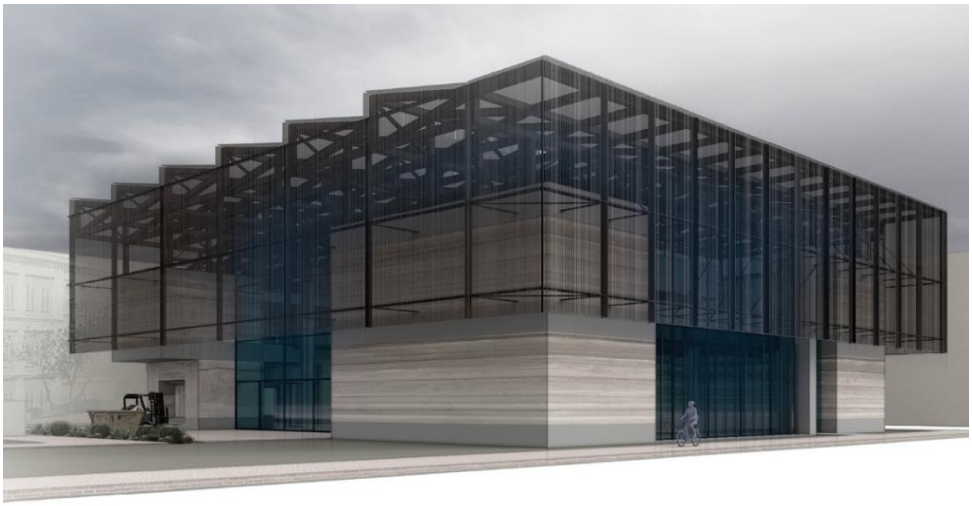

Figure 7. Proposal by Meera Lootah. The design intent contrast the heavy mass of the perimetral walls with the lightness of the roof that acts like a cloak to filter daylight.

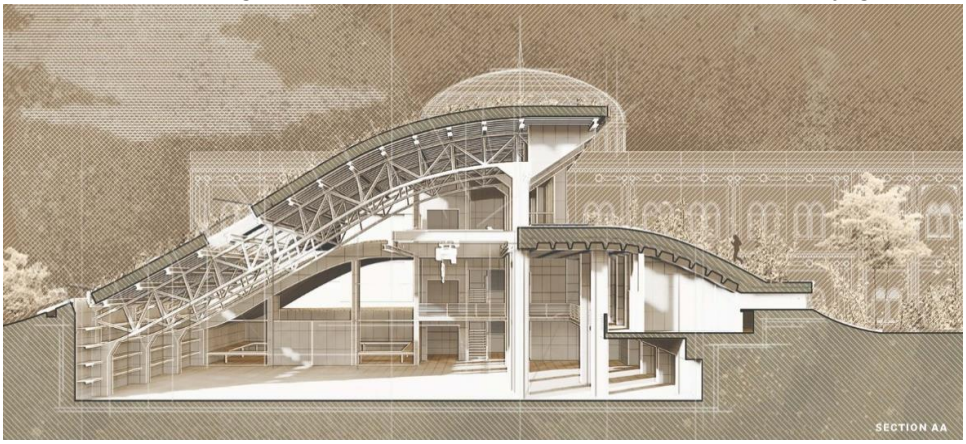

Figure 8. Proposal by Yara Soliman. The project mediates between a topography and the canopy.

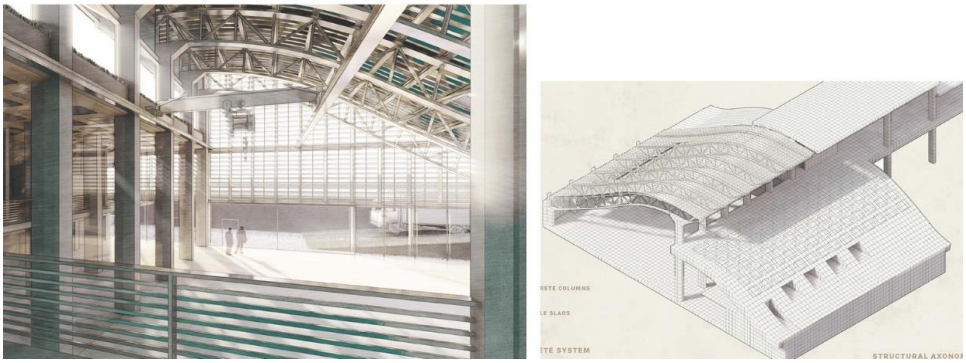

Figure 9. Proposal by Yara Soliman. Interior space and structural diagram.

CONCLUSION

The disciplinary distinctions between architects and engineers have enhanced the divergence between architectural and engineering problems, translating into a lack of collaboration between professionals in coordinating spatial and formal systems and supporting systems. This model permeates into the academic field, expressed in the lack of cooperation of both disciplines and the establishment of preconceptions about the relationship between structures and architecture in the education of architects.

The studio experience presented here attempted to counteract the notion of the structural system as an afterthought of the architectural design process by introducing a design narrative that foregrounded the structural system as a driving force rather than a hidden component. While the studio experience increased the need for attention to technical aspects, the three approaches identified in the process demonstrate that working with structures in the architectural design studio offers students diverse modes of operation, opening stimulating lines of investigation and design rather than limiting their creativity. Future implementations of this studio can outline these approaches beforehand and increase the exposure to conceptual frameworks similar to Frampton's theories about tectonics. By challenging existing preconceptions about the relationship between architecture and structures and blurring the strong boundaries between the architectural and engineering fields, the design studio can promote an awareness of the need for higher collaboration between the disciplines.

NOTES

[1] Andrew Saint. *Architect and Engineer: A Study in Sibling Rivalry.* (New Haven: Yale University Press, 2007),2.
[2]Bjorn Sandaker, Ann Eggen, and Mark Cruveiller. *The Structural basis of Architecture.* (Hoboken: Taylor and Francis, 2013), 2.
[3] Clare Olsen and Sinead Mac Namara. *Collaborations in Architecture and Engineering.* Second Edition. (London, New York: Routledge, 2021), 7.
[4] Clare Olsen, *Collaborations in Architecture and Engineering,* 2*.*
[5] Clare Olsen, *Collaborations in Architecture and Engineering,* 8*.*
[6] Andrew Saint, *Architect and Engineer:*, 431-455.
[7] Clare Olsen, *Collaborations in Architecture and Engineering,* 9*.* "The emphasis on increasing specialization, overloaded curricula, budgetary models that discourage cross-enrollment, and the fact that there are vastly different pedagogical approaches to teaching architecture and engineering, all contribute to keep engineering and architecture students apart in their formative education."
[8] Andrew Saint, *Architect and Engineer*, 2.
[9] Kenneth Frampton. *Modern Architecture: A Critical History.* (London; New York: Thames and Hudson, 2007), 33.
[10] Vitruvius, translated by Morgan Morris. *Vitruvius: The ten Books of Architecture.* (New York: Dover, 1960)
[11] Simon Unwin. *Analysing Architecture.* Fourth Edition. New York: Routledge, 2014
[12] Unwin. *Analysing Architecture,* 180.
[13] Andrea Palladio. *The Four Books on Architecture.* Translated by Robert Tavernor and Richard V Schofield. (Cambridge, Mass: MIT Press, 1997).
[14] Bjorn Sandaker., Eggen, Ann., Cruveiller, Mark. *The Structural basis of Architecture.* Hoboken: Taylor and Francis, 2013
[15] Bjorn Sandaker et al., *The Structural basis of Architecture,* 2*.*
[16] Kenneth Frampton. *Modern Architecture:, 30.*
[17] Le Corbusier. *Toward an architecture.* (Los Angeles: Getty Research Institute, 2007)
[18] Le Corbusier and François De Pierrefeu. *The Home of Man.* (London: The Architectural Press, 1948) 33,103.
[19] Andrew Saint, Architect and Engineer, 367.
[20] Andrew Saint, Architect and Engineer, 367.
[21] Andrew Saint, Architect and Engineer, 367.
[22] Jack L. Naser, Wolfgang F. E. Preiser, and Thomas Fisher. *Designing for Designers: Lessons Learned from Schools of Architecture.* (New York: Fairchild Publications, 2007)
[23] Kenneth Frampton, *Studies in Tectonic Culture. The Poetics of Construction in Nineteenth and Twentieth Century Architecture.* (Cambridge, London: MIT Press, 1995)
[24] https://www.artic.edu/artworks/70944/student-project-for-concert-hall-perspective-collage
[25] Gottfried Semper. *The Four Elements of Architecture and Other Writings.* Translated by Harry Malgrave and Wolfgang Herrmann (Cambridge: Cambridge University Pres, 2010),74.
[26] Kenneth Frampton. *Labour, Work and Architecture : Collected Essays on Architecture and Design.* (London: Phaidon Press, 2002), 92.
[27] Kenneth Frampton. *Labour, Work and Architecture*, 95
[28] Kenneth Frampton. *Labour, Work and Architecture,* 95

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POETIC TRANSFER: CREATIVE INFIDELITY IN DESIGN THINKING

Author:
KURT ESPERSEN-PETERS

Affiliation:
UNIVERSITY OF MANITOBA, CANADA

INTRODUCTION

Inspiration sometimes comes from unexpected places. This paper's inspiration came from reading *A Poetry Handbook* by the American poet Mary Oliver.[1] I had read the book years earlier and picked it up as a diversion from my usual scholarly activities. As the title suggests, the book explains what poetry is, how it functions, and how a poem is constructed. As I read it again, I detected a resonance between Oliver's explanations and the design process used in architecture and interior design. I began envisioning how poetic terms, mechanics, and structure could lead to innovative explorations of the built environment's formal, spatial, and material expressions. Of course, there were obvious differences in medium and message, but the creative process of the two disciplines had relatability; I began visualizing ideas and inferences from poetic practice that could be useful in design thinking. I wondered if poetry could inform architectural design thinking and what the benefit would be.

I deliberately opened this paper with that anecdote to reinforce that ideas can come from anywhere. In designing the built environment, specifically architecture and interior design, ideas are usually contextually derived to solve design challenges or problems, as Kilmer & Kilmer, Rengel, and Aspelund explained.[2] A client has a problem, and the designer has the requisite expertise and skills to resolve it; poets face a similar need to convey a thought, idea, or feeling and rely on poetry's particular mode of expression. Lawson notes that design is a skill, and as with any skill, design can be taught.[3] Oliver believes the same about poetry. At this point, the genesis of this project emerged: can poetry inform conceptual design, and could such skills be taught? Such a project would have to overcome a series of challenges. To begin, let's look at the impetus for this project: poetry.

Poetry and Architecture

To be precise, let's begin with poetry and architecture. Poetry has a long association with the built environment. There is the deep confluence of buildings and landscape in Ruskin[4] and the lived experience in Bachelard.[5] Frank Lloyd Wright stated that "every great architect is necessarily a great poet,"[6] and for Heidegger, poetry is expressive of an existential condition, where "poetic creation, which lets us dwell, is a kind of building."[7] Poetry has currency in design thinking but lacks a consistent understanding and application. Some poets write about architecture, and architects ascribe poetic terms to their works, but has there been an attempt to construct architecture *as* poetry? What would that even mean? This question deserves a wider treatment beyond what can be given here. Still, it identifies a

singular line that can be explored: using poetry to not just describe but *inform* architectural and interior design. This dilemma became the genesis of this poetic project.

To begin, we might ask why use Oliver's book. Her explanation is not universal, and other excellent interpretations of poetry and poetic craft exist which could serve as primary sources, such as Robert Pinsky's *The Sounds of Poetry*,[8] Jorge Luis Borges' *The Craft of Verse*,[9] James Longenbach's *The Art of the Poetic Line*,[10] or Robert Hass' *A Little Book on Form*.[11] So why choose Oliver's book over the others? The answer lies in what Oliver brings to the table regarding translatability, which, as it turns out, is essential in making this endeavour work. Let me explain.

A Poetry Handbook approaches poetry as a writing endeavour. It focuses on the structural aspects of poetry, stating that "this book is about the things that can be learned [...] it is about matters of craft," and is "about the part of the poem that is a written document, as opposed to a mystical document."[12] The book is helpful because of its comprehensive understanding and explanation of the field of poetry in detailed but layman's terms, making it accessible to first-time readers and specific enough to engage those more familiar with poetic concepts. However, it works for design thinking because her take on poetic structure is closely affiliated with the "design craft" of the built environment; there is a synergy between the source material and the destination discipline—an ease of translatability. In design thinking, a similar message is revealed. Lawson states that "design is a highly complex and sophisticated skill [...] it is not a mystical ability given only to those with recondite powers but a skill which, for many, must be learnt and practiced."[13] In speaking about the design process, Kilmer & Kilmer assert that "design can be viewed as a strategy of problem solving in which creative ability utilizes art and science to generate solutions to problem situations."[14]

The broad outlines of this project began to take shape. With a shared interest in using craft to shape expression, it became necessary to devise a way of transferring the knowledge of poetic craft into the design process. The pressing problem is that poetry and interior design are not disciplinarily aligned—poetry relies on language to convey meaning, whereas buildings use tectonics and space. For this project to work, there needed to be a way of aligning the two languages and finding a way to transfer the mechanics and craft of one to the other.

TRANSFER

Transferring poetic knowledge into interior design requires a translation method between the two disciplines. Knowledge Transfer (KT) presents a notable method. KT is generally concerned with generating, sharing, and using knowledge. As Huberman and others note, multiple KT taxonomies and applications exist across a broad spectrum of disciplines.[15] Therefore, narrowing the focus to a method that addresses the project's specific requirements is imperative. Love promotes a basic structure for KT that follows the production-transfer-utilization process, where knowledge or its production is moved to situations where it can be used or applied.[16] This definition works well at a general level because it situates the details of context and execution for the disciplinary level. In his survey of KT literature, models, and theories, Love notes that "no extant 'model' comes close to encompassing the entire range of variables that are important for understanding all phases of knowledge production, transfer, and utilization."[17] This claim situates KT as being contextually determined and employed. To facilitate KT, it is important to validate the knowledge to be used, the acceptability of the knowledge for use, and the mode of transfer needed to facilitate its application. This all has to be contextually determined and address the needs of the situation it serves.

The poetic project does not fit neatly into any extant KT process, but the larger objectives of production-transfer-utilization provide a strong overview for constructing one. If the terms are adjusted, we can get a more precise context for the poetic project without losing the overall structure. In terms of production,

Oliver's book exists as a capsule of knowledge that can be treated as a totality; it is the product of specialized thinking and becomes the object of transfer. The utilization of such knowledge is established as how poetry informs the conceptual approach to design thinking of the built environment; the design process is the intended use of specialized knowledge, the destination of poetic craft. The variable in this equation is how the transference will occur. The transfer will contend with disciplinary boundaries, dissimilar modes of expression, and compatibility. Once the source and destination parameters have been established, the work begins developing a mode of transference that respects both operating conditions: original knowledge and destination design process.

Translation

To ensure that poetic knowledge can get to design thinking, there has to be a way to bridge the divide. The literary concepts of translation can be helpful here, especially in terms of translatability and equivalence. Because the transfer of knowledge is between dissimilar disciplines with different modes of expression, the transfer must assume a form of translation. Translation as a process brings us closer to a method for bridging poetry and interior design. Translation has existed ever since one mode of expression needed to find conveyance in another.[18] Walter Benjamin offers the notion of translatability in his essay "The Task of the Translator." He indicates that translation only occurs if the original work is translatable, possessing an "essential quality" or relevance that transcends linguistic structure.[19] This infers that the message can be adequately transferred, stating that "it is the task of the translator to release in his own language that pure language which is under the spell of another."[20] Paul Ricoeur echoes this argument and offers that translation exists in two dilemmas: the linguistic paradigm referring to meaning within language structures and the ontological paradigm of meaning between human beings.[21] He cautions against perfect translations, instead encouraging an "equivalence" between divergent linguistic expressions.[22] For this poetic project, translatability is the potential of poetry to inform design thinking and the possible synergy or connection across the disciplinary practice. Rather than ignore potential sharing on grounds of disciplinary incongruency, finding equivalencies becomes a strategy for successful knowledge transfer.

Understanding and Interpretation

These goals of translation and equivalency focus on an intention or message that moves from one mode of expression to another. What about a mode's structure or organizing principles? Can those be translated as well? Instead of the message, the method would need to be transferred. Understanding and interpretation are helpful here. As a basic definition, to understand is to comprehend,[23] and to interpret is to understand and then explain.[24] Before any translation occurs, comprehension and explanation of the source and destination disciplines are necessary to determine translatability and equivalency opportunities. Although presented as separate concepts, understanding and interpretation are self-reenforcing and requisite for translation. Sontag offers, "to understand is to interpret,"[25] and Steiner surmises that to understand is to translate.[26] Comprehending disciplinary knowledge is thus the first step in translation and finding equivalencies. For example, the poetic concept of rhythm in verse correlates with interior design as a basic design principle—this could be a point of equivalency.[27] A more complex idea might include the Iambic meter that governs a poem's syntactic structure. Similarly, a design style, such as the Ionic classical order, possesses a regulating compositional structure. There exists a possibility of equivalency between the structural capacity of each mode, where the alignment of one could help inform the other. The trick would be working out ways such an alignment could manifest. Exploring how this alignment could occur became the impetus for the pedagogical aspect of the poetic project.

THE POETRY PROJECT

Facilitating the transfer of poetic knowledge to design thinking requires determining the translatability of the source knowledge to the destination context and what equivalencies could be created to connect the two. By establishing the premise that linking poetry to interior design is plausible, constructing a learning opportunity focuses on establishing transfer equivalencies. A design studio for third-year interior design students served as an opportunity to test the premises. The 12-week course was part of a Canadian university's undergraduate interior design program. There were 26 students in the class tasked with designing the interior of a community library. As part of their initial ideation, students were required to select at least one poetic concept from Oliver's book to use in their design concept. To simplify the transfer process, three transfer methods were provided to quickly orient the students: interpretation, translation, and transliteration. Interpretation was defined as explaining or reframing an individual understanding of a poetic concept. Translation was finding equivalency between the original and destination source materials. Transliteration was the word-for-word translation from one alphabet to another, irrespective of meaning. While these three methods covered a broad range of transfer possibilities, they were also starting points for students to develop their ideas further. With translation and equivalency acting as a middle ground, interpretation could be seen as a liberal approach, allowing students a little more freedom in their translation, and transliteration as a more rigorous and structured approach, providing structure for those who might struggle with higher-level concepts. The intent was to have the poetic element inform and guide the conceptual aspects of the design solution while providing further guidance during the iterative development stage of the design project. It was envisioned that the poetic element would form the basis of the students' design concept, the driving idea behind their design solution.

The Design Assignment

The design assignment was divided into a research and concept stage and a design development and document production phase; it was imagined that the poetic process could span both. Student progress was charted through their early iterative design exploration, ideation, and conceptual development phases, where multiple approaches and schemas were explored before a final design solution materialized. Students used sketches, diagrams, and models to explore their concepts. They met twice weekly in small critique groups with the instructor to discuss their understanding of poetic and design concepts and advance their translation and equivalency ideas. A few examples of student work included one student using rhythm as a design strategy for structuring the library's circulation.[28] Another student used the poetic concept of repose to create moments of pause and reflection within the library, creating intimate reading spaces.[29] A student used the idea of rhyme to generate a symmetrical rhythm and asymmetrical counterpoint throughout the library, using surface finishes and colour and bridging her conceptual ideas with material selection.[30] Using poetic meter as an inspiration, another student took the Iambic pentameter poetic pattern to organize a flooring pattern while finalizing her design solution.[31] Overall, the student work demonstrated a range of strategies that employed the three transfer methods, some literal and others more conceptual. The continuation of their speculative ideas into material selection and final finishes demonstrated a governing theme throughout their work, lending a sense of cohesion and order to their design solution.

PROJECT CONCLUSIONS

The poetic project intended to open greater possibilities for inspiration and alternate ways of thinking outside the design strategies typically associated with the built environment. Rather than evaluating the final design solutions as evidence of student success, tracking the changes in student thinking resulting

from the process was more beneficial and insightful. Thus, capturing student feedback and reflection became a paramount focus of the design assignment. The students provided reflections on their learning through critique sessions, a design journal, and interviews conducted after the completion of the course. The critique reflections are mostly anecdotal but illuminating, whereas the journal and interviews provided reflective and critical thinking by the students about their learning progress. In addition to the student's journals, four students participated in the interviews.

From these reports, students found the initial orientation to the project's intentions challenging, especially for those with little knowledge of poetry. Most admitted to early confusion over terminology and the transfer process and questioned the purpose or benefit of using poetry in design. However, after this initial skepticism and trepidation, students found the simplified yet flexible guidelines encouraging and inspiring. Many responded that they felt more confident in their critical thinking skills, some because they overcame an unfamiliar design challenge and others who began to see the possibilities of integrating influences from outside the interior design spectrum. Most felt that their critical thinking and reflective skills were improved. Others mentioned that the journaling exercise allowed them to consider their design decisions. The benefits of this process ranged from providing clear and comprehensive guidance in making decisions to providing opportunities and room for experimentation and instilling confidence in drawing inspiration and ideas from interdisciplinary sources. After overcoming the initial difficulty of understanding how to apply the translation process, students felt that their work was more meaningful, responsive, and expressive of their ideas.

Reflections

The idea for the poetic project was to discover if transferring poetry into design thinking was possible; it toyed with the idea of creative infidelity—borrowing ideas from other disciplines. What began as a novel idea soon became a teaching and learning challenge and opportunity. The original intention was to open possibilities for student design work by increasing the availability of alternate sources to inspire their work. The tangible goals revolved around improving the product's quality, essentially a better design solution. However, the intangible goals focused on the students' thought and thinking processes, effectively improving how they evaluate, analyze and make informed decisions. Measuring student success is always a challenge, but placing evaluation in the hands of the students themselves makes them responsible for their learning. Students could measure their progress weekly by introducing reflective journals and a stringent critique/review system. Also, introducing a simple set of transfer guidelines provides students with guidance and freedom to explore their ideas. Creating a positive learning environment, especially in terms of critique and review sessions, gave students the confidence to push and experiment with their ideas and creative potential.

The learning outcomes revealed that it was a meaningful opportunity for students to practice thinking critically, reflectively, and progressively about a given design challenge. Confronting them with a foreign concept removed them from the safety net of their previous learning experience. This challenge forced them to open their minds to alternate ways of considering design and the design process. It also changed their perspective from producing a product to considering the process, thus emphasizing how they learn, think, and create. As all products of a student's education do, these projects eventually fade into their portfolios, but the advancement and development of their learning stay with them. Ultimately, that is what matters: helping students learn how to think.

ACKNOWLEDGEMENT

This paper would not have been possible without the participation, trust, and enthusiasm of interior design students and the tireless and dedicated work of Corene Stoski, Research Assistant for this project. My thanks to everyone.

NOTES

[1] Mary Oliver, *A Poetry Handbook* (Boston: Houghton Mifflin Harcourt Publishing Co., 1994).
[2] Rosemary Kilmer & W. Otie Kilmer, *Designing Interiors* (Toronto: Nelson Thomson Learning, 1992); Roberto Rengel, *Shaping Interior Space,* 2nd Edn. (New York: Fairchild Publications, 2007*)*: and Karl Aspelund, *The Design Process* (New York: Fairchild Publications, 2006).
[3] Bryan Lawson, *How Designers Think: The Design Process Demystified* (Oxford: Architectural Press, 2005), 11.
[4] John Ruskin, "The Poetry of Architecture," in *The Works of John Ruskin,* Volume 1, Library Edition. Edited by E.T. Cook and Alexander Wedderburn, 1-188. London: George Allen, 1903-1912.
[5] Gaston Bachlard, *The Poetics of Space* (Boston: Beacon Press, 1994).
[6] Frank Lloyd Wright, *Frank Lloyd Wright Collected Writings, 1931-1939,* Volume 3 (New York: Rizzoli, 1992), 45.
[7] Martin Heidegger, "...Poetically Man Dwells," in *Poetry, Language, Thought.* Translated by Albert Hofstadter, 211-229. (New York: Harper & Row, 1971), 215.
[8] Robert Pinsky, *The Sounds of Poetry* (New York: Farrar, Strauss, Giroux, 1998).
[9] Jorge Luis Borges, *The Craft of Verse* (Cambridge, Mass.: Harvard University Press, 2000).
[10] James Longenbach, *The Art of the Poetic Line* (Saint Paul: Greywolf Press, 2007).
[11] Robert Hass, *A Little Book on Form,* (New York: Ecco Press, 2018).
[12] Oliver, 1.
[13] Lawson, 11.
[14] Kilmer & Kilmer, 154.
[15] R.G. Havelock, *Planning for Innovation Through Dissemination and Utilization of Knowledge* (Ann Arbor: University of Michigan Center of Research on Utilization of Scientific Knowledge, 1973); John M. Love, "Knowledge Transfer and Utilization in Education," in *Review of Research in Education,* Vol. 12 (1), (1985): 337-386; and M.A. Huberman, "Moving Towards the Inevitable: The Sharing of Research in Education," in *Teachers and Teaching: Theory and Practice,* 8 (3), 257-268.
[16] Love, 339.
[17] Love, 355.
[18] Matthew Reynolds, *Translation: A Very Short Introduction* (Oxford: Oxford University Press, 2016), 16.
[19] Walter Benjamin, "The Task of the Translator," in *Illuminations,* edited by Hannah Arendt, 69-82. (New York: Schocken Books, 1968), 70-1.
[20] Benjamin, 80.
[21] Paul Ricoeur, *Interpretation Theory: Discourse and the Surplus of Meaning* (Fort Worth: Texas Christian University Press, 1976), xii.
[22] Ricoeur, 22.
[23] *OED*, s.v. "Understanding," accessed January 28, 2024, https://www.oed.com/search/dictionary/?scope=Entries&q=understanding.
[24] *OED*, s.v. "Interpretation," accessed January 28, 2024, https://www.oed.com/search/dictionary/?scope=Entries&q=interpretation.
[25] Susan Sontag, "Against Interpretation," in *Against Interpretation and Other Essays* (New York: Farrar, Straus and Giroux, 1966), 7.
[26] George Steiner, *After Babel,* 3rd Edn. (Oxford: Oxford University Press, 1998), xii.
[27] In their book *Designing Interiors,* Kilmer & Kilmer state that rhythm is considered one of the seven basic design principles. See Rosemary Kilmer, 117.
[28] Students participating in the interviews were assigned a letter name to preserve anonymity. Research Assistant Corene Stoski compiled all interviews and correlations of student work. Student A, interviewed by Corene Stoski (R.A.), June 22, 2023.
[29] Student B, interviewed by Corene Stoski (R.A.), June 22, 2023.
[30] Student D, interviewed by Corene Stoski (R.A.), June 22, 2023.
[31] Student C, interviewed by Corene Stoski (R.A.), June 22, 2023.

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OPEN AND CO-CREATIVE ARCHITECTURAL EDUCATION

Author:
ISRA TATLIĆ

Affiliation:
FACULTY OF ARCHITECTURE, UNIVERSITY OF SARAJEVO, BOSNIA & HERZEGOVINA

TRANSFORMING ARCHITECTURAL EDUCATION: HABERMAS CONCEPT OF COMMUNICATIVE ACTION AND INCLUSIVE PRACTICES

The prevailing crises in democracy and education necessitate rigorously reevaluating our established architectural pedagogies and methodologies. Historically, architectural education has prioritized pragmatic problem-solving and technical proficiency. However, the evolving socio-political landscape underscores potential inadequacies in these traditional approaches, particularly in fostering critical inquiry, adaptability, and sociocultural awareness. The exigencies of contemporary challenges demand the evolution of architectural education towards a more integrative and adaptable model. This model should encompass technical competencies and cultivate skills in critical analysis, communication, collaboration, and interdisciplinary thinking. An inclusive educational framework that acknowledges and values diverse perspectives is essential to navigating the multifaceted complexities of today's architectural practice. Democratic principles, characterized by dialogue, diversity, and the continuous evolution of value systems, offer valuable insights for reformulating architectural education. Drawing upon Mannheim's concept of evolutionary democracy and Habermas's theory of communicative action, this essay aims to elucidate their relevance and applicability within architectural pedagogy. Emphasizing horizontal communication and fostering an environment of open dialogue can enhance students' preparedness to engage with and respond to evolving societal and professional dynamics.

In architectural theory and pedagogy, Jürgen Habermas's intellectual contributions stand out for their rigorous engagement with the principles of communicative action and the public sphere. Habermas's[1] contribution is "a new social theory that is above all critical."[2] He focuses on the research of the political public - "the space of mutual intellectual communication behavior."[3] Habermas' attitude towards architecture first appears in the article *Modernity, an Incomplete Project*, in which he criticizes the inclusion of architecture as a discipline at the Venice Biennale in 1980 under the title *La Presenza del passato*.[4] Assuming the role of protecting modern rationality, he warns against the "sacrifice of modern tradition in the name of a new historicism."[5] He further presents his attitude towards postmodernism in the article Modernism versus Postmodernism in Architecture, where he sharply criticizes the three trends: neo-historicism, postmodernism, and alternative architecture. According to the author, participatory initiatives in alternative architecture too often led to the "cult of vernacular" and a worship of banality. Habermas warns that there is a hidden truth behind the projects: the colonization of the human habitat by the system and its economic and administrative processes - "a problem that modern architecture has left in the background."[6] The debate achieves special significance in architectural theory. Other works of Habermas, mainly due to the study of the public sphere, are more related to urban and spatial planning and design.[7] At the same time, many other authors use the transformative

power of communication for various forms of joint decision-making and participation.[8] The work done by the author on communicative action and the public is significant in changing architectural dialogues. Previously, architects were trained to use their specific language to dominate conversations or to translate power language into spatial interventions. However, with the presented theoretical basis in this article, it will be shown that architects can be trained to mediate the space and different needs instead of designing the outcomes. In his work, Habermas defines two distinct levels of contemporary society: the lifeworld[9] and the system. Lifeworld is the realm of informal, culturally grounded understandings that constitute the social context of communicative action. It has a horizon shaped by background, unproblematic, and diffuse beliefs within which subjects seek understanding.[10] The structural components of the lifeworld are culture, society, and personality. Its concept embodies cultural reproduction,[11] social integration,[12] and socialization.[13] According to Hugh Baxter, the societal component of Habermas depicts the institutional order that, through its norms, coordinates and constitutes actions, guaranteeing the stability of the lifeworld.[14] Therefore, the lifeworld has an internal coordination process and does not exclude the concepts of control and order. Habermas's concept of the system represents a level of society in which interpersonal action is regulated through its functional norms. "Market and power relations are normative, usually legally regulated, and thus integrated into some institutional framework."[15] According to Habermas, the system regulates human behavior through the media of money and power.[16] Media-controlled social interaction relies on strategic reasoning instead of social agreement. The communication utilized by the system is established to achieve a specific purpose or goal. Habermas's scheme shows social action as either communicative or strategic. Baxter emphasizes that Habermas's perception of economic and political-administrative systems is exclusively instrumental and does not recognize communicative action as a possibility.[17]

Model	**Teleological (strategic) model**	**Normatively regulated model**	**Dramaturgical model**	**Communicative model**
Coordination	Self-centered way of using	Socially integrated into norms and values.	Arrangement of active participants and audience	Cooperative processes of interpretation
Language	One-sided	One-sided	One-sided	Multifaceted
Goal	Preformed language serves as a persuasive tool			Rationality, comprehensiveness
Type	SUCCESS-ORIENTED ACTION (GOAL)			ACTION DIRECTED TO UNDERSTANDING

Table 1. Models of action according to Habermas[18]

The basis of functionalist theories is that a certain degree of order and stability is necessary for social life, accepting mechanisms of social control as essential for maintaining social order.[19] What is particularly important for the relationship between the lifeworld and the system is that both levels of society imply specific control and regulation. However, they differ in terms of the levels and mechanisms of their application, which implies that participation in either group does not necessarily signify order and stability. Jürgen Habermas proposes a communicative model to solve contemporary issues. The communicative model differs primarily from other models regarding communication's

purpose and the horizon's variability. Communicative rationality is a process in which different validity claims[20] lead to a satisfactory response[21] "How mutual understanding in language functions as a mechanism for coordinating action is that the participants in an interaction agree about the validity claimed for their speech acts; that is, they recognize validity claims intersubjectively. What gives rationally motivating force to speech-act offers is, in turn, the structural connection linking the meaning of an utterance, on the one hand, with its validity conditions, the validity claim that is raised for what is said, and the reasons that can be mobilized for the discursive redemption of this claim, on the other hand."[22] According to Habermas, if participants in communication coordinate actions, it can ultimately serve the social integration of the lifeworld. The components of the lifeworld[23] arise from communicative action and its processes: understanding, coordination of activities, and socialization. [24]

Communicative action	Purposeful action
Agreement through dialogue	Agreement through the exercise of power
The action aimed at understanding	Action directed toward success
Public participation	Top-down decision making
Sharing information with the public	Information control
Reflective planning (reflective planner)	Technical expert

Table 2. Characteristics of communicative and purposeful action[25]

The basic unit of measurement for this capital is a neighborhood or village. Sociologists, economists, and architects have studied its direct connection with architecture and urban development. Unlike Habermas's view of communicative action as an utterly correct model, social capital theory considers its positive and negative effects. According to Robert Putnam, cooperation, solidarity, inclusion, trust, and mutual support are positive values of social capital that counteract its equally present negative phenomena such as sectarianism, ethnocentrism, and corruption. Equally significant is the problem of the culmination of community limitations concerning individual freedoms and rights, which is why the author illustrates a clear need for control over its functioning.[26] Therefore, the "dark side of social capital" conflicts with freedom and tolerance. Social capital that connects people based on their similarities often intensifies social stratification, resulting in various social inequalities.[27] It is imperative to prioritize preserving community and equality to empower them ultimately. Habermas's response to the diagnosed problem of the colonization of the lifeworld is the acceptance of communicative rationality in which language is used as the primary source of validity. This Habermas concept means that claims can be verified only through free and unhindered argumentation and shared understanding. Besides communicative rationality, the author suggests strengthening civil society's autonomy and expanding accessible communication among individuals to reduce the system's domination.[28] It is particularly significant to note that there is strong criticism of the rationality of modernity, which poststructuralists perceive as another form of power. At the same time, feminists argue that it masks male domination. In this sense, Albrecht Wellmer, continuing on Habermas's theory, argues that it is necessary to adopt selective rationalization that would not endanger the lifeworld.[29] The "other voices" and the "valorization of fragmentation and diversity" are excluded within the totalitarian illusion. Lyotard rejects any idea of metanarrative, universal, rational rules that conceal the domination of one thought and advocates accepting the diversity of others' experiences and an orientation toward reality instead of an objective vision.[30] The transition from Cartesian, mechanical, individualistic, and detached observation of the world to another holistic and organic paradigm within which all elements (voices) are perceived as equally important,[31] as Fritjof Capra and Pier Luigi Luisi prove, entails a shift from objective to epistemic science. According to the authors, the new systemic thinking is

characterized by a change in perspective from wholes to parts, objects to relationships, measurement to mapping, and structure to process.[32] According to many authors, Habermas's model of clearly separated spheres of morality, autonomous science, and art overlaps, and its juxtaposition proves the diversity and complexity of the languages used. Ross King, based primarily on postmodern and feminist theories, proposes adopting Habermas's concept of communicative action as a framework for "emancipation that must take the form of learning - to position ourselves between voices, making human resources that were previously rejected accessible, and critically translating languages, deconstructing limitations."[33] In parallel, Nancy Fraser proposes complementing and modifying the normative concept of Habermas's public sphere within the framework of contemporary democracy in late capitalism. According to Fraser, it is necessary to apply an alternative proposal to change the basic central assumptions of the public sphere, which should eliminate social differences rather than support them (participatory parity, i.e., socio-economic equality), which prefers a multitude and diverse publics instead of one public sphere; which would achieve the inclusion of different interests and issues; and enable the exchange of differentiated relationships between firm (those who decide) and weak publics (those who propose).[34] In order to change the architectural positions in the communication processes with different social positions and views, it is necessary to advocate for the community and ensure individual rights. The construction of an abstract model of ideal communication is primarily based on Habermas's theory of communicative action to verify the purposefulness of communication. Unlike other models that use preformed language as a tool for persuasion, the communicative model has rationality and comprehensiveness as its goals, making it an action directed toward understanding and consent. The general characteristics of Habermas's communicative model include (a) a process that recognizes the autonomy of participants; (b) goals of action are mutually agreed upon; (c) participants are in an interactive relationship to solve practical problems; (d) participants are focused on understanding the active situation and developing action plans; (e) their coordination arises through agreement.[35] In this sense, developing an action model that advocates for community and individual rights is essential. In conclusion, Jürgen Habermas's theory of communicative action provides a valuable foundation for rethinking architectural education and the design process, particularly in transitioning from isolation to open and co-creative methodologies. Habermas emphasizes the importance of communicative rationality, understanding, and consensus-building in social interactions, principles that can significantly contribute to transforming architectural education. Moreover, embracing other social communication models, such as Robert Putnam's considerations on social capital, allows for a comprehensive understanding of both the positive and negative aspects of community dynamics. This understanding becomes essential when striving to break away from the limitations of isolated design practices. By acknowledging the potential conflicts and inequalities within communities, architectural education can develop strategies to address them, fostering an inclusive and empowering learning environment. Implementing open and co-creative architectural education, including diverse voices and perspectives, is crucial. By doing so, the profession can redefine its role and value system, moving towards a more inclusive, socially responsible, and adaptable approach. The new pedagogical methodology should actively engage students in collaborative problem-solving, encourage dialogue between different stakeholders, and incorporate real-world challenges to prepare future architects for the complexities of contemporary practice.

NAVIGATING EDUCATIONAL REFORMS: MANNHEIM'S ADAPTABLE APPROACH

According to Michel Foucault, schools are significant disciplinary institutions and mechanisms of social control over individuals.[36] Examined from the perspective of aesthetic values and norms promoted by architectural schools, Jan Mukařovský considers aesthetic function an integral part of collective

consciousness.[37] Educational institutions play a crucial role in promoting contemporary capitalism's values, norms, and goals. According to Karl Mannheim, democracy requires an adaptable approach - a moderate level between blind obedience and absolute freedom. The authoritarian education system violated individual rights, while laissez-faire liberalism neglected the social community and the individual within it.[38] Mannheim proposes a new evolutionary democracy based on planning for freedom and diversity instead of control. "Democracy is, essentially, a method of social change, institutionalizing the belief that adapting to a changing reality and reconciling different interests can be achieved by peaceful means, through discussion, negotiation, and common consensus."[39] Planning that is not totalitarian but under community control, with individual freedoms aiming to achieve a balance between mass society integration and the disintegration of individual forces, complemented by a coordination mechanism. This "middle way" Mannheim has collective rules that must be flexible, voluntary, and functional, primarily based on guidelines that, with their indeterminacy, provide elasticity and adaptability to changes. The author suggests democratic self-control as a type of control where authentic and spontaneous social control is promoted based on fundamental shared values. More complex values are left to the discretion and personal choice of the individual.[40] The application of Mannheim's concept is proposed through reforms and education. According to the author, education must undergo several changes: Collective reasoning achieves significant social changes based on intellectual insight and societal consensus.; it must be oriented towards establishing active cooperation to achieve solidarity and cooperativeness, mutual understanding instead of authoritarianism, and serves to preserve common goals but with adaptable norms and group adaptability. So, the middle way is the protection of collective and individual interests to establish communication between different social levels. Mannheim sees the possibility of achieving their consensus in education.[41]

Educating ourselves first is the grounding of Mannheim's concept of democratic self-control. Educators should reform themselves and live the intellectual concepts in order to escape any possible skepticism and to be able to transfer the skills to the students. The classroom should be organized as a playground of a true democracy. "Consensus is much more than theoretical agreement on certain issues - consensus is shared life."[42] Education should integrate into life – not being a separated and formalized transfer of knowledge. According to Mannheim, the goal of education should be to empower us to learn more effectively from life. We should ensure that education encompasses all aspects of life. In order to secure dialogue, social agreements, justice, and freedom, educators should moderate singular and group antagonism. Practicing ultimately shared, discussed, and mutually created standard policy demonstrates and teaches students methods of communication with alignment of values and continuous coordination and mediation. Dealing with disintegration and the authentic process of social discourse empowers the involved to engage in dialogue, openly discuss every position and view, and integrate them into the standard conclusion. In order to escape the tyranny of choice, Mannheim proposes democratic planning of freedom and social justice. Because of planning and control, he calls his proposal "the middle way."[43]

To embrace diversity in design thinking, educators should encourage students to explore and appreciate diverse perspectives in architectural design instead of imposing rigid, universal design norms. Rejecting metanarratives develops critical thinking while emphasizing understanding the interconnected relationships and context. Promoting interdisciplinary collaboration would integrate knowledge from other disciplines to enrich architectural education and practice. Striving for a balance between individual creativity and adherence to collective rules in architectural design would foster a flexible approach. Introducing collaborative projects would promote active cooperation among students. Design educational programs that integrate real-life experiences, encouraging students to learn effectively from their surroundings and to integrate different lifeworld positions and values in projects. Educators should share with students the skills to navigate the complexities of contemporary architectural challenges,

stimulating critical thinking and adaptability. By integrating these principles, architectural education can better prepare students for the dynamic and complex challenges they will face.

CONCLUSION. GENERATION OF MODEL OF COMMUNICATIVE ACTION AND OPEN AND CO-CREATIVE ARCHITECTURAL EDUCATION

The article discusses the need for change in education to confront the contemporary crisis. We need a reevaluation of traditional norms in favor of more flexible and responsive approaches that better align with the complexities of contemporary society. The reduction of system dominance in spatial actions can be achieved by changing the role of experts by altering their education and practical activities. The educational system would be the "democratic education model," which would require continuous harmonization of value systems through discussion, negotiation, and common consensus. Planning would be primarily for community and macro-social coordination to establish a middle ground between mass society's integration and the disintegration of individual forces. The function of education should provide adaptability for experts to establish active collaboration. Limits must be flexible, primarily in guidelines allowing elasticity and adaptability to changes. A paradigm shift involves rejecting universal, rational rules and accepting parts instead of the whole, relationships instead of objects, processes instead of structures, with the ultimate goal of inclusivity of diversity and complexity. The communicative model is a framework for achieving dialogue among all participants. The engagement of experts gravitates between the lifeworld and the system. The results are significant regarding the sustainability of the newly formed context and its integration with local conditions, directly affecting the improvement of the defined problem. The new role of experts is to facilitate mediation between different levels, translating the concrete values of the community into abstract ones and vice versa. The success of the newly proposed intervention depends not only on the proposed solution but also on the established communication. Abstraction ensures social equality while concretization to realize individual rights and the inclusion of diversity. Conclusions of research concepts are used to determine the levels of abstraction and concretization in the phase of instrumentalization of spatial action, the levels of purposeful and communicative action in applied dialogue, and the levels of involvement of reality and the world of life within the creative process. As an operational model, the combined results test theoretical assumptions in practical reflective activities based on their interdependence, relationships, conditioning, and levels of professional and user autonomy and moderation. We need a paradigm shift in both philosophical perspectives and educational systems, emphasizing adaptability, inclusivity, and a holistic understanding of the interconnected nature of our experiences.

NOTES

[1] Jurgen Habermas is a German philosopher and sociologist educated at the University of Frankfurt am Main during Max Horkheimer and Theodore Adorno's work, whose intellectual work was primarily influenced by the Frankfurt School. After his studies, he was employed as an associate at the Frankfurt Institute for Social Research as Theodor Adorno's assistant.
[2] Michael Pusey, *Jürgen Habermas* (Chichester: Ellis Horwood, 1987), 14.
[3] Jürgen Habermas, *Između naturalizma i religije* (Sarajevo: Tugra, 2009), 21.
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EXPLORATIONS ON A LEARNING MODEL FOR ARCHITECTURAL HISTORY AND CULTURAL HERITAGE AWARENESS

Author:
MUZAFFER ÖZGÜLEŞ, SEVGİ TÜRKKAN SROKA, VERA MARIN

Affiliation:
ALANYA UNIVERSITY, TURKEY. ISTANBUL TECHNICAL UNIVERSITY, TURKEY. DE-A ARHITECTURA ASSOCIATION, ROMANIA

CHANGING EDUCATIONAL PARADIGMS AND LEARNING MODELS IN 21st CENTURY

Along the 20th & 21st centuries there have been remarkable shifts in educational paradigms, theories and pedagogical practices, with continuing impacts on the learning culture today. 1930's progressive education movement introduced learning-by-doing,[1] highlighting the role of student engagement with hands-on, task-oriented educational experiences. 1970's critical pedagogy[2] emerged as a field[3] that objected to viewing learners as empty, inferior, passive recipients of a teacher's knowledge and proposed a student-centered re-positioning with focus on social critique and political action. In "Deschooling Society",[4] Illich challenged conventional school education by advocating for a self-directed education network consisting of fluid and informal arrangements. He proposed a "learning society", where people would be free to choose how they learn with the use of technology-enhanced, decentralized "learning webs" and "peer-matching networks" outside the school systems that "heighten the opportunity for each one to transform each moment of his living into one of learning, sharing, and caring."[5]

The development of digital learning technologies and platforms further spinned these ideas by providing innovative tools, spaces and curricular models like the digital classrooms, online certification programs, cloud platforms, MOOC's, etc. Learning methods such as gamification[6] and storytelling[7] gained traction as novel and creative learning settings to increase engagement and agency.

20th century architectural education, particularly the design studio culture is embedded with some of these notions due to its characteristically open, collective, exploratory learning environment. However, the education of architectural history, often consisting of in-class lectures by the professors, occasional site excursions, homework or research presentations by students, still remains a rather under-addressed area for its learning models, except for some experimental cases.[8]

The aforementioned paradigm changes in educational theories and practices in the 21st century, call for rethinking the ways in which learning takes place in the institutional frameworks as well as in the context of communities and society at large. As Brady[9] invites, there is a possibility to "pro-actively devising new teaching and working methods that leverage the capabilities of digital education to promote constructive social dynamics between students" and additionally between all learner groups in the society.

Hence, the project presented in this paper is an attempt for a critical inquiry into the curriculum design as well as creative educational methods for architectural history education and cultural heritage awareness with a flexible, learner-centered curriculum, which is transferable to all learners, including those left outside the formal higher education systems.

PALIMPSEST CITIES PROJECT

Present architectural history or cultural heritage courses do not adequately help to establish a healthy relationship between citizens and the city or the cultural heritage in need of protection. Therefore, the EU project called "Palimpsest Cities: Gamification and Storytelling for Architectural History and Cultural Heritage Awareness" was created to close this vital gap by designing a new course for architectural history and cultural heritage. This Erasmus+ KA220-HED project, granted in September 2022, started in December 2022 and lasting for 28-months, is conducted in collaboration with Istanbul Technical University (ITU) from Turkey, Center for Education and Innovation from Greece, and De-a Arhitectura Association (DAA) from Romania, under the coordination of Alanya University (AHEP) from Türkiye.

The project's ultimate aim is to create architectural history and cultural heritage awareness particularly in multi-layered cities, by developing an innovative, interdisciplinary, learner-based curriculum for a new course that is supported by gamification and storytelling techniques. The project is going to test this course through pilot lectures, in two partner universities in a total of six semesters. The effectiveness and success of this new approach will be evaluated at the end of each semester. Early observations about the potentials and challenges will be carefully noted down, and the results of the evaluations will be used in a feedback mechanism to make fine tuning and improve the course syllabus.

The curriculum of the “Palimpsest Cities” course is designed by applying novel education approaches, with an emphasize on game-based learning[10] and keeping up with the “digital natives”,[11] to consist of 7 modules covering a 14-week semester as follows: 1. Introduction lecture, 2. Field trips, 3. Timeline Travel, 4. Digital Storytelling, 5. City on Trial, 6. Model of the Palimpsest City, 7. Closing lecture. These modules can be re-organized and adjusted according to the length and context of the learning scenario. It is possible to reduce or increase the number of weeks/hours dedicated to an activity; change their places within the semester; modify the contents of each activity according to the background or age of the learners.

Borrowing from Pearce’s iconic book Magical Child,[12] where he describes the child’s constant intention to play while teachers try to get him to work, “the challenge, if we want our species to survive, is to erase the line between play and study”. Therefore, several on-site and in-class games were inserted throughout the 14-week syllabus of the new course, and the syllabus itself is designed as a game with seven levels, in which points are collected to finish the game, i.e., to fulfill the course requirements.

The project also uses storytelling techniques in various modules of the course, as it has been proven that information conveyed within a story becomes much more permanent, engraved in the minds with its details, and internalized more easily.[13] The new course is also created on a learned-centered strategy, as all activities/modules are based on the active inclusion of the students and boldly deviates from the conventional, inefficient teacher-based canon.

One of the most prominent aspects of the project is its transferability, as it invites implementation in diverse institutions and adaptation for different target groups. Initially designed for architecture students, this new course has a modular and adaptable structure that facilitates integration into various educational contexts. It can be implemented either with minimum regulations in architecture departments, restructured for high-school or graduate levels, or as a basis for similar courses in different educational fields. Beyond academia, its applicability extends to public workshops for different

demographics categories, prioritizing underrepresented and disadvantaged groups such as immigrants. The project aims to transform the approach of cultural heritage in the society starting from the interests and concerns of the learners. The project outputs' transferability will also be tested during the project with local implementations from four partner cities, where this kind of groups will directly meet with various activities from the course's syllabus through varied implementations in collaboration with local governments and NGOs.

The on-site and in-class games, digital and conventional stories, exam templates inserted within the syllabus are published on the project's webpage.[14] Online guides and video tutorials have been prepared to facilitate the transferability, with user-friendly instructions for re-implementations and on how to adapt the Palimpsest Cities course for other target groups. Through this initiative, the project aims to mainstream a transferable approach to cultural heritage education across various communities.

CURRENT PHASE OF THE PROJECT IN THREE CASES

This part of the paper aims to provide an overview of the current phase of the project: The project team is currently conducting two new pilot courses and local implementations in three different educational contexts: At AHEP and ITU, architecture students are enrolled with the course "Palimpsest Cities: Alanya" and "Palimpsest Cities: Istanbul", following the newly prepared 14-week syllabus with changes in the order of the weeks and contents/games due to implementation in two different cities. On the other hand, DAA is conducting public workshops for high school students in Bucharest. These three implementations also testify to the possibility of re-ordering the modules of the course and transferability to various learning scenarios in various multi-layered cities.

Implementations in Alanya

At AHEP, the first test lectures of "Palimpsest Cities: Alanya" course has been launched as a 3 credit/ECTS elective course conducted by Asst. Prof. Muzaffer Özgüleş, with contributions and assistance from Asst. Prof. Elif Gizem Yetkin and Res. Asst. Melike Nur Şahin, and with the enrollment of seven fourth grade students from the Architecture Department. Having reached the middle of the semester during the pilot lectures, and having completed three modules (Introduction lecture, Gamified field trips, Timeline Travel) there is enough evidence and some early observations to summarize potentials and challenges of this new curriculum.

In the introductory lecture the aims, methodology and content of this new course were shared in the classroom with players, i.e., students. Their relationship with the city, their view of the concept of cultural heritage and their interest in the historical texture were explored through games. The introduction lecture video prepared particularly for the project was also shown in the class.

Figure 1. Photos from the gamified field trips in Alanya

The gamified field trips module was conducted in Alanya Castle, the historic and multilayered heart of Alanya city (Figure 1). The enthusiasm of the students was evident while exploring the history in the

field, rather than passively listening to the theoretical contents in the classroom. They also gave very positive feedback regarding the games inserted into the field trips, such as treasure hunt, finding different layers or spolia in monuments. They also documented their experiences with photos and videos for components of future digital stories.

Another module of the course was Timeline Travel. As a digital tool, the Timeline Travel mobile application encourages research more than preparing traditional presentations (Figure 2). Moreover, the timelines they created have been made public on the app after an editing phase, which made this activity more attractive for students.

Figure 2. Presentations of timelines during Timeline Travel activity and a timeline created by students at Alanya University

Early observations at AHEP showed that the assignments to be completed by the students themselves do not usually give satisfactory results, as they were asking for more pressure to fulfill the tasks. Therefore, some of the activities, such as making research about the history of the city, would rather be conducted in the classroom environment, with interaction among students and the guidance of the instructor. It was also seen as a challenge to finishing some of the activities/modules in the limited course hours, such as the field trips. Therefore, it was decided to reduce the number of weeks of some activities (Timeline Travel and Digital Storytelling) and increase the hours and weeks dedicated to the field trips and model making.

Another challenge was a technical one: the number of students did not remain the same in the first weeks due to add-drops, so difficulties were faced in forming working groups. It was also observed that simplification of the content is needed as students tend to drop the course when they see that the time/energy they would spend on the course is more than earned credits/ECTS. Students were also requesting more guidance and instructions in all activities, since this was a very unusual course for them.

In addition to the course at AHEP, six public workshops have been conducted outside the university for various age groups, all of which were gamified field trips in Alanya Castle. The participants, who have no architectural education background, were very satisfied with these tours. Slight modifications in the route, content and games were made according to the age and profile of the group. Some of the participants of these tours were the residents of Alanya and as they admitted, this was their first instance to visit the stunning historic sites of the city.

Implementations in Istanbul

In ITU, Faculty of Architecture, the pilot lecture entitled “Palimpsest Cities: Istanbul” was launched as an elective course by a team of professors from the Architectural History Department (Prof. Dr. Zeynep Kuban Tokgöz, Research Assistant Öykü Balcı and Teaching Assistant Ömer Faruk Ulusoy) and the Architectural Design Department (PhD. Lecturer Sevgi Türkkan Sroka). The semester was dedicated to the study of the Grand Bazaar area in Istanbul, as one of its most stratified, dynamic and complex built

areas that continues its historical, social, and economic vibrancy. 12 architecture students enrolled from 3rd and 4th years.

In applying the Palimpsest Cities curriculum, the modules were reorganized to start with the site trips and model-making as a collective effort to better understand the complex multi-layered fabric of the Grand bazaar area. Timeline Travel, City on Trial and Digital Storytelling modules followed the Model-making module so that they can be physically linked, by adding layers to the model with QR links etc., and using the model to produce authentic visual content for storytelling. Overall, the modules were designed with the intention of integrating the design studio based hands-on exercises with architectural history learning in the application of the curriculum.

The semester began with an introduction to the course content and modules, warm-up games and a guest lecture by Mustafa Sayan on tangible and intangible heritage. Second and third weeks were executed on site with guided trips and drawing games (Figure 3).

Figure 3. Photos from Site Trips.

Figure 4. Excursion to Grand Bazaar and the Collective Drawing Game. Consecutive drawings were put together to form a stop-motion film.

The model-making module followed the site trips. Students were divided into 4 groups and assigned a historic period each: Ancient and Byzantine period until the Ottoman conquest in 1453, the 15th and 16th centuries, the 17th and 18th centuries and the 19th century until the foundation of the Turkish Republic in 1923. The groups carried out literature research on their given historic periods, listed the built fabric of that era (buildings, roads, monuments) and reproduced them as a physical layer to be superimposed on the collective model consisting of 4 historic periods. Timeline Travel module works were also integrated onto the model via pins with text and QR codes on them.

Figure 5. Photos from Model-making Process

Reaching halfway in the semester, early observations showed that the on-site games and model-making increased students' engagement in research and deepened their observations on site. The unaccustomed cooperation between the tutors who otherwise independently teach architectural history and design studio seemed fruitful. However, the intensity of the curriculum led to fewer site-trips and more hours in the studio. The course load, although being a 2-credit elective course, weighed heavily on students' schedules due to this multiplicity of modules and goals. This observation made the tutors reconsider some readjustment on the weekly assignments and length of some modules, and notes to be taken for future curricular organization of this course.

Implementations in Bucharest

With more than a decade of experience in implementing optional courses in public schools around Romania, De-a Arhitectura Association[15] has the role of applying some parts of the modules from the 14-week syllabus in the format of workshops that can be organized in high schools, public libraries and other cultural institutions. At the moment (November 2023), there has not been yet any pilot activity outside the university settings, and there is little comparative basis with previous experiences.

DAA team is preparing the first workshop for high school pupils that gets inspiration from the implementations of the field trips and digital storytelling modules that already took place in the two architecture schools, namely at ITU and AHEP. The simulations for the content of the syllabus that were organized within the consortium meeting in Bucharest in June 2023 were also taken into consideration in the design of this first adaptation of the teaching modules from universities to the different settings of a few hours workshop.

Figure 6. Photos from the Simulations with the Project's Consortium Partners in Bucharest, June 2023

CONCLUSION

The pilot experiences have provided valuable insights into the effectiveness of a modular design, showcasing its inherent flexibility in adapting to different educational contexts. This adaptability was particularly evident in the implementation of content across two diverse locations, namely Alanya and

Istanbul. The unique characteristics and requirements of each university posed distinct challenges, primarily stemming from variations in study content, local case studies, and the overall student profiles. The differences observed between the two universities highlighted the adaptability of the modular design to diverse educational landscapes.

This modular approach permits educators to reorganize and customize the curriculum according to the unique needs of each institution. This adaptability enhances the relevance of the content, also ensures that the educational experience is optimized for the specific context in which it is implemented. The ability to customize and rearrange modules based on local case studies, demographics, and other contextual factors positions the modular approach as a versatile and effective solution for delivering tailored education across various institutions and locations.

In both cases, the issue of a high number of learning objectives coupled with a low ECTS value implies that the course may be demanding in terms of content and expectations, potentially leading to a mismatch between workload and credit allocation. This observation presents a significant challenge that warrants careful consideration for future curriculum planning and alignment with university requirements. This consideration is particularly vital for elective courses, where students may have the option to choose from a variety of offerings with different credit values.

The unique characteristics of the elective course, situated between the traditional spaces of seminar rooms and studio rooms in architectural schools, also demands a flexible and adaptable environment that accommodates both theoretical discussions and hands-on, project-based activities. Striking the right balance in logistic arrangements is crucial for optimizing the learning experience and ensuring the course's effectiveness.

Also, both implementations brought about a positive shift in the students' learning experiences. The adoption of more engaging and hands-on teaching methods has resonated well with the students, eliciting encouraging feedback. Students found the history of architecture more accessible and appreciated the connection between theoretical concepts and practical applications. This positive response suggests that the modular, interdisciplinary design, with its adaptability and emphasis on engagement, has effectively revitalized the pedagogical approach to the history of architecture in both cases. As these encouraging results continue to unfold, it provides valuable insights into the potential benefits of similar courses in other academic disciplines and institutions.

NOTES

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[3] John Dewey, *Logic: A Theory of Inquiry* (New York: Henry Holt, 1938b).; Lev Vygotsky, *Mind in Society* (Cambridge, MA: Harvard University Press, 1930); Paulo Freire, *Pedagogy of the Oppressed* (New York: Seabury Press, 1970).
[4] Ivan Illich, *Deschooling Society* (Harmondsworth: Penguin, 1971).
[5] Illich, 2. He describes a good educational system as follows: that "A good educational system should have three purposes: it should provide all who want to learn with access to available resources at any time in their lives; empower all who want to share what they know to find those who want to learn it from them; and, finally, furnish all who want to present an issue to the public with the opportunity to make their challenge known." Illich, 54-55.
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SERVANT OF TWO MASTERS: HOW ACADEMIC FEARS ABOUT ARTIFICIAL INTELLIGENCE MAP TO EMPLOYER ENGAGEMENT

Author:
SIMON SNEDDON, ROSHNI KHATRI

Affiliation:
UNIVERSITY OF NORTHAMPTON, UK

INTRODUCTION

When OpenAI made their Large Language Model (LLM) based ChatGPT platform available to the public in November 2022, it was as a demonstration version, rather than a full release. This did not stop an explosion of usage, and in January 2023 the app had "590 million visits from 100 million unique visitors."[1] This level of growth, which has been described as "unprecedented"[2] "remarkable"[3] "exponential"[4] and "phenomenal,"[5] took the wider world by surprise. Little wonder then that educational establishments across levels and across geographic boundaries have spent much of 2023 scrambling either to apply existing Learning and Teaching strategies to GenAI or to develop specific new strategies. What is also apparent with platforms such as ChatGPT is that the scope and ability of the free-to-access versions is evolving rapidly. The abilities of ChatGPT in February 2023 will be eclipsed entirely by the abilities of Chat GPT in February 2024. This speed of evolution is causing ongoing problems at universities, as there is a recognition that any rules and approaches must be future proof. The integration of technology is occurring at an incomprehensibly rapid pace and the need for professionals to adjust and learn with an open mind to embrace and integrate change is vital to transform what we do with students and employers.

A second potential disrupter is the lawsuit issued by the New York Times in January 2024 against OpenAI and Microsoft alleging copyright infringement by the data scraping software used by ChatGPT and Bard.[6] This case is contested by OpenAI, and whatever the outcome may be, it will doubtless have an impact.

This article took a focused approach on discussions on the use of GenAI in the healthcare and legal professions and the university programmes developing graduates for these professions. The risk posed by academia responding inappropriately or too slowly is that graduates will not be prepared for the industries in which they hope to work. We identify key themes and key implications for business and academia, and consider the application of the BATTEL model,[7] developed between 2019 and 2021, as a mechanism for steering the appropriate use of AI. We conclude that, if handled properly, AI is far from being an existential threat to the University sector and represents a unique opportunity for the creation of a new paradigm of education.

KEY THEMES FROM THE LITERATURE

For this project, the literature review focused squarely on the use of AI systems in the business and academic settings for the healthcare and legal professions, The overall impression from the literature is of a mixed set of feelings. There are elements of AI which are seen as being both a threat to the status quo, and in some cases an existential threat, Other elements were seen as providing excellent opportunities to develop practice, and still others as being more neutral in nature. It is important to note that the literature review was carried out using both the University's online search tool NELSON (Northampton Electronic Search Online), Google Scholar and focusing on English-language sources.
The results of the literature review have been collated below in Figure 1 (for the professions) and Figure 2 (for academics). The results have been categorized as follows:

- Negative: AI is seen as a threat which needs to be tackled.
- Blocker: There is something inherent within AI which means it blocks some sectors of society from being able to use it.
- Opportunity: AI is creating new opportunities for businesses and universities; and
- Positive: AI is seen as a generally positive thing.

One of the key themes which emerged is that employers tend to regard GenAI as merely the latest iteration of AI-powered systems. Janeček et al[8] for example, make the salient point that the "Ctrl +F" function on Microsoft Word is a form of AI, and we might well highlight tools such as Grammarly, founded in 2009, as being trailblazers for the current suite of AI tools.

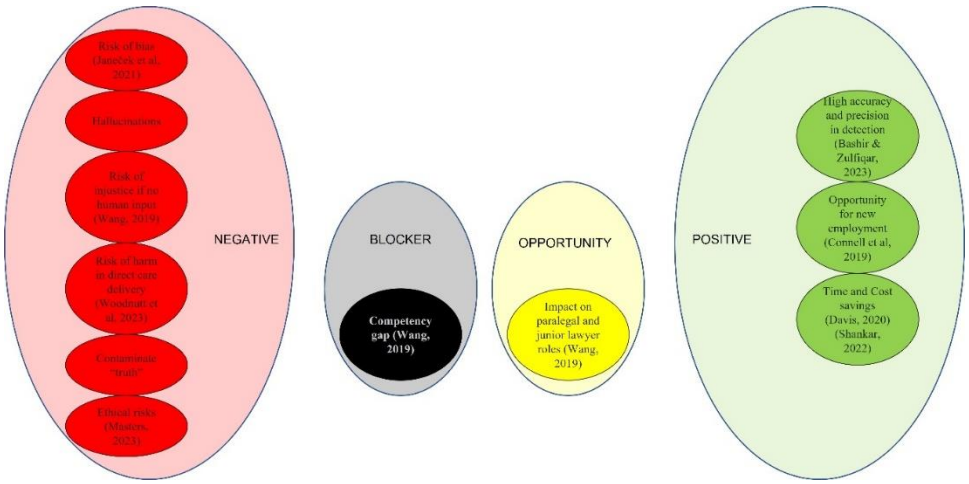

Figure 1. Emerging themes from employers.

One specific risk identified in both the legal and healthcare professions coalesce around the widely-discussed[9] risk of "hallucinations" where the enhanced ability of AI systems "discovers" links or patterns in data which do not exist. The risk of this is that AI becomes self-referencing, using a previous hallucination as the basis of future outputs with material that is invented with citations that are non-existent. Within higher education and clinical practice, it is even more important now to ensure students can evaluate and distinguish the quality of material being produced and impact on patient care. Students must correctly cite resources and declare how much they have used AI generated material within their submissions. Hatem et al[10] call for healthcare staff to be trained to check, date (and citations) generated by AI to control hallucinations. Similar calls are made in relation to law,[11] and Wang[12] argues that without human input there is a real risk of injustices as societal biases are replicated by the AI systems. A common theme across both employers and educators in both sectors, is the "blocker" of a skills gap. Wang calls this a "competency gap" in relation to the legal profession, and similar discussions are taking

place in all sectors. In addition to being seen as a blocker, this skills gap is seen as being a significant opportunity in academia, as the opportunities for training current and future students is significant. The caveat here is, of course, the need to balance technophobia (the fear of new technology), technophilia (the unquestioning love of new technology) and the skills gap within academic staff.

An area of growth is the use of Natural Language Processing (NLP) in Electronic Health Records (EHRs) where NLP is used to extract valuable information from unstructured clinical notes in EHRs. AI can enhance the utilization of EHRs by making the data more accessible and usable for healthcare professionals. The potential timesaving use of NLP is shadowed by concerns about the privacy and security of these data, with the potential for unauthorized access, breaches, or misuse. There is a growing body of literature addressing ethical issues related to AI in healthcare, such as patient privacy, informed consent, bias in algorithms, and the responsibility of healthcare providers in overseeing AI systems. Inaccurate or incomplete data can lead to flawed predictions and diagnoses, potentially compromising patient care. Similar concerns are voiced in legal environments as regulations and legal frameworks may not be well-equipped to address the rapid advancements in AI technology. Ambiguities in liability, accountability, and compliance can pose challenges for healthcare organisations and practitioners with additional concerns about patient-doctor relationships, and the overall quality of care within healthcare practices.

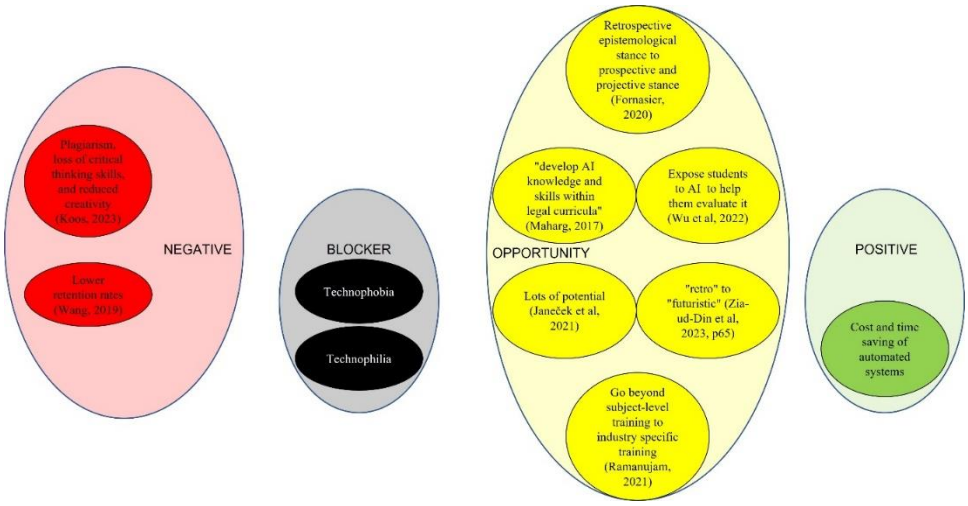

Figure 2. Emerging themes from academics.

On the positive side of the equation, both academics and employers recognise the efficiency gains which look likely to emerge from the use of AI. The ability to "do more with less" has always been attractive. Time and cost savings[13] and higher levels of accuracy[14] are highlighted, as lower-level and more repetitive tasks can be given to AI, which will not be subject to the same needs (or employment laws) as the humans they replace. This enhances the necessity of a cessation in training students for employment roles which will no longer exist by the time they graduate.

What becomes apparent from even this relatively narrow exploration of the literature is the continuing need for academics and employers to work together. This is nothing new – both academic legal and healthcare (and many other) programmes are often accredited by the associated professional provisions, and this collaboration should both continue and get deeper.

What the literature tells is that AI is neither the "white knight" which will save humanity, nor the dragon which will destroy it. As with all technological innovations, is it merely a tool. Improper, unethical use of the tool will help cause problems. Proper, ethical use of the tool will help solve them,

Having identified the emerging themes in the literature, the next section will address what this means in practice for employers and educators.

IMPLICATIONS FOR EMPLOYERS AND EDUCATORS

It appears to be the case that we are entering a new era of employment. This is not the first "new era"[15] and neither will it be the last, but it is at least the current new era. AI is likely to fully or partly replace human activity in many types of employment, in the same way that the automation of production lines in vehicle manufacturing did in their time. As technology is evolving at an incomprehensibly pace, it is vital that clinicians, academics and students embrace these developments, adjust current practices and learn new methods with an open mind to benefit from the transformative potential of AI on healthcare and education.

The National Hi-Tech Crime Unit (NHTCU), which existed in the UK from 2001 until the creation of the Serious Organised Crime Agency in 2008, divided criminal activity into two types:

- Old Crimes, new tools;
- New crimes, new tools.[16]

What the NHTCU was doing in their field was identifying firstly the types of criminal activity which already existed, but which would be facilitated by new technology, and secondly the types of criminal activity which could not have been carried out without the existence of new technology. In healthcare, decision-making rests solely with clinicians - there is a clear parallel between this and our discussion.

We could go so far as to say that employment can be separated into:

- Old Jobs, new tools. These are the jobs which are at risk from AI. It is not beyond imagination, for example that the entire transport sector will cease to exist in any recognsable way with the increasing use of self-driving vans, lorries, trains, ships and aeroplanes. Similarly, much of the work of paralegals and junior lawyers will likely be replaced by AI[17] - indeed the cost/time/consistency benefits of AI means it is already being used in contract negotiations.[18] In healthcare, AI is used in clinical decision-making to help develop diagnosis and develop treatment strategies, patient engagement and adherence data. Therapy solutions are offered through analysis of algorithms that analyse patient data is reducing the need for clinical input for less complex cases.
- New jobs, new tools. There will be the new employment opportunities and the upgrade to existing work which would not exist without AI. Thompson Reuters echoes a widespread belief within the legal profession that "AI is likely to create a host of new legal jobs, as firms will need lawyers to specialize in AI in numerous ways. These include training, consultation, and keeping AI in compliance with state, federal, and global regulations, all of which may be in flux for years to come."[19] The same is true in healthcare, where both Accenture[20] and Goldman Sachs[21] conclude that there will be more complementarity and augmentation than straight out replacement. The introduction of virtual reality (VR) and augmented reality (AR) allows staff and students to develop confidence and competence using AI driven simulation scenarios that provide realistic learning and training for refinement their clinical skills in a risk-free environment, speeding up the adoption of new techniques and procedures.

Both scenarios provide enormous opportunities for educators, whether within the Higher Education or for–profit sectors. Most sources conclude that there will be as many new jobs created as there are old jobs deleted, if not more, and so the opportunities for (re)training are immense.

Fournasier[22] and Zia-ud-Din et al[23] both suggest that it is important for educators to stop looking at how things have always been done and look toward the future. This is a little bit unfair, as the University sector globally has consistently been in a state of flux as it adapts to new technologies, new socio-economic and geopolitical norms and so on, but the crux of the point is well made. If we carry on as we are, without engaging with AI, we will become as redundant to students as those who, in their days,

believed that the printing press was “never going to catch on” or that the Internet was merely a distraction.

In concert with the obvious need for academic and employment to engage with each other, and cross-fertilize in terms of employability, the focus of academia may need to move even further towards application of skills, knowledge and understanding that it already has. Some suggest that programmes could be designed around skills, rather than around subject material. For Health and Law, this would be an interesting direction of travel, although it may not be suitable for all disciplines.

Taking a skill-based approach would require students to become adept in a range of abilities relating to AI:

- The ability to identify which literature is AI-generated, or AI-enhanced. This is a key skill, and links back to the point identified earlier in this piece about the risk of hallucinations. Graduates who are unable to interrogate data and literature to reveal what is real and what is not are far more likely to act on false data.
- The use of AI for healthcare programmes in higher education has added significant value by enhancing education, research, and practical skill building. AI generated materials have created new opportunities for diagnostic analysis, creation of complex virtual patient simulations for training, clinical procedure training, the development of telehealth training and AI simulated patient interactions to train communication skills and empathy. HEI’s are using personalised and adaptive learning resources for students, catering to their individual learning styles and needs. AI can enhance clinical decision making by allowing students to practice making diagnoses, treatment plans, and other healthcare decisions in a safe and supported simulated environment.
- The ability to use AI ethically. There are significant potential ethical issues associated with the use of AI, and many of these have been discussed at length elsewhere.[24] The key for educators is to ensure that the students develop these skills to such an extent that the ethical use of AI becomes normalised. This is essential to address ethical considerations, provide proper training for clinical educators and students, and ensure that AI applications align with educational objectives and ethical standards. Balancing the integration of AI with traditional teaching methods can create a comprehensive and effective learning experience for healthcare students in universities.
- With the rapid evolution of AI learning and use, universities will be required to invest in sustainable solutions including developing sustainable curricula, acquisition and adoption of emerging technologies and equipment to ensure that healthcare programmes remain relevant and in congruence with developments in clinical environments. To support the transformation in both environments it is vital that professional and regulatory bodies guide the development of policies and legislation to support the integration of AI in education and practice settings. The European Parliament has agreed the General Data Protection Regulation and the recent AI act which enables patients to question results and medical interventions as there are concerns that AI generated solutions in healthcare are deemed as high risk and may violate medical ethics and undermine patients’ rights to autonomy and informed consent.
- The ability to use AI effectively. All Generative AI systems require some level of user input - even if it is just asking the question. There are countless professional guides online which focus on asking effective questions, and what is true in the flesh and blood world is also true in the world of AI. The acronym GIGO (Garbage in, Garbage out) has been around in computer science circles for more than half a century and applies equally well here. If students ask any AI a simplistic question, they will receive a simplistic answer.

We need to overcome our fear, and recognise the opportunities of AI, not just the threats. We need to prepare students for the world that will exist, not the world we wished existed equipping graduates with skills needed to "manage" AI as the lower-level jobs will be carried out by AI. Having identified what

it is that the education sector needs to do, and more importantly why it needs to do it, the following section offers up one suggestion as to how this can be done.

THE BATTEL MODEL

The BATTEL (Best Available Techniques in Technology Enhanced Learning) model[25] was developed from the BAT (Best Available Technique) which had been used formally as a standard measurement in the sphere of industrial emissions control since the mid-1990s.[26] The BAT established by the IPPC Directive was not a single absolute "best" standard. Rather, it allowed for different industrial processes to work to differing standard, set by a combination of industry experts, law makers and non-governmental organisations. These standards would be incorporated into a "BAT Reference Document", or "BREF" which was then the touchstone for ascertaining that the current "best" standard was in different areas.

BATTEL was designed to follow a similar path. Technological, subject and pedagogic experts would combine to ascertain the "best" (or most suitable) approach to be used in a particular type of learning and teaching. BATTEL shares two other similarities with BAT:

- As technology advances, the "best" standard will evolve; and
- There can be more than one "best" at the same time.

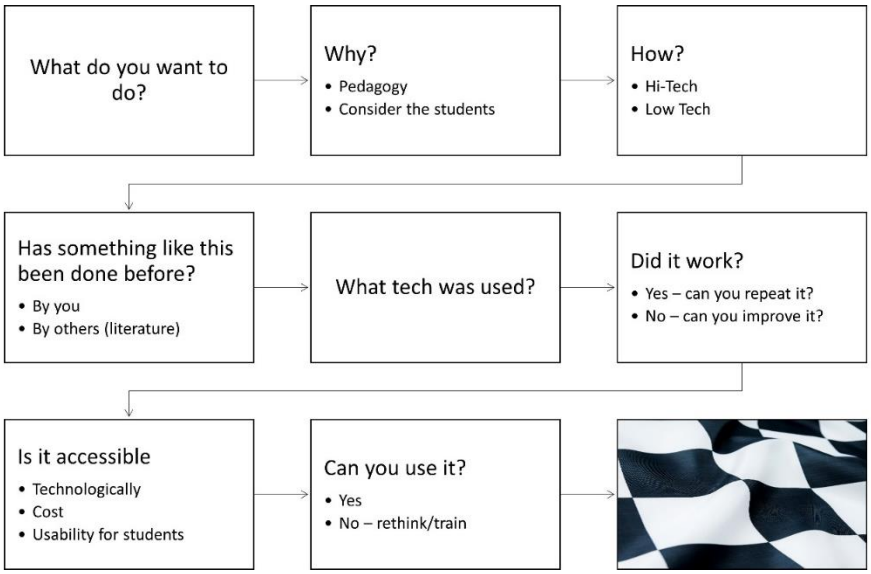

Figure 3. Using BATTEL.

CONCLUSION AND FUTURE STEPS

Samuel Taylor Coleridge, writing in 1835, said "what begins in fear, usually ends in folly."[27] Coleridge was writing about politics, but his words are equally applicable to education. If we fear AI, then we will shun engagement with it and, as Hargreaves points out, "the AI tide will not go back out."[28]

We argue here that AI is an existential threat to the established University sector. This is nothing new: we have had over a millennium of university education, and from the very start the sector has been under existential threats. Individual elements of the system will fall, but the system will endure by doing what it has always done:

- Acknowledging the threat.
- Assessing the level of threat
- Adapting practice to either neutralise the threat or internalise it

- Advancing learning.

AI (whether generative AI or not) represents a a massive opportunity for the University sector to adapt (again) to the changing environment, and to adapt the way we engage with students and our place in wider society. The BATTEL is demonstrated as one way of doing this, and ensuring that we use technology in an appropriate way.

The next step for our project is to carry out interviews with a representative sample of employers, academic staff and academic institutions, and triangulate the themes which have emerged from the literature. We will then use Q methodology as it will enable the systematic study of perspectives of the ethical use of AI using factor analysis to explore the range of beliefs held by these groups.

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RETENTION AS MORAL IMPERATIVE: STUDENT-CENTERED STRATEGIES IN A FIRST-YEAR DESIGN STUDIO

Author:
SARAH YOUNG

Affiliation:
UNIVERSITY OF LOUISIANA AT LAFAYETTE, USA

INTRODUCTION: RETROSPECTIVE CONTEXT AND THE URGENCY FOR PEDAGOGICAL REDESIGN

Our interdisciplinary first year foundations studios at the University of Louisiana at Lafayette serve our Architecture, Interior Design, and Industrial Design students. Pre-pandemic, our first-year design studio methodology worked well for incoming students with prepossessed skills (drawing, making, time-management, etc.) and resources (money, time, social support, academic confidence, etc.), but it was bewildering and alienating for others. This inequity was exacerbated by the pandemic, by waves of national anger and unrest, and by the resultant national mental health crisis. As we returned to in-person learning, incoming students were less academically prepared and needed more support than students in previous years. It was clear that a rethinking of curriculum and pedagogy was necessary in our first-year design studios – to continue with the same curriculum and methods would jeopardize learning outcomes, diversity, retention, and the health of our studio culture. Novel approaches were needed.

This paper will describe and provide supporting research for five student-centered strategies to meet incoming design students where they are and provide them with the skills necessary for success.

THE PROCESS OF STUDIO REDESIGN: A COMPREHENSIVE APPROACH

In the Summer of 2022, a First-Year Task Force comprised of faculty representatives from each of our school's design disciplines began an 8-week process to redesign the interdisciplinary first-year studio experience. The overarching question that guided the process was: "How can we transform a system that often alienates and restricts access into one that embraces students with diverse skill sets, backgrounds, and needs?"

To achieve this, the task force began by formulating hypotheses about the existing issues and crafting interview questions tailored for former first-year students. The students invited to participate were selected to represent a broad spectrum of backgrounds, levels of experience, challenges, and perspectives on their first-year experience.

Through a 2-hour focus group session with these students, the task force identified key areas for intervention, including challenges in perceiving the relevance of assignments and learning objectives, the intricacies of transitioning to college life, the need for greater transparency in grading, and the financial burden imposed by high material and tool costs. Armed with these insights, the task force proceeded to develop a set of student-centered strategies to create new policies and pedagogical

practices in support of first-year design student achievement and wellbeing: 1) acknowledge incoming students as newcomers; 2) make information readily available; 3) build a sense of comfort and belonging; 4) limit cost to students; and 5) create opportunities for additional support.

ACKNOWLEDGE INCOMING STUDENTS AS NEWCOMERS

The first year of college involves a myriad of new experiences for first-year students, including changes in residence, acclimatizing to a new university environment, forming social connections, coping with increased academic demands, navigating competition, grappling with impostor syndrome, and learning to manage their time independently.[1] It is imperative to recognize the novelty and challenges faced by these students during this transitional phase. Notably, Bruffaerts et al. report that nearly one third of first-year students develop mental health issues within their initial year.[2] Consequently, it becomes pertinent to explore strategies through which first-year design studios can acknowledge and support incoming students as newcomers, thereby easing their transition to university life and the design studio.

Onboarding

Enhancing the onboarding process for incoming design students, who are often unfamiliar with studio-type courses, is crucial. Utilizing Bauer's 4 Levels[3] onboarding framework can significantly boost their performance, satisfaction, commitment, and intent to remain.[4] This framework involves four key stages: compliance, clarification, culture, and connection.[5] Within a design studio, these four stages may be organized as follows: Compliance, where students are oriented with the syllabus, course, and university policies; Clarification, which includes discussions on criteria for success, critique etiquette, and career-specific expectations; Culture, focusing on the college, school, or department's vision, values, and mission; and Connection, aimed at fostering both formal and informal relationships within the class and the broader design student community.

Scaffold Basic Skills and Knowledge

To address the diverse skill sets, backgrounds, and knowledge levels of incoming students, it is essential to spend time learning basic skills and concepts to establish a common foundation and bridge knowledge gaps. In our redesigned first-year studios, skills and conceptual knowledge are scaffolded through three key strategies: first, developing a shared language to through which students can effectively engage in and communicate about the activity at hand (through glossary assignments); second, guiding students through hands-on instruction to understand, apply, and then synthesize craft skills, design elements and principles, and iterative design processes; and third, gradually and purposefully decreasing the level of instruction related to the skill over time to foster independent use of the skill (a process described as a "fading scaffold.")[6] This structured progression allows for the complexity of skills and knowledge to build organically from a basic level.

Maximize In-Class Work Time

Allocating substantial time for students to begin assignments during class sessions can give students a chance to ask questions as they arise, setting them up to successfully finish the assignment for homework. In-class work time also allows students to practice the professional designer's work ethic by teaching students the importance of showing up ready to get to work. Additionally, limiting homework to 1-2 hours per class period can help prevent first-year students from being overwhelmed, particularly as they attempt to find balance during their time of transition. This balance between in-class work and manageable homework reinforces a practical and professional work rhythm in a design education setting.

MAKE INFORMATION READILY AVAILABLE

Effective communication plays a pivotal role in student engagement and success. The following approaches suggest that making information available can facilitate a smooth transition from high school to higher education, accommodate diverse learning needs in varied environments, and align academic learning with professional practice, thereby enhancing the overall educational experience in beginning design studios.

Provide Easy to Access to Instructions

Ensuring access to instructions can ease design students' transition from high school, where they may have been accustomed to written instructions and textbooks. In open-plan studio environments, which can often be noisy and distracting, written instructions also aid in overcoming the limitations of solely oral communication, enhancing accessibility for all students. Furthermore, for students who must miss a class, the ability to look up instructions they missed is crucial for catching up. Written instructions can also aid in consistent and clear communication of expectations and requirements across large groups and multiple sections of the same high-enrollment course.

Create Explicit Instructions

Establishing explicit instructions is essential in a design education context. Tolerance for ambiguity is a valuable skill when learning to think critically and creatively, but it is important to recognize that students vary in their ability to handle ambiguity. Therefore, it is important to ensure that any ambiguity in assignments is deliberate and controlled, with other aspects clearly outlined.[7] This can be achieved by providing written instructions, supplemented with illustrations and diverse examples. Additionally, when ambiguity is an intentional component of an assignment, it's crucial to highlight this to students and clarify the rationale behind its inclusion. This approach helps students understand and navigate the ambiguity constructively, improving their overall performance and learning experience.[8]

Establish Relevance

To maintain and enhance student motivation, particularly in pre-professional programs, it is important that students understand how the curriculum is relevant to their future careers. Modern college students, often characterized by practical and financial motivations, benefit significantly when the connection between academic content and professional application is made explicit.[9] This is especially important in design foundations studios that focus on abstract theories, such as elements and principles of design. By clearly demonstrating how these theories are employed in professional practice and ensuring that assignments are evidently relevant, educators can foster a deeper engagement and understanding among students.[10]

BUILD A SENSE OF COMFORT AND BELONGING

Approaches designed to enhance students' personal wellbeing and ease the transition into the unique dynamics of a design classroom are useful for creating a nurturing and inclusive learning environment.

Build Comfort with Critiques

To mitigate feedback anxiety[11] among design students, especially those new to the experience of direct and public criticism, establishing a comfortable critique environment is essential. This process involves initially discussing critique etiquette,[12] explaining the purpose of critique and setting clear expectations regarding critique interactions. In our redesigned first-year studio, we also scaffolded the critique experience to begin with individual, one-on-one sessions, gradually progressing to group critiques or

class-wide sessions as students gain comfort with receiving feedback. As students recognize the value of these critiques, they began requesting group critiques, indicating a positive shift in their perception and comfort level with the critique process. This approach not only reduces the stress around critiques but can also foster a more receptive attitude towards constructive feedback.

Build Community and Belonging Through Low-Stakes Group Projects

A sense of personal wellbeing can be boosted in college students through positive interactions with a diverse range of peers.[13] In a first-year design studio, personal wellbeing can be fostered through low-stress collaboration with their classmates. In this regard, low-stakes group projects are useful for building community and belonging. Incorporating playful, active engagement into group work can create positive interactions between peers and lasting bonds. By creating space for all group interactions to occur during class time, students form positive, meaningful relationships with their peers without the typical stress of coordinating group work outside of class. Group work also helps in developing essential soft skills, thus contributing to a well-rounded educational experience.

LIMIT COST TO STUDENT

The high cost of design education poses a significant barrier to fostering diversity and inclusivity within the field. To attract a wide array of future designers with diverse experiences, it's imperative to reduce the financial burden of entering design school. This issue is particularly acute in the first year, where students face the hefty upfront cost of purchasing numerous tools and supplies essential for their current and future courses. This initial investment can be daunting, especially for those not yet fully committed to a design major. To address this challenge, several strategies can be implemented.

Limit and Streamline Upfront Costs in Design Education

Streamlining supply lists across various courses is critical to avoid the unnecessary purchase of duplicate items. Instructors should coordinate to ensure each tool's utility is maximized across different classes. For single-use materials (i.e. model-making supplies), educators can encourage the use of inexpensive, readily available, or salvaged materials. Additionally, implementing a tool lending program can alleviate the financial strain on students, allowing them the option to borrow tools initially and purchase their own later if they choose to continue in the program.

Connect Students with Outside Sources of Financial Support

Furthermore, targeted support for students facing the greatest financial hardships is essential. Collaborations with local organizations can be instrumental in this regard. For instance, initiatives like NOMA Louisiana's “Design Kits”,[14] which provides supply kits to students in Louisiana architecture schools through donations, set a precedent. These programs can identify students in need through surveys and distribute full or partial supply kits in the early stages of their academic journey. Using indicators such as Pell Grant eligibility can also help in identifying students who may require additional financial support for purchasing supplies. These measures collectively contribute to making design education more accessible and equitable.

CREATE OPPORTUNITIES FOR ADDITIONAL SUPPORT

To enhance first-year design students' experience, integrating supportive curricular links and broadening guidance through peer mentorship and Graduate Teaching Assistants is essential. This approach nurtures a comprehensive and interconnected educational environment.

Create Curricular Links to Support Studio Learning Objectives

To optimize the educational experience for first-year design students, a strategy of creating curricular links that support studio learning objectives is essential. This involves fostering what can be termed "lateral-flow coherence,"[15] where co-requisite courses are intricately connected to reinforce the foundational learning objectives of the design studio. These curricular links should be designed in a way that concepts understood in one course are applied and expanded upon in another, providing a cohesive and integrated learning experience. When planning these curricular links, consider the schedule of co-requisite courses to ensure smooth and complementary progression. Additionally, establishing a shared vocabulary between studio and co-requisite courses enhances understanding and reinforces key concepts.

Provide Near-Peer Guidance

Implementing near-peer guidance through peer mentorship is a powerful strategy to foster a supportive academic environment. This approach not only aids in integrating students more effectively into college life, thereby enhancing their commitment to graduation,[16] but also provides a comfortable venue for them to express their confusions and frustrations. Our first-year studios benefit from the aid of our Graduate Teaching Assistants, who are available both during class and during office hours outside of class time. First-year students may approach GTAs for guidance and support when teachers are unavailable. Additionally, offering incentives such as bonus points can encourage first-year students to actively engage in this mentoring process.

OUTCOMES

Following the redesign of our interdisciplinary first-year design studios, both data analysis and faculty feedback strongly affirm the effectiveness of the newly adopted strategies and their positive impact on students.

Increase in Retention

The 2022-2023 academic year presented a unique challenge with 40% of the first-year class failing to meet standard university admission requirements, indicating a potentially low level of academic preparedness. Yet, the retention rate impressively rose from 51% in 2021-2022 to 79% in 2022-2023, an 18% increase in students progressing to their discipline-specific second-year studios.

Enhanced Student Engagement and Attendance

Making information accessible and connecting learning objectives to real-world applications proved effective in engaging students, particularly those who initially appeared less prepared academically. The new methodology not only encouraged class attendance (with only 8% of students having 9 or more absences compared to 24% the previous year) but also led to significant improvements in learning outcomes and overall engagement.

Improved Student Wellbeing and Participation

Faculty reports highlighted that students were better and more evenly prepared. Students demonstrated enhanced use of design terminology, confidence in presenting their work, and active participation in class activities. This was also a noticeable shift from previous cohorts, where a greater number of students tended to be withdrawn or failed to integrate into the studio community.

Building a Supportive Community

The implementation of low-stakes group projects, phased introduction to public critique, and increased access to resources and peer guidance created a more comfortable and supportive learning environment. Faculty perceptions were that these changes fostered a greater sense of support and camaraderie among students, who were more willing to share resources, seek help, and engage with peers and faculty. Anecdotally, these strategies contributed to a decrease in students' stress levels and an increase in enjoyment and excitement about their work.

CONCLUSION

In conclusion, the transformative impact of our redesigned first-year studio on student success underscores the necessity of continuously adapting our curriculum to evolving student needs. While the five strategies implemented—welcoming new students, ensuring accessible information, nurturing a sense of belonging, alleviating financial stress, and offering additional support—have significantly enhanced retention, diversity, and well-being, they also underscore the vital need for ongoing curricular reassessment. This approach emphasizes the critical role of dynamic, responsive curricular development in shaping the studio culture and diversity of our design studios and the future of the design professions.

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CREATIVE FLUENCY THROUGH MAKING

Author:
ANDREA SOSA FONTAINE

Affiliation:
KENT STATE UNIVERSITY, USA

INTRODUCTION

Creativity, by definition, prompts us to question the norm, and develop novel practices or outcomes. However, within the professional practices of design in the built environment, creative expansion is at risk. Educators that develop curriculum for professional accredited programs must carefully negotiate the foundational needs to prepare students for the profession, while also teaching them expansive tools for creative thinking. It can be quite difficult to lead with both, however, not impossible. While design educators have expertise aligned with their discipline, it is not uncommon to insert interdisciplinary practices within their courses, however, they will likely do so from their own framing, limiting opportunities for innovation. One approach to expanding creativity is through learning other practices outside of our own, leading us to become multilingual designers. This can only occur through developing fluency in other creative practices. Through exploring making, as a modality for learning new languages of creativity, we in fact can learn quicker, and with more innovation, as there is strength in the relationship between the hand and critical language development. The greater the body of knowledge, and level of expertise within a particular discipline, the more challenging it becomes to learn something new without being influenced by what we already know. As such, design students should be exposed to other creative disciplines, while they are still learning foundational theory and praxis of the design practice that they are pursuing. This paper will focus on one such approach that prompts interior design students to develop fluency in another creative practice, through an elective course on shoemaking.

Creativity and the Novel

A foundational skill for good design, is the ability to creatively ideate novel responses to circumstances. But in a class with 60 design students, and one professor, it can become difficult for each student to develop a novel response, when they all have access to the same lecture, materials, readings, and critique. While design educators can teach, and provide prompts to unlock creative potential in design students, if each student is taught by one professor, from a singular institution, then is it fair to expect 60 unique, and innovative design responses?

Interior Design Education Accreditation

Interior Design, as a discipline, has rapidly evolved and expanded since 1905, when the first documented designer, Elsie de Wolfe, was commissioned to design an interior space.[1] Since that time, both society and industry have shifted substantially, however, interior design, as a discipline of the built environment, has not equally adjusted to suit modified societal conditions. When compared to allied

disciplines, such as architecture, interior design has a significantly shorter history of practice. Throughout this time, however, interior design has developed a distinct design language, that borrows much from architecture, and melds the languages of practice with its own disciplinary nuances.

Within professional design disciplines, it is not uncommon for professors to enter academia with a background in professional practice. As interior design educators step away from practice and into fulltime roles as educators and researchers, it is imperative they are critical of their own discipline, and not simply accepting conventions of professional practice as a law that must be followed. Barely a century old, within interior design there is opportunity to define and expand disciplinary boundaries and methods of creative practices[2] through taking a moment to slow down and reflect before speeding into the future. There however exists a challenge withing accredited professional design programs, where there are standards to be met, to uphold a minimum level of design education needed to enter practice. The *Council for Interior Design Accreditation*, CIDA, has developed a set of standards and practices that interior design programs must meet to be designated as accredited, where CIDA clearly identifies the significance of creativity as a foundational skill to interior design professional practice, refereeing Paul E Torrance's framework for creativity that includes the development of "creative fluency, flexibility, originality, and elaboration.[3]" However, it is critical to note that CIDA also has accreditation standards which reference a typical design process within interior design, that should be learned and practiced for any design project. When methods and process remain the same over years, or even decades, eventually, it becomes difficult to expand creative fluency, when creativity is continually taught within the same framing[4]. How can we expect students to design novel solutions within these circumstances?

This critical, and rather simple comparison between accreditation standards for creativity, and design process, became a revelation to my own practices as an interior design educator, through unveiling this key contradiction, I was prompted to explore other conflicts that exist within the language of interior design, where language includes methods, practices, visual representation, and defining vocabulary. The more I explored, the more contradictions I was able to identify, between languages of practice and how interior design sees itself.

Problematic Language of Practice

An innate understanding of people, their relationships with each other, and with interior space is what differentiates the discipline of interior design. Ironically, some of our most problematic language centers on how and who we design for. Commonly used in practice, *end-user, occupant,* and *scale figures,* are three terms that dehumanize people in creative design process. Words hold embedded meaning and inform how we think about and practice design, and so use of language that generalizes needs of people, has potential to impact a design response that is not representative of individual unique circumstances, and lived experiences.

Provocation

So how do we foster expansive creative thinking in interior design students, when we continue to teach them practices, and language of interior design that is taught by interior designers, who were taught by interior designers, with expertise in interior design?

If the tools, practices, and languages that we know are solely perceived through the lens of interior design as a discipline, then we face the added challenge of identifying our own biases, potentially never having the ability to see outside of our discipline, until we learn another creative practice.

Interdisciplinary Practices

It took an ex-physicist and a former ornithology student-- along with some unwitting help from a competitor--to crack the secret of life." - Robert Wright in *TIME* magazine[5]

The very basis of human genetic design was understood only through interdisciplinary translations. If Watson and Crick did not come from different disciplines, perhaps we would not understand DNA to the capacity that we have today.

As such, design educators need to foster graduates that are self-initiated novel creative thinkers, where they can readily respond to the circumstances that surround them, through understanding how to intersect ideas from multiple disciplines.[6]

Within a defined major, and accredited professional program, it can be difficult to find opportunity, or rather enough opportunity within curriculum, to introduce another discipline such that students gain enough fluency to foster expansive and original creative responses to design circumstances.

Making as a Pathway to Rapid Fluency

To learn a new language, the practices, methods, and vocabulary, can take a commitment of months or even years to develop full fluency. Immersion is commonly one of the most successful methods to learn a new language quickly, letting go of first language, and navigating experiences through direct and frequent daily application of the new language.[7] However, learning a new creative language, within a tightly structured curriculum, can be a significant challenge, without increasing time, or cost of design education for students. Despite this, there is opportunity to learn new creative languages rapidly and effectively by immersion through *making*.

Making, is more than the culmination of the design and fabrication of a physical thing, but instead is the practice of getting there. The process of thinking through a design problem with the hands as the primary tool of design inquiry, offers both solutions and extended provocations.[8]

Practices of making, while commonplace in design, are not new to human creativity and language development. Dr. Frank R Wilson's research identifies that complex language, as a milestone of human evolution, was only possible because of the connection between tools, the hand, and subsequent analysis and processing within the mind.[9] As humans experience the world through a negotiation between touch and cognitive processing, making becomes a pathway to develop expanded creative thinking.

Design theorist, Tony Fry, acknowledges that "it is by hand, with care as craft, that the sacred can be made."[10] By working with our hands through active learning, we can connect to humanity, through collective practices of care. Additionally, we can connect to and develop an appreciation for craft, and novel creative practices, as we learn them. Where creative responses to complex circumstances can only occur through acts of making by hand, as this prompts a multilevel practice of reflective, and empathetic sensory processing. Additionally, through the act of making, material, and scale become part of ideation, and tectonic discovery. Making is not a new pedagogical practice, and extends from origins of experiential learning,[11] which can contribute to language retention and fluency capacity through actions of reflection, where thoughts, and ideas are tested with immediacy and adjusted accordingly.

Case Study

As a starting point to becoming multidisciplinary, interior design can look toward an allied creative discipline that effectively has developed a language of practice that centers people, as individuals in design process. In this case, this practice begins with learning fashion design. Through a baseline comparison of the problematic language of interiors, fashion design has a vocabulary that speaks more directly to people, humanizing the experience of design, and objects of clothing. Terms such as tailoring,

fit, mending, and repair, immediately allude to the acceptance of modifications to design solutions to directly suit individual needs. Vocabulary that is arguably missing from interior design practice.

To expand capacity for innovative creative design thinking, an elective course was developed for undergraduate interior design students. The primary intention of the course was to develop multidisciplinary creative fluency to contribute to more resilient future designers, better equipped to respond to changing societal circumstances, and providing students with the skills needed to be able to evaluate, discard, as needed, and build onto, the discourse of the discipline of interior design.

The elective course was framed in the context of shoemaking and fashion design, and utilized three types of learning, which included learning about fashion design theory, learning practices of shoemaking, and learning how to translate between disciplines. Through completing the course, students would develop the hard skills needed for the craft of shoemaking through experiential learning, and the soft skills of creative fluency and translation that contribute to long term multilingual creative design thinkers. By immersing students in novel languages of practice and creative thinking, capacity for innovative and resilient design thinking becomes expansive.

Within the three categories of learning, the course was structured through a series of modules, and exercises.

1. On Shoemaking
2. Exploration through making
3. Reflection through writing
4. Questioning what we know
5. Make again
6. Translating between

Each day of class, there was a lecture, and discussion, followed by a skill development exercise through making. Learning outcomes are cumulative, where outcomes from one module contribute to understanding in the next.

On Shoemaking

The course began with a focus on practices and theory related to shoemaking. The first half of the semester focused on theory and design process, topics included, identity and performance, cultural significance of footwear, ecological responsibility, fashion design process, patterning, tectonics of fashion design, the shoemaking process, and repair.

Exploration through making

Following the weekly lecture and discussion, each class included an experiential component, where students learned various techniques to understand construction of shoes, fit, patterning, and subsequent making of a bespoke pair of shoes. While the students eventually learned how to make shoes, they began by finding an existing pair of shoes, deconstructing and analyzing the material and construction methods – as illustrated in Figure 1. Collectively, this prompted students to identify similarities in different styles of shoes, simply through material construction, and layers of materials uncovered during deconstruction. Working with their hands, students were able to explore practices of shoemaking at a 1:1 scale, reinforcing the lecture content. Students engaged in a sort of flow through making that allowed them to get lost in the practice, loosening restrictions of control and any expectations of perfectionism through craft.[12]

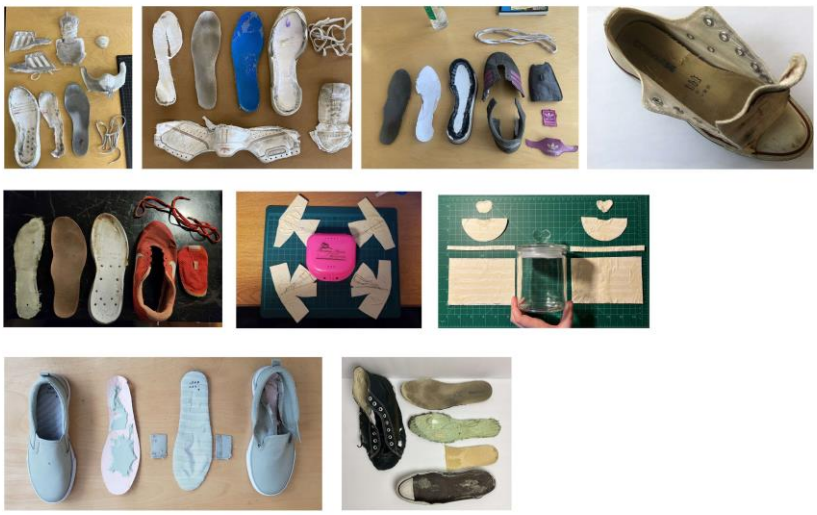

Figure 1. Deconstructed Shoes – examples of student work

Following the initial deconstruction, students began to learn, and make a pair of sneakers, over the course of 5 weeks. Student crafted sneakers, and process documentation are illustrated in Figure 2.

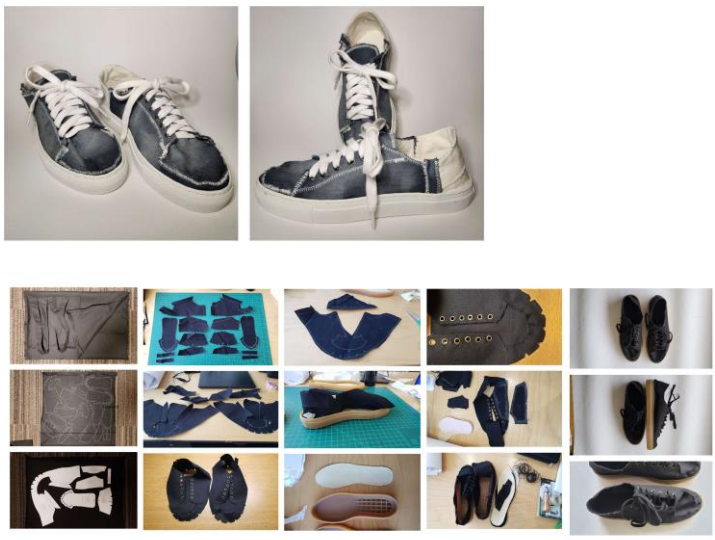

Figure 2. Examples of shoes made by students.

Reflection through writing

While continuing to learn the practices of shoemaking, students were assigned to expand on a theory or practice learned in class, exploring the role of language, as limiting or expansive to those practices of shoemaking. This provided an opportunity for students reflect on the new practices they were learning, as they were learning them, without yet directly connecting to interior design.

Questioning what we know

Following reflective writing, discussions began in class, and during the making process, about the differences between interior design practice, and shoemaking, as well as the similarities, and the strengths and weaknesses of each. This offered an introduction for students to begin to translate and

move between disciplines in their creative thinking practices as they develop multilingual creative fluency.

Making again

Once each student finished making a pair of standard sneakers, they were asked to explore challenges that exist in shoemaking practices and theory and resolve some of those challenges through a custom designed pair of shoes, developed to the level of prototype – as illustrated in Figure 3. This offered students an opportunity to apply design thinking skills to their newly learned practices of shoemaking, while also continuing the reflective practices of design.

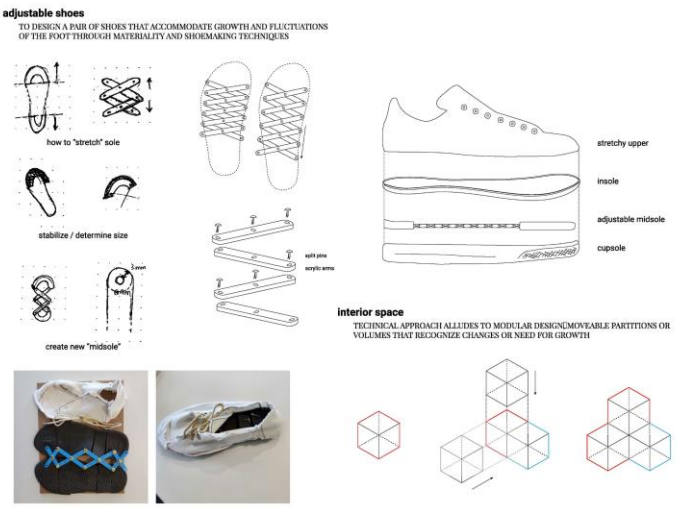

Figure 3. Example of student prototype shoes.

Translating between

Finally, the course culminated in lectures, discussions, and practical applications of translating design language from one discipline to another. Students learned how to make logical decisions on what languages and practices were worth borrowing from another discipline and letting go of from within interior design. Each student created a framework to translate their custom concept shoes to an interior space.

Course Outcomes

There were many expected learning outcomes of the course, such as learning both theory and the skills of shoemaking, and expanding capacity for creative fluency, however, there were other unexpected outcomes that contributed to learning reinforcement and longevity. For example, during the initial shoe deconstruction exercise, there was significant frustration amongst a third of the class, when they were unable to easily deconstruct their shoes. Students were provided access to various hand tools, but were given little instruction on how to deconstruct, and instead were asked to examine the construction of the shoe and look for cues within the form on the sequence to disassemble. Students were also asked to keep each piece intact, wherever possible. Collectively, there was excitement and students learned how to deconstruct through trial and error, realizing that some shoes were easy to disassemble, and others nearly impossible. Some students were proud of their ability to careful deconstruct, while others grew

increasingly frustrated, acknowledging that the construction of a particular shoe did not allow them to fully deconstruct with the tools and knowledge available to them on the first day of class. Whether welcomed, or not, months later, students were able to recall the process of deconstructing their shoes, and the emotional weight that they felt in the process.

Learning a new skill was welcomed by students, and there seemingly was less fear of the unknown amongst the cohort of students, where they didn't hesitate to ask for a reiteration of a demo, or to confirm the process and tools that they should use. Whereas in core curricular design studios, there often exists hesitation amongst students in asking questions. It appears that through the novelty of learning shoemaking, and the collective experience of learning together, students experienced more creative freedom.

CONCLUSION

While each student met the immediate course learning objectives, the abstract outcomes are more challenging to measure. In the short term, students learned the skills to translate ideas and practices from one creative discipline to another. In addition, the course prompted students to consider expanded future career pathways, and despite being enrolled in a professional interior design program, prompted them to explore potential opportunities for them to find success outside of interior design.

At the completion of the course, effectively, all students had become both shoemakers and interior designers, being versed in the practices of both. As a foundational outcome of the course, students were effectively multilingual designers, and creative thinkers, with fluency in more than one creative discipline. Students anecdotally expressed expanded skills, and confidence in making and translating concept from one discipline to the next, however, it is difficult gauge the long-term impact of their expanded capacity for creative practices, and the impact on their future career pathways within design disciplines. Perhaps revisiting this collective of students, 5 years post graduation, may reveal the expansive ways in which they are practicing within creative industries of the built environment.

To develop creative fluency, and the capacity to respond to shifting societal values and circumstances, design educators need to expand disciplinary languages that are taught to students through fostering multilingual creative thinkers. Although the future of design in the built environment suggests unforeseen opportunities through the disruption of Artificial Intelligence, there will however remain a need for human analysis, interpretation, and guidance of generated data, and images. With potential opportunity for design professionals to work outside of the physical built environment, design thinking and creative flexibility, through multilingual design education, and rapid fluency through making, offers a pathway to expanded capacity for how interior designers might practice, and think about the world in the future.

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FOUNDATIONAL CLIMATE EDUCATION IN STEM: A MODERN 'VORKURS'?

Author:
ALEX MACLAREN

Affiliation:
HERIOT WATT UNIVERSITY, UK

INTRODUCTION

The Climate Emergency presents an urgent challenge for educators; to prepare students for academic or professional careers in a context where society must change, at pace, in wholesale and unknowable ways to support a sustainable future. Core amongst the skills required for this societal transition will be traditional engineering and science expertise (STEM), but also outstanding holistic and 'systems thinking' cognisance and appraisal; skills associated with learning through problem-based and challenge-based pedagogies, (PBL and CBL), multidisciplinary approached and messy open-ended 'wicked problems'.[1] Traditional specialist departmental curricula in Higher Education are not built on these pedagogic principles. Proponents of Education for Sustainable Development (ESD) argue that transformation of established higher education delivery is required to achieve this shift.[2]

Perhaps STEM subjects can learn from established teaching methods in Art and Design Education?

This provocation explores the origins and development of the 'foundation year' in Arts Education as a means of developing holistic thinking, heuristic skills and learner agency; and reviews this against three years' delivery of a new ESD course to STEM students, seeking to stimulate similar learning. Student feedback and reflections from past cohorts evidence the personal and academic development of students across the course. The paper concludes by positing the efficacy of this method in developing critically-evaluative, resilient and engaged students with a clear sense of purpose in tackling the Climate Emergency.

Innovating in ESD: providing 'a lens through which to view' your specialist learning

'Shaping Tomorrow Together' (STT) is a year-long, 15-ECTS-credit module delivered in Heriot Watt University, to over 400 students across 13 STEM disciplines and two global campuses, UK and UAE. The module foregrounds the Climate Emergency as a frame through which emerging specialists view their subsequent learning.[3] The course delivers social, technical and political content around Climate Change as an engaging, discursive vehicle for building students' key academic study skills and encouraging personal and collegiate growth. Multidisciplinary collaborative activity develops the core social and teamworking skills required to address the interconnected complexity of climate issues, and builds contextual and cross-cultural awareness.

Figure 1. 'Shaping Tomorrow Together' class cohort with TA mentors and Academic teaching team.

Practical delivery of this course is designed around several key components, initially very scripted and guided, and increasingly open for student interpretation (and in Semester2, active co-creation). The course commences with short-burst individual and group exercises designed to instil confidence in academic processes, assessments, and expectations, with swift feedback turnaround. Subsequently, students engage in more extensive, in-depth group assignments guided by weekly course leader input, large-scale interactive lectures addressing global issues, featuring voting and text-based interactions. The approach involves scaffolded multidisciplinary small-group work, facilitated by PhD students acting as mentors, modelling and fostering collaborative learning. Subject-specific material and lectures contribute to students' sense of disciplinary identity and agency within their groups. The delivery team prioritise the inclusion of live guest lectures and direct engagement with global current events, maintaining flexibility with a minimal fixed curriculum syllabus.

This large-scale teaching innovation project involves a teaching team led by two academics co-managing weekly global sessions and course administration. Further disciplinary-specific academics and 13 Teaching Assistants (TAs) support the program, the former in short block-taught content delivery, the latter (all current PhD students at the same institution), in weekly 'mentoring' sessions with small groups of students, which form the essential core of learner's self-development and introduction to the academic community. Staff development was crucial for both academics and TAs; initially in acknowledging and agreeing the scope of the course and the learning aims with senior subject-area academics, and subsequently in introducing 'coaching' and 'train the trainer' elements in addition to the usual teacher-development pathway for early career academics.

The program is offered in hybrid delivery mode. Initially delivered 100% online due to pandemic lockdown, some of the software and online interactivity tools have been retained in the switch to face-to-face and in-person delivery. Harnessing technology remains a core part of the course, to receive and respond to student feedback on a weekly basis; to train students in using relevant software and in synchronous/asynchronous global academic teamworking; and to effectively manage the number of students and activities taking place.

The course emphasises engagement with diverse content, including blogs, news sources, and datasets, with podcasts and student input valued. Encouraging this broad scope of research leads to engaging discussions in global fora around veracity and reliability of sources, and inevitably misinformation and bias, including AI-generated fallacy. Cultural and political contexts become very relevant and powerful analysis tools. For the modern student these debates develop their critical analysis and research

evaluation in relevant, applied ways: skills that are as much core academic arsenal as effective referencing and citation. Flexibility is key, focusing on scaffolding and designing learning processes, finding opportunities to model critical reasoning and research, rather than rigid syllabus content. The dynamic nature of the content reflects the pace of change of climate discussion, also enabling a continual evolution of the course from year to year.

It is unusual find a large-scale, mandatory, multidisciplinary, credit-bearing module in Climate Literacy and advocacy in accredited STEM tertiary education. This paper proposes that this innovation is analogous to the traditional Art School 'foundation year' experience, where personal growth, positioning and core skill development is facilitated via a broad pedagogic framework for exploration and experimentation.

EDUCATION FOR SUSTAINABLE DEVELOPMENT IN A CLIMATE EMERGENCY

The United Nations (UN) identified innovation in ESD as a core target several decades ago, declaring the period 2005-2014 the 'Decade for Education for Sustainable Development'.[4] The final report on the activity of that decade notes that, particularly for Higher Education, subject-based silos and disciplinary compartmentalisation "continue to be barriers to the exploration of complex issues, and to the preparation of learners with the capacity to address complexity".[5] Weighty publications explored the issue, and various HE institutions globally sought to develop their offerings to serve this requirement. The literature reveals a preoccupation with achieving meaningful multi- or trans-disciplinarity in education; a leader in the field, the Open University, reflects:

'Learning about Sustainability…. requires not only *understanding* disciplinary perspectives but the *practice* of interdisciplinarity (moving beyond 'understanding' content within disciplinary boundaries), and the *praxis* of transdisciplinarity (moving beyond the divide between theory and practice to the world of learning as action).'[6]

The acknowledgement of systemic barriers to multidisciplinarity in HE spurred significant action in educational theory and innovation across the political spectrum, but there is evidence of institutional inertia. More recent reports echoes these concerns, without significant indication of movement: the global Organisation for Economic Co-operation and Development (OECD), in their 'Future of Educational Skills 2030' project, make an argument for 'transferability' in curricula, defining this as requiring multidisciplinary contextualisation; "A transferable curriculum should also recognise how students can develop skills, attitudes and values in particular disciplinary contexts, while also applying them across different disciplines and contexts."[7] A further OECD report calls for 'Authenticity' in learning, defined as "link[ing]… learning experiences to the real world [to] have a sense of purpose in their learning. This requires interdisciplinary and collaborative learning alongside mastery of discipline-based knowledge."[8]

The call for multidisciplinary learning experiences to enhance ESD is clear. Inherent in this is the call for real-world, complex and contextualised learning; the authors of a UN report calling for 'global competencies' in ESD state that "while the cognitive skills of analysing and evaluating information are intrinsically general in nature, global and intercultural issues present their own specific challenges that require knowledge of the world and of cultural differences."[9] This inclusion of scenario-based or real-world engagement is familiar to those engaged in problem-based learning or challenge-based learning; established, effective pedagogies slowly gaining prominence in higher education syllabi.

The pace of change in ESD in HE is not enough. In 2023, Advance HE, the UK's primary body for excellence in Higher Education, with a global reach, initiated an annual 'Sustainability Conference' for senior and strategic leaders in the sector, with the primary aim of unlocking some of the institutional

barriers that remain to developing these educational formats with the urgency demanded by the speed of Climate Change. Rapid evolution of ESD education is becoming an increasingly urgent imperative.

FOUNDATION YEARS [IN DESIGN EDUCATION]- LEARNING FROM THE BAUHAUS

The Bauhaus was an extraordinarily influential design school, established in Germany with the aim of rapidly reforming education to meet contemporary challenges. The school's 'Vorkurs', a semester-long preliminary course for all students across all disciplines, was established by Johannes Itten and subsequently led by Laszlo Moholy-Nagy and Josep Albers. It is widely credited as the forerunner to the near-ubiquitous 'foundation year' run by art and design courses at institutions worldwide. The Vorkurs evolved to become a series of guided exercises in a variety of media, addressing and critiquing the practical constraints of the physical media, and students' facility in their use, but also theoretical and philosophical engagement in the making.[10] In this way, a student going on to study painting will have experimented in sculpture; a photographer will have worked in glass-blowing. The 'Vorkurs', or 'foundation course' expands both knowledge (of tools and disciplinary context), and self-knowledge (of ability, purpose, and relational positioning to others and other art forms); informing and enriching the students' later practice. In addition, "A key function of the foundation course in design is to encourage lifelong learning and to build up self-awareness and confident generative self-criticism that leads to further creative action in students."[11]

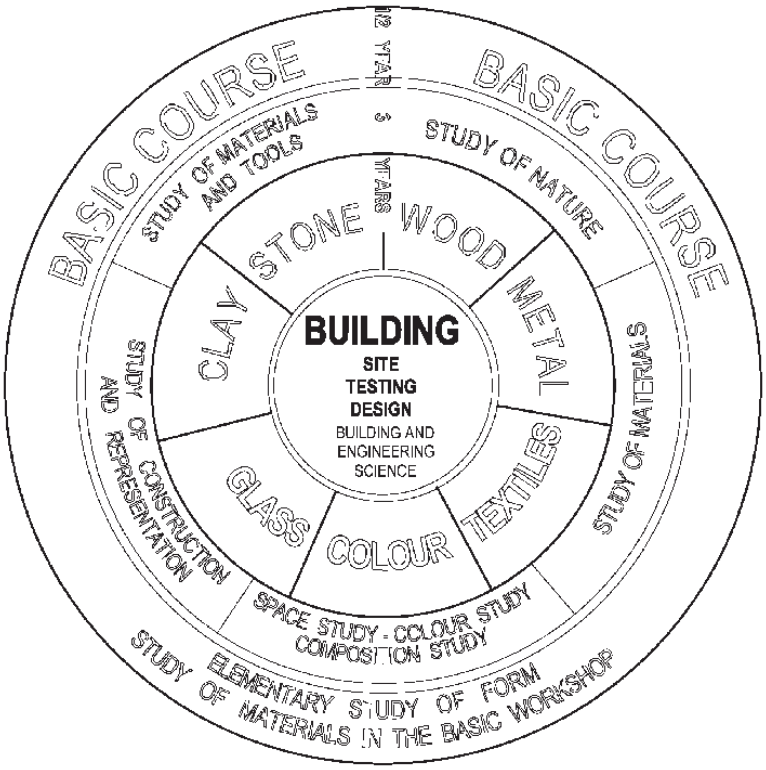

Figure 2. Johannes Itten Bauhaus Vorkurs Curriculum diagram (redrawn by F. McLachlan) Reproduced with permission from the author

'Creative action' in STEM disciplines lies at the core of what is being proposed by the OECD in their 'Global Competence Framework', produced in Pisa in 2018, and by the UN in their call to develop new strategies in ESD. Can open-ended, problem-based learning around sustainability develop that 'confident, generative self-criticism'[12] in nascent scientists and engineers, at the start of their academic

careers? STT seeks to encourage this behaviour with extensive discursive work in small groups, applying students' own research to real scenarios, presented back to peers for review and feedback in quick-fire, low-value projects that reduce the stress of academic submission. Weekly responses to lecture material are shared and debated; self-critique is modelled by staff and propagates in students. White-Hancock, asserting the value of the 'Bauhaus approach' to STE(A)M education, argues that "the principles of the Bauhaus were addressed through a range of organizational mechanisms and resources which helped to create a 'safe' though challenging space for expansive learning and innovation to occur".[13] The STT course seeks to achieve this safe space, in many ways leveraging the diversity of students and their subject choices in order to do so: students' differences in strengths, choices and outlook are recognised and applauded from the start; discussion is welcomed.

DEVELOPING LEARNER AGENCY

Problem-based learning (PBL) strategies thrive on complex, multifaceted-contexts such as the Climate Emergency. By asking students to grapple issues across a social-environmental-economic spectrum, we are placing them in situations of uncertainty and contradiction which offer fertile learning opportunities, but can be overwhelming. In such scenarios it is important to scaffold a path for students to navigate uncertainty, but in doing so to develop their own confidence and sense of purpose.

A study of engineering students' responses to a context-based PBL course in Aalborg University, Denmark, where students worked in small teams on open-ended 'real-world' problems, found that students developed both individual and "collective agency" through working in this way. The study concluded that learner agency was "dynamic and complex, linking to cognitive processes and intentional actions within a larger social context."[14]

The multidisciplinary contextualisation called for in ESD manifestos develops that wider 'social context', but the scale and complexity of climate change issues can be overwhelming to early-stage academic learners. The STT course has evolved to include a specific focus, offering students a framework to map out future agentic actions they could take to develop this purpose. This 'micro' programme, originating on the Heriot Watt Malaysia campus, and designed by the Provost, Mushtak Al-Atabi, centres on human narratives, encouraging students to articulate a personal purpose, and advocate for relevant impact.[15] Sharing is encouraged but not mandated; equal weight is given to modest or all-encompassing ambition; there is an emphasis on iterating and developing the position statement, and 'telling stories'.

Introducing this component to the course has had transformational impact on the engagement of the cohort. Articulating and advocating, in a structured 'safe' space, their personal ambition; and co-developing routes to achieving these aims, seems to banish the inertia previously felt when encountering the multi-faceted, massive problems. The cohort-wide experience of working on this alongside ESD groupwork, gives a sense of shared endeavour across disciplines; promoting not only individual potential but group "interdependence, relational connections, and joint actions with others".[16] One learner reflected in feedback "it's incredible that we are motivating an empowering student giving them this kind of tool set […] it's quite moving really".[17]

Developing the relational agency across cultures and contexts is key to success in addressing the wicked problems of the Climate Emergency. This 'multi-faceted' ability, identified by the Aalborg university team as extraordinary in their cohort of engineering students, is more commonly explored in arts curricula, in explicit exploration via philosophy and theory. It is a facet of learning often perceived as absent in traditional STEM curricula, but essential to the 'global competency' promoted by the ESD frameworks presented earlier. Zeidler argues, in presenting normative STEM education as a 'deficit' framework,[18] that framing STEM learning in socio-cultural contexts, with a discussion of the reciprocal

cause-and-effect- interplay in these systems, is essential for effective 'scientific literacy'. She concludes that "it is fundamentally important for any student to be able to frame any STEM topic in a personal, thoughtful and meaningful context so as to allow for open inquiry, discourse, and evidence-based reasoning."[19] The co-exploration of multidisciplinary climate issues with colleagues, alongside explicit discussion of personal purpose, is designed to effect exactly this cognisance and ability.

There are other interesting parallels with Bauhaus-derived education; the famous polymath Buckminster Fuller, who taught alongside Josef Albers at the Black Mountain College in the after the latter emigrated alongside Bauhaus leader Walter Gropius,[20] there refined his 'World (Peace) Game' for students, a 'heuristic device'[21] that gamified complex resource management, political maneouvres and development strategies in order to impart a sense of context to students' design decisions; and an experience, albeit simulated, of impact and agency.

PREPARING THE EDUCATORS FOR THIS CHALLENGE – PROFESSORIAL PROFESSIONAL DEVELOPMENT

Leading students through such complex content is a demanding task. Sevian et al, in exploring STEM context-based learning, note that:

"Another aspect still not investigated enough yet is the learning or professionalisation of the teachers to teach CBL effectively. [Further Study] should relate to effectiveness of STEM teachers' professional development with focus on teaching and learning in context."[22]

Teachers in HE are particularly likely to be (expert) specialists, and most often 'career academics'; individuals who have been part of the academe for the majority of their adult lives. Many see this situation as a direct result of successive funding and policy decisions governing the HE landscape; where peer-reviewed achievement in the academic sphere is considered superior to practical applied experience in allocating funding and assessing league tables. Tennant et al, commenting on construction and engineering education, argue that "The rise of the career academic… is emblematic of recent HE policy-making".[23] The same team argue that more efficacious engineering education might be achieved by instead embracing the value of the 'pracademic'[24] – an academic experienced in practical application of theory in industry, as well as developing expertise in the academe.

ESD as presented above requires a 'pracademic' approach; a teaching team keen to embrace the complexity and pragmatism of the applied; but also 'instructor vulnerability'- the ability of the lecturer to act as a model for self-reflection, active listening, empathetic judgement and open-mindedness. These skills are not traditionally valued in academic for a; nor are they taught as part of professional pedagogic development to nascent lecturers of undergraduates. In STT the solution was to bring in external advisors to develop the teaching team's skills in coaching and self-development; this may be more widely applicable across curricula delivery, if a transformative, holistic, heuristic pedagogy is required to train students to meet the challenges of climate change.

CONCLUSION

Significant parallels can be drawn between the foundational STEM course, STT, and the established ambitions and delivery processes of an arts 'foundation year'. The fundamental reliance on a combinations of skills development, self-development, and contextual-relational exploration, in order to build contextual awareness and trans-disciplinary literacy, and learner agency, is common to both. This analogy is helpful in explaining the course as 'a lens through which students perceive their subsequent disciplinary learning'; and aligns with global ambitions for ESD education to develop effective trans-disciplinary critical evaluation in learners. This allows the reflection that this model of beginning tertiary study (with a foundation course) has evolved and thrived across arts and design

disciplines for over a century; that there is significant theoretical and evidentiary weight behind the efficacy of such an approach.

This approach can in turn be expanded to discuss recent innovations in widening access to HE and STEM subjects via foundational education provision as a gateway to accredited degree study. Literature suggests that real-world contextualised education, and learning through applied theory, is more inclusive for traditionally under-represented cohorts in STEM.

The STT course is relatively novel and its impact has yet to be tested in HE graduate reflections; the first cohort will graduate from batchelors degrees this year. Developing and exploring this analogy does, however, inspire optimism that the 'STEM foundation year' approach both supports contemporary strategy for educational innovation and has precedence in proven praxis in other sectors. As educators struggle to meet the urgent imperative of developing learner competency to meet the challenges of our changing Climate, we can reflect that much can be gained from sensitive adaptation; both in education and in our societal response to Climate Change.

ACKNOWLEDGMENT

The author owes a debt of gratitude to Prof. Mary-Jane Rooney, previously Head of Architecture at Heriot-Watt University Dubai, whose initial observation, offered in creative discussion as we developed the course, sparked this analogy.

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FLUID PEDAGOGY: THE QUEER ART OF FAILURE IN ARCHITECTURAL STUDIO TEACHING

Author:
SCOTT SINGEISEN

Affiliation:
NORTH CAROLINA CENTRAL UNIVERSITY, USA

"I want to write a book that changes as it goes, he said. I want to tell a story that cancels itself as it goes, I replied.", Raymond Federman, *Take It Or Leave It*.[1]

INTRODUCTION

This article argues the regulation of architectural education, proposing an alternative to the–often engrained–persistent linear design trajectories and static studio formats. It proposes a counter-narrative through the exploration of fluid pedagogies inspired by *The Queer Art of Failure*, written in 2011 by Jack Halberstam. A fluid pedagogy disentangles traditional studio learning, paving the way for a dynamic interplay of temporalities, spatiality, and voices.

The article provides an example and principles of fluid pedagogy highlighting its potential to reshape architectural education and equip architecture students with the tools to navigate and succeed in the ever-evolving landscapes of design practice.

THE ARCHITECTURE STUDIO

The field of architectural education has been formed on a tension between the expectations of the professor to achieve course outcomes through their project selection, the relatable and quantifiable successful manners of creating architecture, and the student design solution; the result of deep personal investment (in the best case) or simplistic derivative solutions (in the worst case).

Architecture faculty members sometimes carry deep personal preferences for architectural types and styles that become imparted to students in their studio design process and assignment results. This is most evident when architecture faculty have achieved some degree of notoriety through the publication of work, whether images and drawings or competition entries or constructed buildings, and to continue to build influence expect studio students to design in their method and arrive at results fitting the influence of the faculty member.[2] Additionally, the studio professor may not have carefully thought out the design process themselves, potentially selecting a design project that doesn't align with the abilities of the students learning experience, for example.

In tandem with the professor's expectations, students must adhere to basic principles of architectural planning and organization. Commonly referred to as design fundamentals, these expectations govern organization layout, circulation design, layering of building elevations, and the creation of space within (programmed and non-programmed). Other than the design detail at the end of the design process which instructs contractors on how to assemble the multiple pieces of material to form the intended design, design fundamentals are the only other quantifiable rules of design. While building codes may come to

mind as additional rules, codes are in fact related to the health, safety, and welfare of the occupants and user, and are not criteria by which we judge good or bad design. Students work with the expectations set forth by the studio professor, i.e. the type of building (museum), the size and square footage (60,000 square feet), and the programmatic adjacencies (bathrooms should be off the lobby), conceive a concept for their design, consider the design fundamentals, and then further develop the design solution, all while receiving regular "desk crits" from the professor.

This design process is a lateral thinking process that requires the designer understand the basics of the location where the building is to go, before placing the main entry, while at the same time, the main entry itself may be redesigned several times based on decisions made about the lobby, the access from the street, as well as the material, scale, transparency, safety, etc. of the entire entry itself. The design process can move forward, stall, loop back on itself, restart, and then eventually arrive at a–hopefully–successful finish. The design process engages lateral thinking and is not a direct line from start to finish.

Figure 1. Michael's diagram of time.

JEREMY BEARIMY

In Season 3, Episode 4 of *The Good Place*, titled "Jeremy Bearimy," Michael, a demon architect of the afterlife, attempts to explain the complex nature of time to his human friends. He draws a convoluted, looping diagram on a whiteboard, labelling it "Jeremy Bearimy", Figure 1. This represents the non-linear flow of time in the afterlife, contrasting with the linear perception of time on Earth.

Michael explains that while time on Earth moves forward in a straight line, time in the afterlife is more fluid and cyclical. Events can happen out of order, with past, present, and future intertwining. This cyclical nature is depicted by the diagram's continuous loop, which suggests that there is no definitive beginning or end to time.

The characters initially struggle to grasp this concept, as it challenges their fundamental understanding of reality. However, they eventually come to accept the Jeremy Bearimy model as a way to make sense of the seemingly random and chaotic events they've experienced in the afterlife. This revelation helps them to embrace the unpredictability of their existence and to appreciate the interconnectedness of past, present, and future.

While the Jeremy Bearimy Model might not align with conventional scientific views, it serves as a thought-provoking metaphor for the design process. It challenges practitioners, students, and the public to reconsider our assumptions about idea generation and the expected flow of thoughts, ideas, and design solutions. By embracing this non-linear perspective, we open ourselves to new possibilities for understanding the interconnectedness of events and the cyclical patterns that may exist as conceived through the design process.

THE QUEER ART OF FAILURE

In *The Queer Art of Failure,* Jack Halberstam takes readers on a provocative journey through the realms of success and failure, challenging deeply ingrained societal norms along the way. Halberstam argues that mainstream ideas of success are often tied to capitalist, heteronormative, and patriarchal systems, which marginalize and exclude those who do not fit into these frameworks. Instead, Halberstam proposes embracing failure as a means of resistance and subversion.[3]

At the core, the narrative by Halberstam is a bold critique of traditional notions of success. Through incisive analysis, they expose the inherent limitations and exclusions embedded within mainstream ideologies of achievement. Capitalist, heteronormative, and patriarchal standards are called into question, and Halberstam dismantles the rigid frameworks that dictate who is deemed worthy of success and who is relegated to the margins.

Yet, it is in the embrace of failure that Halberstam discovers a radical form of resistance and subversion. Rejecting the notion that failure is synonymous with defeat, they champion failure as a powerful tool for defiance. In the face of oppressive systems, marginalized individuals find agency and empowerment through acts of refusal, challenging the status quo and forging new pathways toward liberation. From the pages of children's literature to the screens of independent cinema, they uncover narratives of resilience and defiance that defy conventional norms. These cultural artifacts serve as beacons of hope, illuminating alternative modes of existence that flourish outside the constraints of mainstream success.

Ultimately, *The Queer Art of Failure* is a call to arms, beckoning readers to join in the collective struggle for liberation. By rejecting the narrow confines of traditional success and embracing the transformative power of failure, Halberstam invites us to imagine a world where authenticity and belonging are not measured by societal standards, but by the strength of our resistance and the depth of our solidarity.

EMBRACING DIGRESSION IN STUDIO PEDAGOGY

Détournement, meaning "rerouting" or "hijacking," emerged in the 1950s as a subversive artistic technique pioneered by the Letterist and Situationist Internationals. It aimed to challenge the authority of existing culture and ideology by creatively recontextualizing pre-existing art, media, and everyday objects, an irreverent rebellion against artistic and societal norms. Ideologically, détournement stands as a critique of capitalism and mass culture. It exposes how existing works often serve as propaganda, furthering dominant narratives. By recontextualizing them, détournement exposes these hidden agendas and empowers individuals to interpret and redefine culture on their own terms.[4]

As a model for design studio action, students might delve into the socio-political implications of housing–rather than only designing housing, the intersection of architecture and the human body, or the ecological effects embedded within materials. These explorations aren’t mere intellectual exercises; they inform and refine design projects, with unexpected influences on the concepts of architectural design proposals.

Within this pedagogical studio framework, digression is not a misstep, but a catalyst for exploration. Rather than adhering to a predetermined path, students are encouraged to meander through diverse realms, questioning assumptions, and forging unexpected connections. Political discourse informs building design, the human body dictates spatial relationships, and the awareness of erosion and material decay challenge notions of permanence. These digressions, far from derailing the design process, enrich it, fostering critical thinking and adaptability.

This fluidity extends beyond the individual student, embracing a variety of voices. The traditional hierarchy of instructor and student can dissolve, replaced by a collaborative construction of meaning where ideas can collide, and critiques can transform into dialogues. The studio becomes a culture of

shared learning, where knowledge flows freely and the collective wisdom of the group elevates individual projects.
In the studio, digression wouldn't be seen as a detour, but a détournement – a deliberate shift in focus to illuminate overlooked facets of architectural education that should be challenged.

A FLUID STUDIO PEDAGOGY

Drawing inspiration from the non-linear, digressive narrative explored in Raymond Federman's *Take It Or Leave It: An Exaggerated Second-Hand Tale to Be Read Aloud Either Standing or Sitting*,[5] fluid pedagogy rejects the authority of linear progression. *Take It Or Leave It* traverses physical and metaphorical landscapes with an unrestrained principle, inviting the reader to embark on a journey that transcends the boundaries of any single place or perspective. Time ceases to be a unidirectional force, morphing instead into a tapestry of interconnected moments. Past, present, and future intertwine, revealing the rich tapestry of influences that shape the narrator's experience. Similarly, in a fluid pedagogical architecture education design assignments expand to encompass both tangible studio spaces and the multi-disciplinary areas of the arts, social sciences, and humanities.
Just as *Take It Or Leave It* shifts between temporalities, a fluid pedagogy studio environment shifts between past, present, and future. Within this fluid framework, digression becomes not a distraction, but a catalyst for reflective exploration. The narrative meanders through diverse realms of experience, inviting contemplation on topics as varied as politics, sexuality, national identity, literature, humor, mortality, and the very nature of design authorship itself. These digressions serve not to derail the design process, but rather to enrich it, fostering unexpected connections and challenging the architecture student to question their assumptions about the world around them.
In *Take It Or Leave It* the traditional hierarchy of storyteller and audience is subverted, as the reader is invited to become an active participant in the construction of meaning. This participatory ethos mirrors the fluid nature of the narrative itself, fostering a sense of shared ownership and inviting a multiplicity of interpretations. Architecture students within a fluid pedagogy studio don't simply study architectural history as precedent; they inhabit it, immersing themselves in the ghosts of ancient ruins and the whispers of futuristic projects. The present studio wouldn't be a siloed entity, but a conduit, drawing inspiration from contemporary art, literature, and technology while simultaneously shaping design proposals.
The ultimate expression of this fluid pedagogy is found in the concept of a "story that cancels itself as it goes."[6] Spoken by the narrator in Federman's novel, this seemingly paradoxical notion challenges the very foundations of storytelling, suggesting that the act of telling can simultaneously create and dismantle meaning. It invites us to embrace the ephemerality of narrative, to acknowledge that stories are not static objects, but rather fluid processes that are constantly evolving and transforming.

QUEER AND TRANS THEORY AS PEDAGOGICAL INFLUENCE

To dismantle entrenched education norms within architectural pedagogy, we must embrace fluid pedagogies informed by queer and trans theory. Fluid pedagogies move away from the rigid structures and linear narratives that dominate traditional education. Instead, they emphasize flexibility, collaboration, and the exploration of multiple perspectives. This approach creates a more inclusive learning environment where students are encouraged to challenge assumptions, experiment with diverse design approaches, and express their unique identities through their architectural creations.
Queer and trans theory, with its emphasis on deconstructing gender binaries and challenging normative power structures, offers a valuable lens through which to reimagine architectural education. By applying

these theoretical frameworks to a curriculum, we encourage students to critically analyze assumptions embedded within architectural design and practice.

In her 2006 journal article, Sara Ahmed describes how an encounter with an object, body, or situation that fails to line up with the "straight line" can cause a "queer moment" and the experience of disorientation.[7] When things no longer line up, we might feel uncertain, out of place, unable to move forward. However, Ahmed suggests that disorientation opens up for new possible directions that might have otherwise not been discovered. No longer on the "straight path",[8] we can reorient ourselves toward other lines. This can be a source of unease, but in it we might even find delight.

In a world obsessed with permanence, a fluid pedagogy embraces the concept of an architecture education that cancels itself as it goes. Instead of fixating on static expectations, students focus on transience that fosters a culture of experimentation and resilience. Mistakes become steppingstones, failure a catalyst for innovation. Students learn to adapt, refine, and evolve their designs in response to real-time feedback and the ever-shifting needs of their surroundings. They acquire the agility and critical thinking necessary to navigate the uncertainties of architectural practice, and cultivate a culture of experimentation, resilience, and adaptation.

The traditional hierarchy of student and professor is instead transformed into a dialogue, akin to the dialogue within *Take It Or Leave It*.[9] In a fluid pedagogy studio, students don't simply receive critiques; they actively participate in a collaborative construction of meaning, challenging, and refining each other's ideas through iterative feedback and shared explorations. This participatory ethos extends beyond the studio, forging connections with communities, local artisans, and other disciplines.

FLUID PEDAGOGICAL EXAMPLE

Disorienting Dilemmas[10]

The term meaning making has been used in constructivist educational psychology to refer to the personal epistemology that persons create to help them to make sense of the influences, relationships and sources of knowledge in their world.[11] According to the transformative learning theory of sociologist and educator Jack Mezirow, adults interpret the meaning of their experiences through a lens of deeply held assumptions.[12] When they experience something that contradicts or challenges their way of negotiating the world, they have to go through the transformative process of evaluating their assumptions and processes of making meaning. Mezirow called these experiences that force individuals to engage in this critical self-reflection "disorienting dilemmas".[13]

In *Educating the Reflective Practitioner*, Donald Schön suggests that artistry is necessary for the solution of problems in professional practice that occupy the indeterminate zones of uncertainty, uniqueness, and conflict. The two traditional approaches to the teaching of artistry, however, are problematic. The first, its elimination from a curriculum based on technical rationality, is predicated on the belief that artistry is mystical and essentially unteachable. The second, its reduction to a set of procedures, has proven not to work with indeterminate phenomena that are inherently unmanageable. Schön proposes a third strategy: reflection in action, based on his observations that considerable tacit knowledge is already built into practice. By entering the condition of action and reflecting on what has been done, one can resolve "indeterminate" problems in situ by doing.[14]

By first positioning students in a disorienting dilemma, and by second, providing a framework for "reflection in action" for students to identify and use analogous architectural research elements, students develop a personal methodology and their own contextual position with a fluid pedagogy. In this work, I argue that the traditional reliance on case studies and precedents, particularly in the age of the internet, can hinder students' ability to develop their own design agendas and engage in deep, meaningful research.

Each of the projects challenge the student's assumptions and their individual process of making meaning. Since a ___torium is not Googleable no mental models will impede the student's personal development throughout the term and rather than attempt to summarize meanings of type, students explore the purpose of type for which the concept is used and develop a self-authored design agenda. This fluid pedagogy intentionally avoids familiar typologies and encourages students to explore unconventional design solutions. By removing the crutch of readily available online references, students are forced to rely on their own creativity and develop a personal methodology for approaching architectural design.

Disorienting dilemmas also emphasize the importance of reflection in the design process. Students are encouraged to critically evaluate their work through the lens of multiple interpretations, situations, and engagements. This reflective practice helps students to understand the broader context of their design decisions and to refine their personal interests and passions.

These fluid pedagogical tactics not only foster self-authorship and critical thinking but also help students to develop a deeper understanding of architectural history and theory. By engaging with the discipline on their own terms, students are better equipped to navigate the complexities of the field and to contribute to its ongoing evolution.

One approach for fluid pedagogies to succeed is to adapt pedagogical approaches to the changing landscape of information access. By embracing the challenges and opportunities presented by the internet, educators can empower students to become more independent, creative, and critical thinkers.

CONCLUSION

In conclusion, this article has argued for a fluid pedagogy in architectural education, drawing inspiration from Jack Halberstam's *The Queer Art of Failure* and challenging the traditional linear design trajectories and static studio formats. By embracing digression, fluidity, and diverse voices, architectural education can empower students to navigate the complexities of design practice and contribute to the ongoing evolution of the field.

The proposed fluid pedagogy offers a counter-narrative to the dominant educational paradigm, emphasizing the importance of experimentation, reflection, and collaboration. By incorporating disorienting dilemmas and encouraging reflection in action, students develop a personal methodology and contextual position within their design process. This approach fosters critical thinking, adaptability, and resilience, equipping students with the tools to navigate the uncertainties of architectural practice.

Furthermore, the integration of queer and trans theory into architectural pedagogy challenges normative power structures and encourages students to critically analyze assumptions embedded within architectural design. By embracing fluidity and rejecting static expectations, students are empowered to experiment, learn from failures, and adapt their designs in response to real-time feedback and the ever-shifting needs of their surroundings.

The fluid pedagogy proposed in this article is not merely a theoretical construct but a practical approach that can be implemented in architectural studios. By incorporating disorienting dilemmas, encouraging reflection in action, and embracing diverse voices, educators can create a more inclusive and dynamic learning environment that prepares students for the challenges and opportunities of the 21st century.

Ultimately, the goal of fluid pedagogy is to cultivate a new generation of architects who are not only skilled in design but also equipped with the critical thinking, adaptability, and resilience necessary to navigate the complexities of the built environment. By embracing failure as a catalyst for innovation and challenging traditional notions of success, fluid pedagogy empowers students to become agents of change, shaping a more equitable, sustainable, and inclusive future for architecture.

NOTES

[1] Raymond Federman, *Take It Or Leave It: An Exaggerated Second-Hand Tale to Be Read Aloud Either Standing or Sitting* (Salt Lake City, Utah: Fiction Collective 2, 1997), 44.
[2] Sherry Ahrentzen and Kathryn H. Anthony, “Sex, Stars, and Studios: A Look at Gendered Educational Practices in Architecture,” Journal of Architectural Education 47, no. 1 (1993): 11–29.
[3] Jack Halberstam, *The Queer Art of Failure* (United Kingdom: Duke University Press, 2011).
[4] Culturally, détournement had a profound impact on various artistic movements, from punk rock's anti-establishment energy to the sampling techniques of hip-hop music. Its influence is also evident in contemporary pop culture's mashups and memes, which continue to subvert and reimagine existing material.
[5] Raymond Federman, *Take It Or Leave It: An Exaggerated Second-Hand Tale to Be Read Aloud Either Standing or Sitting* (Salt Lake City, Utah: Fiction Collective 2, 1997).
[6] Federman, 44.
[7] Sara Ahmed, “ORIENTATIONS: Toward A Queer Phenomenology,” GLQ: A Journal Of Lesbian And Gay Studies 12, no. 4 (2006): 561-66.
[8] Ahmed, 561-66.
[9] Federman.
[10] Scott Singeisen, “Disorienting Dilemmas: A Studio Model for Teaching Meaning-Making and Reflection in Action” (paper presented at the 2019 ACSA/EAAE Teachers Conference, Antwerp, Belgium, June 28-29, 2019).
[11] Neil Postman and Charles Weingartner, "Meaning making," in *Teaching as a subversive activity*. (New York: Delacorte Press, 2010), 82–97.
[12] Jack Mezirow, "Perspective Transformation," Adult Education Quarterly 28, no. 2 (1978): 100–10.
[13] Jack Mezirow, *Transformative Dimensions of Adult Learning* (San Francisco: Jossey-Bass, 1991)
[14] Donald A Schön, *Educating the Reflective Practitioner* (San Francisco; London: Jossey-Bass, 1987).

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FOSTERING STUDENT AGENCY AND RESILIENCE IN DESIGN EDUCATION & PRACTICE

Author:
SARAH HOWARD, DRAGANA BOGAVAC

Affiliation:
BOSTON ARCHITECTURAL COLLEGE, USA

INTRODUCTION

At the beginning of the Pandemic, a school administrator of a spatial design college asked us if we would be willing to teach our revised experiential learning model as part of the school's 'beyond the curriculum' professional practice requirements. With the world essentially shut down, students were struggling to complete these graduation requirements. We said yes. This was an opportunity for us to reflect, assess, and understand this model and to strengthen epistemological and pedagogical approaches for design students as they bridge from academic contexts to professional contexts. In our study, we found that when students learn structured methods to self-lead and self-direct their learning within and beyond the curriculum (e.g. have more agency) they increasingly develop resilient and adaptive competencies.

During this significant global disruption, we as educators and as institutions were faced with fundamental pedagogical questions of 'what are we teaching, how and why?' We were also challenged with philosophical and epistemological questions such as 'what kind of knowledge do students as emerging professionals need in a changing, disrupted world?' and 'what are valid ways of knowing?' Additionally, the murder of George Floyd and the emergence of a more visible Black Lives Matter movement highlighted the need to address institutional racism and discrimination by supporting knowers of historically marginalized/oppressed groups, and their ways of knowing, within and beyond the design curriculum.

In our ongoing action research study, we examined self-led processes in which students are encouraged to find their own agency towards becoming learners in changing professional spaces, preparing them to navigate uncertainty and complexity. We reviewed, assessed, and iterated an educational model for student-led experiential learning (EL) in which students construct knowledge from professional practice experience. We analyzed and evaluated the benefits of teaching students as emerging professionals to metacognitively develop their own experiential learning frameworks. By doing this, we aim to expand our understanding of how to support student competencies within and beyond the design curriculum, and to better understand these crucial epistemological and pedagogical questions.

Research Question & Theoretical Frames

What are ways of learning that foster key competencies of resilience within and beyond the curriculum in an increasingly complex and uncertain world? Kolb's EL model[1] is a well-tested framework that supports learning from experience. We have found, however, that it needs additional theoretical frames as we seek to iterate the model from educator-led to student-led. Two additional frames that support

this process are Bloom's Revised Taxonomy[2] and Metacognition.[3] Bloom's Revised Taxonomy is a framework that introduces a model for understanding the cognitive learning process and types of knowledge. Metacognition refers to learning about and understanding one's own cognitive and learning processes.

THE STUDY

With a cyclical action research approach, we implemented the study in multiple phases, each comprising the following steps: study/plan, act/teach, collect data, reflect/analyze, iterate/develop, and then test. This study builds on years of work by key faculty at the college to create 'beyond the curriculum' learning opportunities. We (authors) had been teaching the material in a number of different contexts since late 2014, first developed by the dean of the school with other faculty prior to that. In 2017, we (authors) received a research grant from the college to study the model. We tested, and iterated the material from the initial course in several different contexts, within and beyond the core curriculum:

- The Practicum Program for design studies bachelors students in a spatial design college (a bridge located within and beyond the academic curriculum): course size ranged from 3 to 15 students aged 17-60;
- Boston area urbanism and design firm internship for spatial design and liberal arts undergraduate and graduate students from area colleges (beyond the curriculum): cohort size ranged from 2-6 interns aged 18-45;
- WHY Project as a Gateway Program for students of design studies, architecture, landscape architecture, and interior architecture in a spatial design college (beyond the curriculum): cohort size 11-15 students;
- Real Estate Development (RED) post-professional graduate degree program for students in a spatial design college (bridge between curriculum and beyond): cohort size ranged from 3 to 8 students aged 22 - 60;
- Teaching Assistantship Program for spatial design students teaching in a pre-college summer program (beyond curriculum): one cohort, 14 teaching assistants aged 19-30.

Cycle 1—Revised Experiential Learning Model (2015-2017)

We started the study by reviewing course materials and reflecting on what we had learned from the initial ten courses and six internships to better understand the effectiveness of the self-led model and each of the steps of this model, and to identify the core competencies. We emailed a seven-question survey to students who completed the Practicum. We also assessed the final reports of the courses to understand how the EL cycle supported learners' ability to 1) use and create the EL framework and learning methods 2) demonstrate and apply new knowledge; and 3) create new learning and career opportunities. Key action learning in cycle 1: 1) what works and what doesn't in a revised Kolb model towards preparing students to be adaptive/resilient professionals beyond the curriculum; and 2) what additional steps of the cycle are needed to support student learning including, and 3) identifying the core adaptive professional competencies to inform an assessment tool. We examined student surveys and work from the following:

- Ten (10) Practicum courses with design studies bachelors students (data from Moodle Shell);
- Six (6) firm internship cohorts with spatial design and liberal arts undergraduate and graduate students.

Cycle 2— Assessment Tool (2018-2020)

We researched, developed, and tested the core professional competencies framework and assessment tool (see figure) to assess the self-led learning model (and courses) and its effectiveness. We reviewed student final reports from the previous courses; and then identified when, where, and how the cycle helped them build skills and foster competencies, and when/where it failed. We iterated the revised cycle applying this learning. Key action learning in cycle 2: researching and applying the five (5) core adaptive professional competencies to the assessment tool; identifying that the Big WHY and origin story is necessary for students to guide their own experiential learning cycle during major disruptions such as a global pandemic (facilitating student agency beyond the curriculum) informing the development of the Meta-Cycle. We examined student work from the following:

- Six (6) Practicum courses with design studies bachelors students (data from Moodle Shell);
- One (1) WHY Project Gateway cohort with spatial design students;
- Four (4) firm internship cohorts with spatial design and liberal arts undergraduate and graduate students.

Core Adaptive Professional Competency	Characteristics to develop according to literature	How addressed in curriculum— Kolb, Blooms, Livingstone?	General approach in Practicum courses	Example of how it is developed in coursework	Student work examples
Self-actualization	Striving towards capacity	Experiential Learning (Kolb); Metacognition (Livingstone)	Students learn to identify their professional and career goals and to create opportunities and learning methods that support these goals.	Students create their own professional practicum experience, and learn from it.	Appendix B,D,E,G,H
Self-actualization	Purpose in life	Inquiry; Metacognition (Livingstone)	Student learn to identify their personal, career and professional purpose, direction and goals.	Students design meaningful learning experiences, and are encouraged to align these experiences with their purpose and goals. Instructors model this.	Appendix B,E

Figure 1. Beyond the Curriculum Assessment Tool—An Example

Cycle 3—Metacognitive Cycle (Meta-Cycle) 2021-2023

To test the revised Meta-Cycle we reviewed student work and final projects through the lens of students demonstrating new skills learned based on 1) additional key steps, such as the origin story as a way to invite students to step into the plurality of their standpoints and positionalities; and 2) introduction of the core competencies as part of the curriculum. Key action learning in cycle 3: Further articulated and developed the Meta-Cycle in response to pandemic to support student-led learning as a bridge between traditional in-person classroom learning and learning beyond the curriculum. We examined student work from the following:

- Six (6) Practicum courses with design studies bachelors students (data from Moodle Shell);
- One (1) WHY Project Gateway course with spatial design students;
- Three (3) RED courses with post-professional students in a spatial design college;
- One (1) cohort of teaching assistants (spatial design undergraduate and graduate students) in a pre-college summer program.

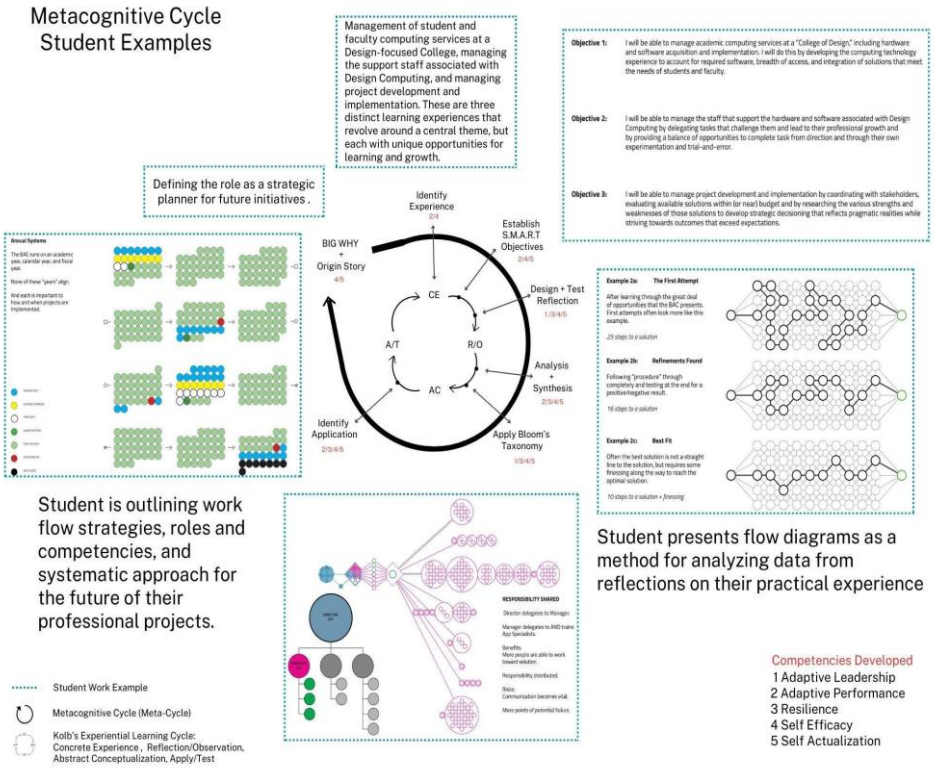

Figure 2. Meta-Cycle with Student Examples

FINDINGS: AN EMERGING MODEL/TOOLBOX

Metacognitive Cycle (Meta-Cycle)

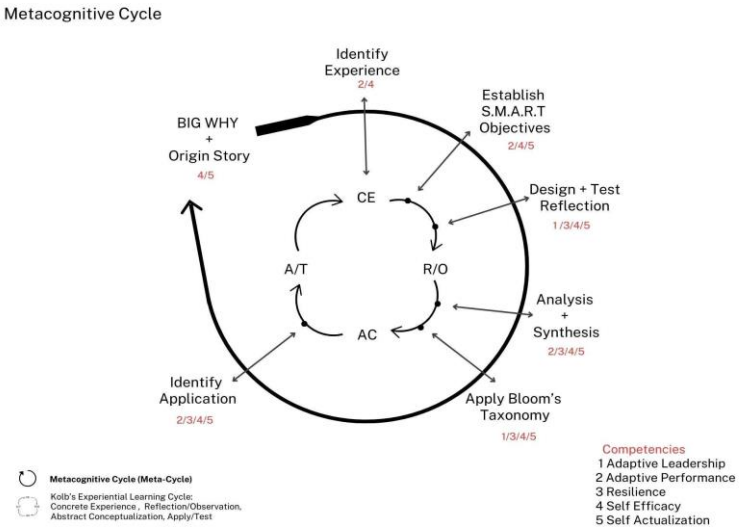

Figure 3. Meta-Cycle

The metacognitive cycle, or the Meta-Cycle, shifts the driving actor from the educator to the student by supporting metacognitive development of core professional competencies. Additionally, it honors a plurality of standpoints/positionalities, experiences, and knowledge. The foundation of the Meta-Cycle

is the four-step EL cycle introduced by David A. Kolb. The Meta-Cycle then introduces a metacognitive frame through which the students learn to develop methods for each of Kolb's steps. We added the following steps to support students as they move around the cycle:

+BIG WHY. This step is inspired by Simon Sinek's work on Starting With Why.[4] Sinek argues that in professional contexts people will purchase products and services based on shared interests and values. He says, "People don't buy what you do, they buy why you do it." Students develop their "why" as an inquiry for pursuing the design professions, which positions them to lead with and connect to their larger purpose as they engage with the EL cycle in professional learning contexts. Competencies addressed include self-efficacy and self-actualization.

+Identify Professional Experience. Students select a specific professional experience about which they would like to develop knowledge to advance their career pathways. Competencies addressed include adaptive performance and self-efficacy.

+S.M.A.R.T. Objectives. This step was adopted from a model developed by Doran, Miller, and Cunningham in 1981. Students establish objectives that are specific, measurable, achievable, realistic, and time-bound. S.M.A.R.T. supports students as they design their reflection structure in connection to their 'why'. Competencies addressed include adaptive performance, self-efficacy, and self-actualization.

+Design and Test Reflection. Students design, test, and iterate a structured reflection method[5] in alignment with S.M.A.R.T. objectives and their 'why.' Once students have successfully established a reflection method that supports their learning objectives, they apply it iteratively reflecting on their professional experience. Competencies addressed include adaptive leadership, resilience, self-efficacy, and self-actualization.

+Analysis and Synthesis. Inspired by Jon Kolko's research on design synthesis processes,[6] students analyze their reflections as data and apply design synthesis techniques to construct new knowledge. Students create visual representations of their cognitive processes as evidence. Competencies addressed include adaptive performance, resilience, self-efficacy, and self-actualization.

+Bloom's Revised Taxonomy. Applying Bloom's Revised Taxonomy of cognitive processes and knowledge typologies, students construct knowledge by identifying steps in their learning process and categorizing their knowledge types. This supports students' self-awareness, understanding of their learning processes, and metacognition. Competencies addressed include adaptive leadership, resilience, self-efficacy, and self-actualization.

Core Professional Competencies & Assessment Tool

Through a scan of the literature, we identified the definitions and assessment methods for the core professional competencies. We created an assessment tool that links core professional competencies to the 'beyond the curriculum' model and methods and enables educators to assess/align the cycle with the core competencies. Naming, explaining, and demonstrating the why/purpose of the core professional competencies supports students as they learn to adopt the cycle.

Competency—Adaptive Performance	
Definition "Adaptive performance[7] refers to an individual's capacity for adaptation to dynamic work situations and to the capability to modify behavior according to the requirements of new environments, situations, or events.[8]	**Characteristics** Deal with uncertain or unpredictable work situations. Handle emergencies or crisis situations. Solve problems creatively. Handle work stress. Learn new tasks, technologies, and procedures. Demonstrate interpersonal adaptability. Demonstrate cultural adaptability.
Competency—Adaptive Leadership	
Definition Heifetz at Kennedy School of Government at Harvard University defines adaptive leadership as "the practice of mobilizing people to tackle tough challenges and thrive".[9] "Unlike technical problems where the know-how already exists, adaptive challenges require learning to overcome the values, or reduce the gap between the espoused values and reality. They require changes in values, attitudes, or habits of behavior.	**Characteristics** Understand the differences between technical and adaptive challenges, ability to address both as leaders (including time needed etc.). Reflect in action by spending time on the "balcony and the dance floor". Ability to "take stock of performance" Identify behaviors, attitudes, and habits that need to change.
Competency—Resilience	
Definition Conceptualized as an "employee capability, facilitated and supported by the organization, to utilize resources to continually adapt and flourish at work, even if/when faced with challenging circumstances." Resilience as a transformational process in which individuals not only cope and successfully deal with change but also learn from it and adapt accordingly to thrive in the new environment.[10]	**Characteristics** Utilize past experiences with change and adversity to be more flexible and adaptable in the future. Participate in a "supportive, collaborative and learning-oriented work environment". Learn from mistakes. Re-evaluate performance and continually improve the way work is being done. Collaborate to manage the unexpected. Receive feedback.
Competency—Self-Efficacy	
Definition "The construct of Perceived Self-Efficacy reflects an optimistic self-belief. This is the belief that one can perform a novel or difficult tasks, or cope with adversity -- in various domains of human functioning. Perceived self-efficacy facilitates goal-setting, effort investment, persistence in face of	**Characteristics** Set and accomplish goals. Invest effort [with the expectation of positive outcomes]. Persist in the face of barriers. Recover from setbacks.

barriers and recovery from setbacks. It can be regarded as a positive resistance resource factor.[11]	
Competency—Self-Actualization	
Definition Development toward full capacity (Maslow)	**Characteristics** Autonomy Striving toward capacity Courage and curiosity Democratic character Lack of fear of one's own greatness Openness to experience Purpose in life Self-acceptance Ability to live in the moment while integrating experiences and future goals (time integration)

Table 1. Five Competencies

The Meta-Cycle Development Continuum

Students adopt the cycle developmentally (see figure) and therefore there is a need to scaffold the implementation of it, from full teacher facilitation of Kolb's (traditional approach) to full use/adoption of the Meta-Cycle by the student. The scaffolded learning can be facilitated through a series of activities with manipulatives (similar to the Montessori model) combined with peer and mentor coaching within a learning community. In doing this, the Meta-cycle becomes adaptable to a wide range of academic and professional contexts by supporting the learner as emergent professional to observe, reflect, learn, adapt, change, and ultimately lead themselves towards personal and professional goals.

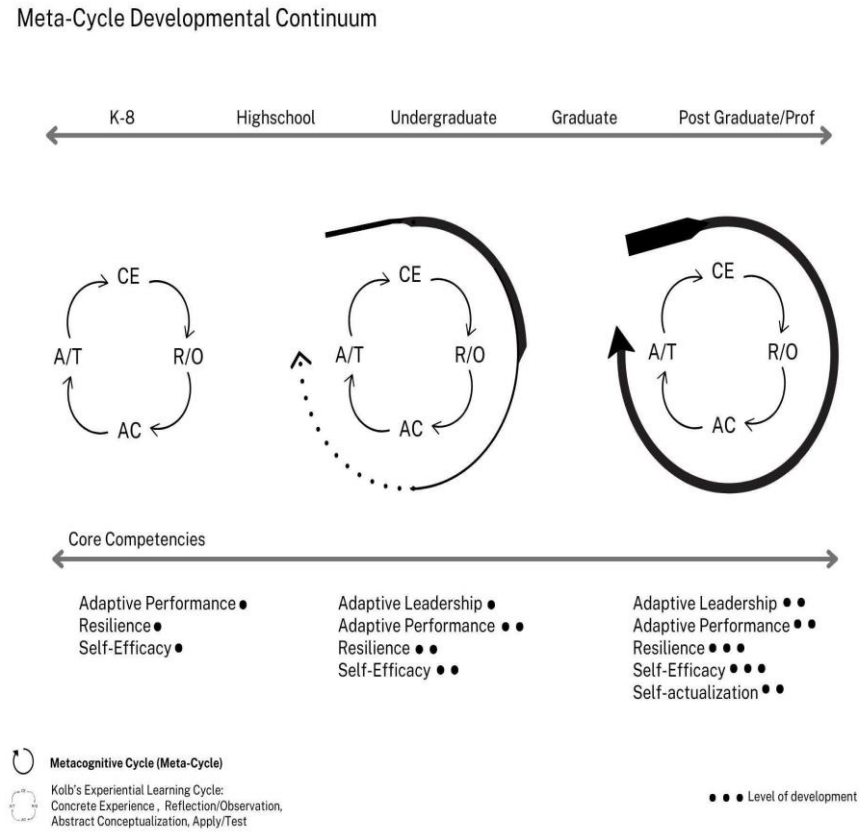

Figure 4. Learning Along a Developmental Continuum

Meta-Cycle Step	Student A Example (Undergraduate)	Student B Example (Graduate)	Analysis
BIG WHY	"I want to learn about interior design so I can help my community."	"How do I build my career in design in order to create generational wealth and legacy towards positive change in the world?"	While both examples of the BIG WHY inquiry are admirable, student A has a much smaller and ill-defined scope for their career and professional trajectory. Student B uses the inquiry to clearly drive their career path.
Analysis and Synthesis	"From the reflection, I got to analyze and learn about the community's stories and everyday struggles. Their needs and requirements could be different for each family. Not everyone follows the cultural norms and traditions set by the society. The family I am designing for and their income source have a huge impact on design, especially when the requirements are more than what they can afford."	"Based on the reflections, there are five major themes that seem to drive my immediate short-term goals as well as point to the path towards achieving my ultimate Big Why. Those themes are ancestry, motherhood, job progression, legacy, and happiness. These themes define the components of my personal and professional growth and I can now design next steps in order to move my plans forward while addressing all parts of what I find important."	Student A is exhibiting an analysis and synthesis of their reflection as a low register of new knowledge. There is no evidence of the student building any new knowledge from the synthesis, but merely re-stating what they already had knowledge of. Student B is deriving new evidence of how, why, and where the new knowledge is coming from. They are building connections and setting forth a new system to lead themselves towards new knowledge.

Table 2. Levels of Development Demonstrated in Student Work

CONCLUSION

In this study, we identified that the following are needed for student agency and resilience beyond the curriculum: diversity of learning approaches (methods, models, etc); core professional competencies and tools to assess a variety of approaches (above); formal and informal collegial learning communities that support student learning as they bridge beyond the curriculum; educator-practitioner trained as facilitators of student led learning in these in between spaces; understanding of when lecture/content-driven curriculum supports and when it stymies student agency and resilience; and developmentally scaffolded models that can be introduced to students prior to college.

The challenge for educators today as we grapple with pedagogical and epistemological questions is that we must be careful not to project our own experiences onto this next generation that conceptualizes the

world differently. With that said, we understand there are certain competencies and skills necessary to become licensed spatial design professionals such as architects. The Meta-Cycle framework was developed to address the need for students as emerging professionals to create their own professional pathways guided by their goals and purpose, and in response to current contextual, systemic, and transdisciplinary challenges and complexities. Its aim is to iterate the experiential learning model from educator-led to student-led to improve student competencies of resilience and adaptivity, in spatial design contexts and beyond. By testing and applying it in a range of contexts we learned that it is a framework that is applicable across disciplines because it centers the learner's goals and objectives in relationship to any given discipline, rather than the discipline itself. The Meta-Cycle is conceptualized as a value-added framework to enable educators and employers alike to support learners as they develop the professional skills and competencies across disciplines to thrive in professional spaces.

NOTES

[1] David A. Kolb, "The Process of Experiential Learning," in Experiential Learning: Experience as the Source of Learning and Development (Englewood Cliffs, NJ: Prentice Hall, 1984), 21–38.
[2] David R. Krathwohl, "A Revision of Bloom's Taxonomy: An Overview," Theory Into Practice 41, no. 4 (2002): 212–18.
[3] Jennifer A. Livingston, Metacognition: An Overview (2003).
[4] Simon Sinek, "How Great Leaders Inspire Action," TED, 2010, https://www.ted.com/talks/simon_sinek_how_great_leaders_inspire_action?language=en.
[5] Harry M. Kraemer, "How Self-Reflection Can Make You a Better Leader," Kellogg Insight, 2016.
[6] Jon Kolko, "Design Synthesis," 2009, Vimeo, https://vimeo.com/3945848.
[7] F. A. Neal and B. Hesketh, "Technology and Performance," in The Changing Nature of Performance: Implications for Staffing, Motivation and Development (Jossey-Bass, 1999).
[8] Audrey Charbonnier-Voirin and Patrice Roussel, "Adaptive Performance: A New Scale to Measure Individual Performance in Organizations," Canadian Journal of Administrative Sciences (2012).
[9] Ronald Heifetz, Alexander Grashow, and Marty Linsky, "Harvard Business Review" (2009),http://ljournal.ru/wp-content/uploads/2016/08/d-2016-154.pdf, doi:10.18411/d-2016-154.
[10] Macie Hall, "Adaptive Leadership Framework," June 10, 2013, https://ii.library.jhu.edu/tag/adaptive-leadership-framework/.
[11] Ralf Schwarzer and Matthias Jerusalem, "General Self-Efficacy Scale (GSE)," January 5, 2009, accessed from http://www.midss.org/sites/default/files/faq_gse.pdf.

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DESIGN PEDAGOGY REIMAGINED: REFLECTION TO SPECULATION ON INCLUSIVE DESIGN EDUCATION

Author:
NEKITA THOMAS, LISA MERCER, TERESSA MOSES, ANGELICA SIBRIAN

Affiliation:
UNIVERSITY OF ILLINOIS AT URBANA CHAMPAIGN, USA
UNIVERSITY OF MINNESOTA. USA

INTRODUCTION

In 2020, a year marked by the global pandemic and societal upheaval following George Floyd's murder, the urgency for introspection and reform in higher education, particularly design education, became ever more apparent. Paulo Freire's concept that "education either functions as an instrument… or it becomes the practice of freedom" takes on renewed significance in this climate.[1] Design, as a discipline that significantly influences societal norms and values, faces a crucial moment to transform education into a practice that liberates rather than oppresses. It is imperative for design education to reflect and contribute to the creation of a more inclusive and equitable society, moving beyond Eurocentric, capitalistic, and exclusionary paradigms.

This paper presents a collaborative effort by four design educators from predominantly white research 1 universities, who come from diverse and often marginalized backgrounds. They embark on a reflective and speculative journey to redefine design education through a matrix of intersectional principles aimed at creating inclusive futures.[2] This initiative goes beyond mere reflection; it is a proactive exploration where classroom pedagogies and projects inform a wider design research agenda that challenges and expands the boundaries of traditional design education.

Beginning with narrative inquiry and employing critical reflexive methods, each educator draws inspiration from W.E.B. Du Bois' concept of the 'Megascope,' as described in his unpublished work "The Princess Steel."[3] The Megascope serves as a metaphorical instrument for reflection on course projects that incorporate anti-oppressive strategies. Unlike devices such as telescopes or microscopes, which magnify the distant or the minute, the Megascope symbolically illuminates societal, cultural, and ideological dimensions, thus exposing narratives that are often hidden within the margins. It provides profound insights into the complexities of society and challenges the status quo in design education. More than a theoretical construct, the Megascope acts as a practical tool to encourage productive dialogue and innovation within the realm of design education.

Megascope Principles

By wholeheartedly embracing the Megascope's principles, we are compelled to rigorously reexamine design education's people, places, and patterns towards more socially responsible and anti-oppressive design education. Specifically reflecting on how we each, through design education, address:

Making the Invisible Visible

This principle seeks to unmask and dismantle entrenched Eurocentric and elitist biases within design. It poses: How can we employ design to unravel bias/oppression and utilize diverse cultural pedagogies to evolve from mere observation to genuine comprehension?

Amplifying Underrepresented Narratives

Emphasizing the significance of a diverse array of cultures, ideologies, and experiences, it propels us to consider: In this age of growing inclusion, how do we amplify various narratives, ensuring a holistic design discourse?

Understanding Societal Complexity

Advocating for a holistic grasp of societal structures, it leads us to ponder: How can clarity on social complexities transform design pedagogy and how can curricula changes shed light on inherent biases, thereby influencing student perceptions of design?

Positionality Acknowledgement

Recognizing the profound impact of educators' backgrounds on their teaching philosophy and methods, this section delves into personal narratives and reflections from the classroom, offering a window into the diverse experiences that shape our pedagogical approaches.

Teressa Moses

I am a Black queer woman who teaches graphic design at a predominately white institution in the Midwest. In my work, I **make the invisible visible** by using counter-storytelling as a methodological approach in liberatory design outcomes. I **amplify underrepresented narratives** by radically including authors and designers from Black and Afro-diasporic backgrounds as inspiration and reflections of strong design aesthetics. And lastly, I make an effort to **understand societal complexities** by first understanding how my own positionality perpetuates healing and/or harm in societal contexts, exploring oppression at its root through primary and secondary research, and then using my gained sense of agency to create positive change in my community.

Angelica Sibrian

I am a Guatemalan woman teaching graphic design in a non-tenured position at a predominately white institution. I grew up in inner-city South Los Angeles in a community where funding for the arts was almost nonexistent; however, I did procure grants for my undergraduate studies through the arts—a testament to **making the invisible visible**. I was taught that Americanization meant assimilation, causing me to lose my identity, my culture, and my way of being during the process, which fuels my commitment to **amplifying underrepresented narratives**. My approach is rooted in a blend of lived experiences and scholarly inquiry, promoting diverse and unsilenced approaches to **understanding societal complexities**.

Lisa Mercer

I am a cisgender woman of Mexican descent, proud of my ethnically mixed-race family. I work to **make the invisible visible** in my courses by engaging with colleagues and students on re-imagining oppressive design. I **amplify underrepresented narratives** through the dissemination of my work and being intentional of the authors I cite and the people I collaborate with. My **understanding of societal complexities** comes from passion for a shared language to dismantle racism and oppression.

Nekita Thomas

I am a Black woman, proud first-generation college graduate, and second-generation descendant of the great migration. As a designer, researcher, and educator, I **make the invisible visible**, shedding light on systemic barriers faced by communities like mine, questioning design's role in sustaining these divides. I leverage my own sense of "double consciousness" to **amplify underrepresented narratives**, prioritizing historically marginalized experiences and epistemologies. Committed to **understanding societal complexities**, I create space for cross cultural and generational dialogue and knowledge exchange.

REFLECTIONS FROM THE CLASSROOM

This section serves as a candid dive into the educators' pedagogical approach to social impact, offering insights into the transformative moments and challenges encountered within the learning environment.

Section 1: A Future Without Violence: Since Magazine Series and User-Interface

A Future Without Violence is a project facilitated in a senior-level design studio course at the University of Minnesota, a R1 Predominately White Institution, in Spring 2020. Senior design students embarked on a cross-disciplinary journey merging creative writing with design, inspired by a workshop led by Autumn Brown, to develop "Since," a magazine and UI publication series. They explored visionary fiction through genres like science fiction, fantasy, horror, and magical realism, reimagining historical events of Elias Clayton, Elmer Jackson, and Isaac Mcghie, and envisioning a world where violence against marginalized communities is non-existent.

The assignment challenged students to consider themes of anti-violence and power manipulation such as self-direction, collectivism, gender identity, race, and ethnicity. They crafted individual 80-page magazine issues, part of a collective "Since" series, reflecting diverse perspectives on a future free of violence. Influenced by the New York Times' 1619 Project, their work, integrating journalistic and artistic elements.[4] They gathered articles, conducted interviews, and added photographs and illustrations, each creating their own unique narrative around the central theme, leading them to address the intersectionality of anti-violence issues across various dimensions such as race, gender, and politics. Each magazine featured both articles on current societal violence and envisioned violence-free societies, where students often incorporated Afro-futurism and reparations to center marginalized voices. Students also created character interviews for their non-violent world, using personas as a tool for fostering deeper understanding of diverse experiences and viewpoints of societal issues. This provided them with a unique lens to critically assess systemic oppression and imagine transformative scenarios, enhancing their design and storytelling skills.[5] The completed magazines, a collection of narratives and designs, demonstrated their capacity to merge creativity with critical social inquiry, positioning them as empathetic and responsible designers.

Figure 1. This image shows three examples of Since Magazines in the class collection.

Section 2: Type as Discourse

In the "Type as Discourse" project of the Advanced Typography course at the University of Illinois at Urbana Champaign in Spring 2020, students tackled educational inequities, focusing on the segregation of Latino students. They studied "Barriers to Latinos," an article highlighting discriminatory policies by school administrators, as detailed in Donato's 2012 research, intended to segregate Latino students.[6] This deep dive prompted students to imagine themselves within that context and reflect critically on their identities and how these biases shape education.

Embracing the Megascope principles, students worked to reveal underrepresented narratives and challenge Eurocentric biases in design and education. Choosing content that illuminated the Latino (Mexican-American) educational experience naturally led to amplifying these narratives. This process enriched the learning experience with diverse materials and consequently sparked meaningful discussions on race, class, and equity. It empowered students to share their own experiences and critically assess their own positionality and perspectives towards addressing systemic biases and undercurrents in society and education. Drawing inspiration from Paulo Freire's belief that “Human beings in communion liberate each other,” the project fostered necessary critical consciousness that served as a catalyst for transformative action and change.

This assignment was more than academic; it was an exploration of empathy and inclusivity. Students didn't just create content; they delved into and investigated their own personal journeys and agency within a societal framework, better understanding systemic biases to promote a more inclusive design approach. The project became a platform and medium for addressing race, class, and inequality, aiming for a more equitable and conscious design education.

Figure 2. This images shows the works of two students in typographic systems.

Section 3: Counter-Scrollytelling: Website and Counter-Storytelling

In Fall 2021, junior and senior students at the University of Illinois at Urbana Champaign engaged in an eight-week design studio course, concentrating on creating scrollytelling experiences that highlight stories omitted from our shared history. This course was an opportunity for faculty and students to explore emerging technology, new ways of making, and the contemporary practice of design. The method of scrollytelling is the act of scrolling through a website layered with design elements to tell a story. Counter-Storytelling, a critical component of the course, focused on narratives from cultural outgroups, as described by Delgado in 1989.[7] These narratives aimed to create a shared understanding of lived experiences typically overlooked by dominant cultural narratives.

The curriculum of the course was structured in two parts: firstly, students honed their interactive skills essential for crafting engaging scrollytelling experiences, an increasingly popular storytelling form that blends images, text, motion, and interactivity. This approach to narrative gained traction in 2015, leading to its widespread adoption in various mediums. A notable example is the New York Times' "The Year in Visual Stories and Graphics" section, created in 2016, which exemplifies the integration of scrollytelling and emerging technologies into compelling visual essays.[8] Second, students engaged in the development of counter -stories and -narratives that spotlighted individuals absent from mainstream historical accounts. The course was a space of exploration for students to layer interaction design and counter-storytelling through a sequence of images layered with time, motion, signifiers, and affordance. This approach was illustrated through examples like "How the Virus Got Out" by Jin Wu, Weiyi Cai, Derek Watkins, and James Glanz, which shares a vast amount of information that might take an individual much longer to consume if read.[9] However, the viewer can digest information more succinctly through a sequence of images, motion, and written narrative through scrolling and interactivity, demonstrating how scrollytelling could succinctly convey complex information through an interactive format.

Leveraging Vashti Harrison's books – "Little Legends," "Little Leaders," and "Little Dreamers" – students selected historical figures of color and crafted narratives explaining their absence from mainstream history.[10] This task required students to question who traditionally writes history and whose stories are prioritized. While preparing the counter-storytelling narrative for the person they chose, they were asked to examine why this person is missing from our shared history. Who wrote those stories?

Moreover, who benefited from the stories being told from that perspective? The scrollytelling projects they developed were more than just stories; they were re-imaginings of history, providing a voice to those marginalized and overlooked. Through the development of the narrative arc, students were asked to consider the actions present in the story, the emotional spectrum, and the semiotics in visuals and text created to tell the story. As students considered these essential elements of storytelling, they were also asked to consider the affordance of scrollytelling: functionality, cues, semiotic paths in their designs, what buttons are used for prompting a specific action, and how the scrollbar is used in the act of scrollytelling. This course not only enhanced students' technical skills in digital storytelling but also broadened their perspectives, enabling them to contribute to a more inclusive and diverse historical narrative.

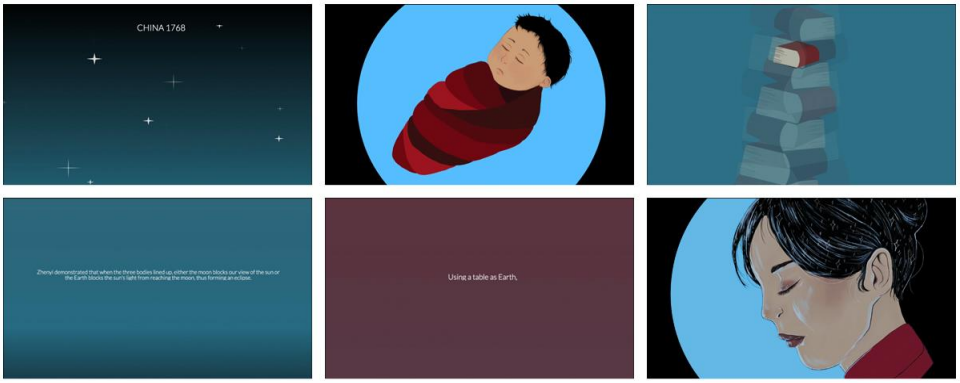

Figure 3. This is a sequence of images and a subtle overlay to show some of the motion captured in stills as one example of student work from the counter-scrollytelling website.

Section 4: Supergraphic Landscapes: Ethical Placemaking Installation

In the fall of 2022, junior and senior students at the University of Illinois at Urbana Champaign engaged in a 16-week design studio course, " Ethics of a Designer in a Global Economy." This course offered a deep dive into the ethical dimensions of graphic design, emphasizing the transformative potential of Supergraphic Landscapes. As a design research project, Supergraphic Landscapes investigates graphic design, tactical urbanism, and creative placemaking strategies, focusing on how these practices might amplify civic engagement, identity, access, and belonging within public spaces. Students actively engaged with the project, examining how strategic graphic interventions can dynamically intervene, transform, and vitalize community spaces.

Structured in three distinct phases, the course first focused on “sensing” through autoethnography, positionality, and team formation exercises that empowered students to identify, share, and operate from their individual culturally situated design epistemologies. This foundational phase was followed by a period of “defining” decolonial spatial design practices, to curate and develop an understanding of how, where and why graphics intervene in the built environment. In this stage students interviewed anti-racist design practitioners, repurposed the local art museum as a living laboratory and prototyping space, and engaged with university students across cultures, forging meaningful connections to gain insights about their needs and challenges.[11] The final phase, “ideating and prototyping”, saw students actively designing and enacting public installations in response to pressing student body issues such as mental health, inclusion, agency, and safety.

The course culminated in a series of public installations exhibited at the university's student gallery, showcasing the practical application of students' research into Supergraphic Landscapes. This exhibition served as an extended design studio experience, allowing students to test and observe

visitors' engagement with their designed interventions. This immersive experience, grounded in the practical application of Supergraphic Landscapes, underscored the importance of co-design and community feedback, embodying Hartman's assertion that such methods allow for the rearticulation of marginalized experiences within academic spaces.[12] Through this process, students explored critical fabulation as a method to construct new narratives and imaginaries, particularly within university spaces, not only showcasing their understanding of societal complexities but also demonstrated how design can be a tool for systemic change, echoing hooks' belief in education as a practice of freedom.[13] This exploration crossed theory, practice, and activism—to equip students with design strategies that not only beautify but also create a sense of identity and belonging in public spaces and design.

Figure 3. Process and final images of select Supergraphic Landscape installations.

CONCLUSION

As we draw this exploration to a close, it becomes clear that reimagining design education is an ongoing, ever-evolving process. The insights and reflections compiled here are not endpoints but rather sparks for continuous dialogue and a pledge to the relentless evolution within the realm of design education. W.E.B. Du Bois' 'Megascope' has emerged as more than a metaphorical tool; it has become a practical framework for educators to confront entrenched educational norms, bring forward marginalized voices, and navigate the intricacies of societal structures that shape pedagogical approaches.

The concerted endeavor of the four educators, each contributing their distinct perspective, highlights the critical and practical necessity for an educational model that is inclusive, equitable, and fundamentally anti-oppressive. The applied methodologies—narrative inquiry and critical reflexive practice—propel an inward-looking and transformative process, inspiring both educators and students to become agents of change, shaping learning environments that go beyond instruction to become hotbeds for responsible design.

The application of the Megascope principles calls for a daring reimagining of the design education ecosystem, affecting its participants, environments, and established patterns. This paper serves as a critical engagement with prevailing educational practices and posits the design classroom as a dynamic space for learning, with principles and provocations derived from this collaborative inquiry, including:

Visibility of Marginalized Perspectives:
Advocating for counter-storytelling and historical reclamation in design curricula to highlight the experiences and histories of marginalized communities, prompting a curriculum audit to incorporate intersectional case studies that dismantle the Eurocentric narrative and foster healing within design stories.

Critical Engagement with Socio-Cultural Contexts:
Urging a confrontational approach to cultural contexts within design to address and rectify historical erasure and exclusion, fostering educational modules that critically assess the societal impact of design and promote healing through deep reflection.

Inclusivity in Design Thinking and Making:
Embedding inclusivity and universal access as core components of the design process, ensuring that diverse voices are integral from the outset and that spaces are crafted for everyone.

Integration of Collaborative and Participatory Methods:
Embedding agency and critical fabulation in design studios to transform them into platforms for participatory community liberation, fostering student projects that deconstruct and reconstruct narratives, enhancing their agency and communal engagement in line with liberationist design practices.
In conclusion, this investigation affirms a dedication to instilling values of diversity, dynamism, and equity in future design curricula. We invite the broader academic and professional community to engage actively in the evolution of these core principles, propelling design education towards a future marked by critical examination and shared aspirations. The anti-oppressive principles laid out offer a framework for curricula that challenge, equip, and excite students, acting as stepping stones toward innovative teaching that embodies collective wisdom and ethical involvement vital for advancement. It is our hope that this work sparks ongoing conversation and action, nurturing an educational landscape as diverse and inclusive as the society it serves. In embracing Du Bois' vision, we endorse a collective re-envisioning of design education, creating avenues to a future characterized by communal creativity and critical involvement.

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AN HISTORICAL REVIEW OF STATE OF THE ART ARCHITECTURAL EDUCATION LITERATURE

Author:
ZOË V. GIBSON, PAUL G. CLARKE, MARTINA E. MURPHY

Affiliation:
ULSTER UNIVERSITY, IRELAND

INTRODUCTION

The landscape of the architectural profession is advancing at a radical pace as new technologies and personal skills are introduced to the Built Environment. Pursuing a career in architecture is becoming increasingly more skills-based, challenging the architectural pedagogies educating the future profession. The turn of the century has highlighted the increasing disconnect between the architect in practice and the architect-to-be, with calls from academia and the architectural profession demanding a re-evaluation of architectural education.

These calls for change and the arising issues with the architectural design studio, present an opportunity to re-evaluate the design studio pedagogy and assess its value in educating architects in contemporary education. Architecture Schools internationally, adopt the design studio learning environment and historical influences from the Beaux-Arts education system and the master-apprentice tutelage. This paper addresses the historical context of the design studio from the master-apprenticeship model to the current, stratified, horizontal approach to architectural education typically demonstrated in most architecture schools. This paper assists in forming a context for wider research into the architectural design studio and presents an opportunity to re-evaluate architectural education and the horizontal operations of the design studio in favour of professional needs.

THE DESIGN STUDIO

Contemporary Architectural Education

The learning environment adopted internationally by schools of architecture is known as the design studio. The design studio has always been unique in architectural education as students naturally spend most of their time within this educational environment.[1] This paper aims to set out the historical context of the design studio, facilitating the wider context of this research which intends to generate a new design studio pedagogy for architectural education.

As architects and educators, we are currently amidst the most pivotal changes in architectural education. The profession and the architectural community are recognising that the educational pedagogies shaping the future of the profession need to be revised.[2] These enquiries stem from concerns such as;

- The effectiveness of stratified year groups and traditional design studio pedagogies[3]
- Opportunities for independent learning and a pedagogic framework for self-education[4]
- Diversification of teaching and learning practices in the design studio[5]
- The relationship between the design studio in academic and professional practice[6]

Studio-Based Learning Environment

The design studio in architectural education is a unique learning environment, facilitating collaborative learning, reflective exercises and an interactive process of learning and teaching.[7] Studio-based education within most contemporary architecture schools continues to operate within an 'atelier' structure of master or architect educating students in architecture. The role of the design studio remains central to an architect's education[8] as it combines theoretical architectural knowledge, with technical and practical skills,[9] following prescribed criteria from professional bodies such as the Royal Institute of British Architects (RIBA) and the Architect's Registration Board (ARB).

Architectural education – along with other professions including law, medicine and engineering – exposes learners to a variety of skills and knowledge at each stage of their educational experience.[10] Contemporary architecture schools follow a traditional architecture pedagogy, organising students into stratified year groups – like many creative disciplines – with similar levels of experience or design skill.[11] The structure of the design studio has been used as a method to educate architects for over 500 years, with the earliest version of an institutionalised design studio originating in the Ecole des Beaux-Arts.[12]

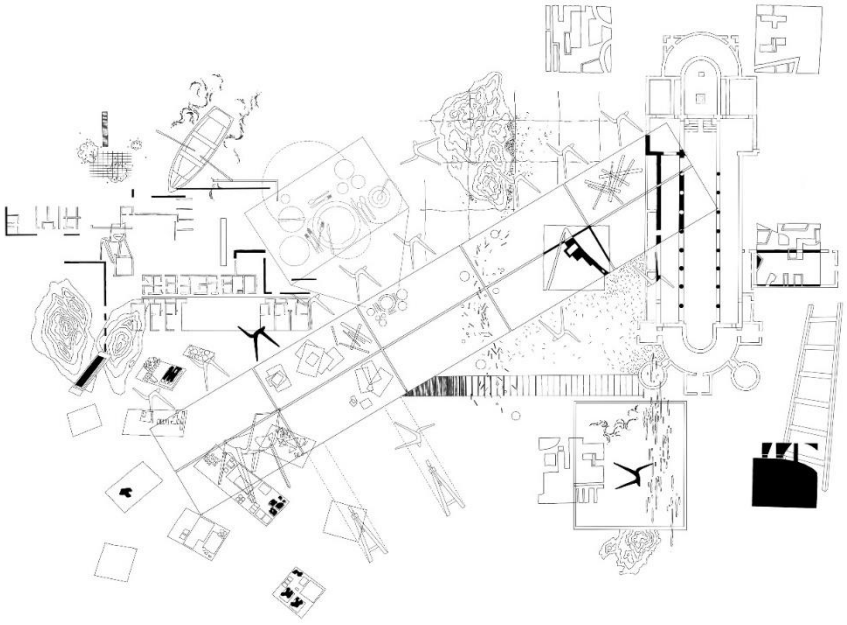

Figure 10. The Educational Design Studio. Drawing by Author

THE ÉCOLE DES BEAUX-ARTS

The Académie Royales

The earliest example of an architectural design studio was conceived at the Ecole des Beaux-Arts in Paris. Its long history under royal control, Napoleonic control and control of the state, saw the school grow from one or two royally approved lectures a week on architectural studies and artistic disciplines in the 1700s, to one of the most prestigious learning environments for the creative arts.[13]

The Académie Royale d'Architecture was established in 1671, following Royal Académies of dance, music, science, painting and sculpture. The Académies brought together academicians in learned disciplines as chosen by the King.[14] The Royale Académies were established in France as an alternative to participating in apprenticeships with the guilds as they were not under Royal control.[15] However, the

academies succeeded in attracting individuals – due to the Ancien Régime in France – to formally learn about the arts, sciences and architecture in a regulated and codified learning environment.[16]

L'École des Beaux-Arts

The French Revolution saw the Académies lose their Royal title, however, the formation of the 'Institut' in Paris attempted to bring back the main focus of formalised education – the ability to study. Whilst the abolition of the monarchy was short-lived, the Institut succeeded in uniting all of the Académies and aspects of education by moving students from the Louvre to the College Mazarin (*Figure 2)*, located on the adjacent bank of the Seine. In 1819, a royal order was issued to unite all schools of architecture, painting and sculpture into a new L'École des Beaux-Arts.[17]

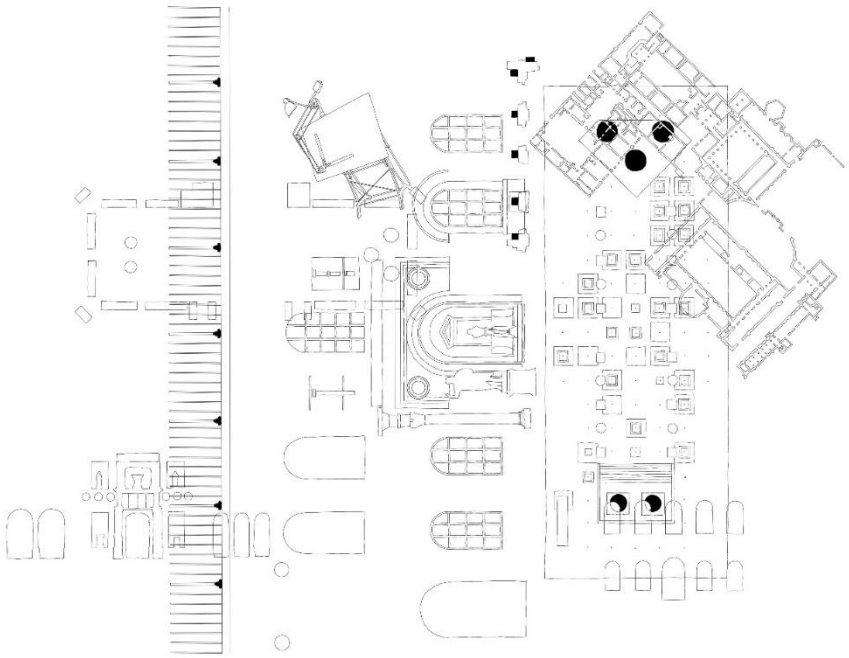

Figure 11. The Ecole des Beaux Arts; College Mazarin. Drawing by Author

The indoctrination procedure for the École was a competitive process. To be accepted to the Académie d'Architecture, a prospective student –'*aspirant*' – had to seek a recommendation from a renowned artist or architect with whom they would be working within the professional atelier.[18] If the student was accepted to the Académie, they would have to divide their education between the professional design studio, and the academic design studio working towards competitions and '*concours d'esquisse'* for their academic studies.[19]

Structure of the Académie d'Architecture

Allen Cunningham in a publication for the Journal of Architecture[20] lists the methodological characteristics of the École des Beaux-Arts educational environment from the perspective of an *élève* as being;

- The division of students into ateliers run by a *patron* (master)
- '*Anciens'* within the atelier teaching the '*nouveux élèves'*
- Having the design exercise at the core of the educational programme
- Commencing studies on architectural design immediately within a professional atelier
- Systematic resolution of architectural design issues starting with the '*equisse*'

• Development of competitive spirit as a pedagogic tool.

These characteristics are still evident and persist in contemporary design studios as institutions of architecture are still enabling students with the skills to design for university awards or international competitions in recognition of their studies.[21]

THE BAUHAUS

Unification of the Arts

Established in 1919 by Walter Gropius, the Bauhaus was a key example of a European design studio that unified architecture with the arts.[22] The Bauhaus combined elements of architecture, sculpture and painting into a craft-based curriculum with the vision to produce students who were 'capable of creating useful and beautiful objects appropriate to this new system of living'.[23]

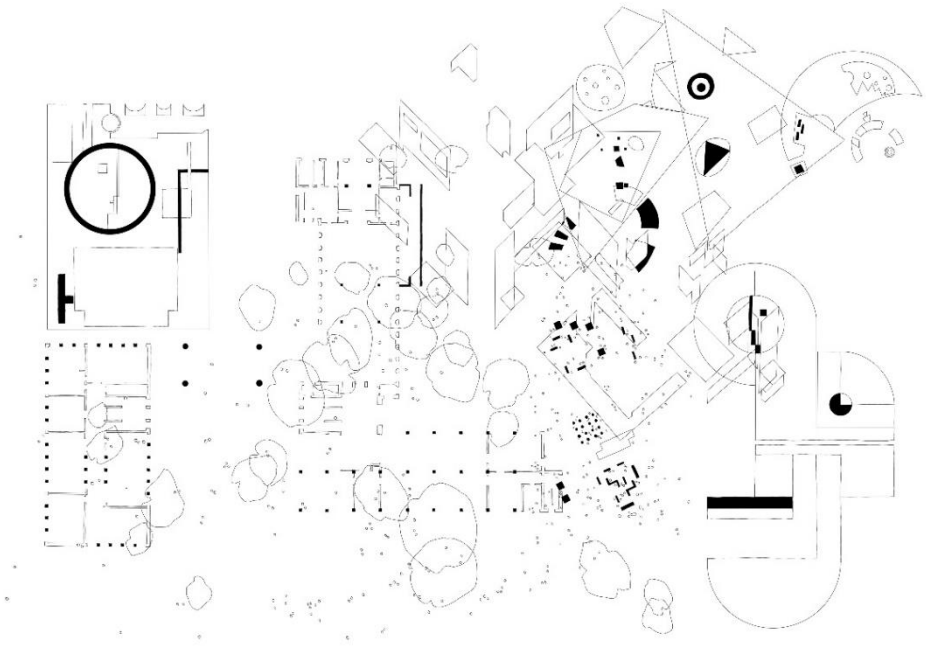

Figure 12. Bauhaus Dessau. Drawing by Author

Vorkurs – The Preliminary Course

Students of the Bauhaus – '*Bauhäusler*' – were from diverse backgrounds with a variety of social and educational experiences, learning with individuals from multiple nationalities and various ethical views.[24] Preliminary Courses – '*vorkurs*'[25] – were taught at the beginning of a student's education by masters such as Paul Klee and Vasily Kandinsky, teaching skills and instilling in the *Bauhäusler* the Bauhaus ethos – a unification of arts through craft.[26] *Vorkurs* taught students the necessary skills for educating artists, learning lessons about materials, colour theory and light composition.

The *vorkurs* would also allow students to confidently progress through the Bauhaus, enrolling on courses of their choice whilst finessing the skills learned in their preliminary education. The Bauhaus curriculum established divergent trajectories in allowing their students to determine which disciplines they could pursue.[27] Fundamentally, the Bauhaus aimed to establish a design-based curriculum – not dissimilar to that of the historic guilds – that would encourage learning, experimentation and re-unification of the artistic disciplines.[28]

A European Design-School Pedagogy

Whilst the Bauhaus is the most renowned example of a radical art-architecture school in the 1900s, the Russian VKhUTEMAS (Vysshie khudozhestvenno-tekhnichskie masterskie) was established in 1920 as a free-state art school, preparing master artists and craftsmen for work in industry and higher education[29] (*Figure 4)*. Another European-based art school following design-school principles like that of the German Bauhaus, was the Slovak Bauhaus School of Art and Design in Bratislava in 1928.

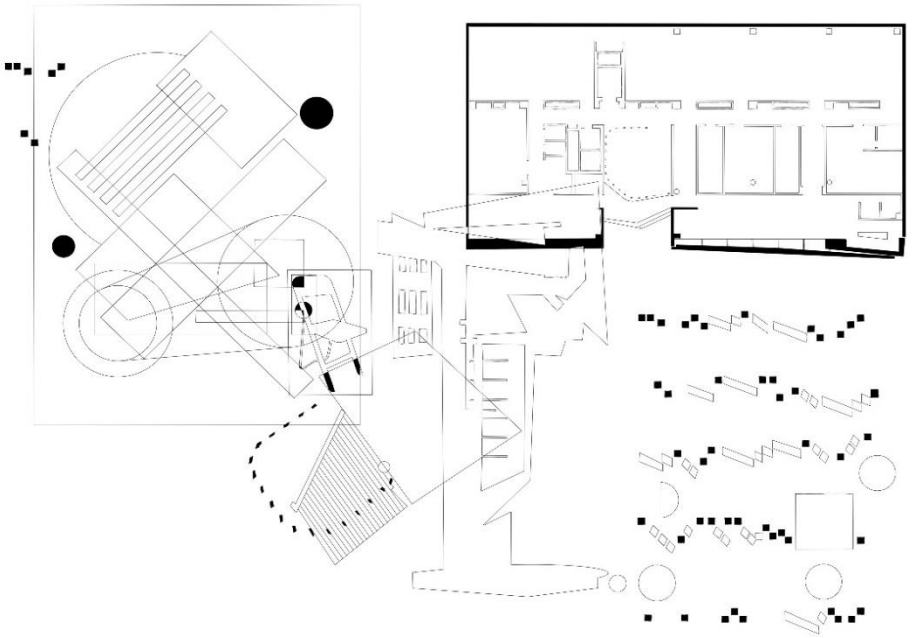

Figure 13. VKhUTEMAS. Drawing by Author.

The *Bauhäusler* acquired skills in abstract design and intensive problem-solving across a multiplicity of disciplines such as art, drawing, sculpture, textiles and woodworking to name a few. The Bauhaus relocated to a purpose-built school in Dessau (*Figure 3)* due to political circumstances in Weimar – designed by Gropius – in 1925 to accommodate a shift in focus for the school to celebrate architecture harmoniously with the arts.[30] In 1927 an architecture course was formally established upon which selected students could join after completion of multiple skills workshops in their *vorkurs*.

The Bauhaus received international recognition due to its diverse teaching team, architect-directors of the school' and its unique curriculum. The school was also non-conformist to the German Social Democrat's approved education systems, meaning that the school faced tensions with the government concerning matters of educational funding.

The Bauhaus was closed in 1932, two years after a final move from Dessau to Berlin. Many of the teaching staff such as Josef Albers emigrated to America where many of them sought educational roles in American Universities within their architecture schools, establishing curriculums founded on Bauhaus principles.[31]

EARLY ARCHITECTURAL EDUCATION IN THE UNITED KINGDOM

Architectural education has been exposed to pivotal changes following influences from leading architectural schools and the development of the architectural profession. Whilst the École des Beaux-Arts and the Bauhaus have influenced schools of architecture internationally, the adoption of innovative design studio pedagogies extends to other architectural programmes exploring the relationship between practical and theoretical education in the United Kingdom.

Government Schools of Design

Somerset House, located in South Kensington in London – now known as the Royal Academy of Art – was the first Government School of Design established in 1837. Government Schools of Design were established as a response to the need for arts-based training and as a state provision of technical education[32] (*Figure 5).* They sought to improve the output of British Industry and the education of designers as an evolution of the guilds and master-apprentice tutelage system.

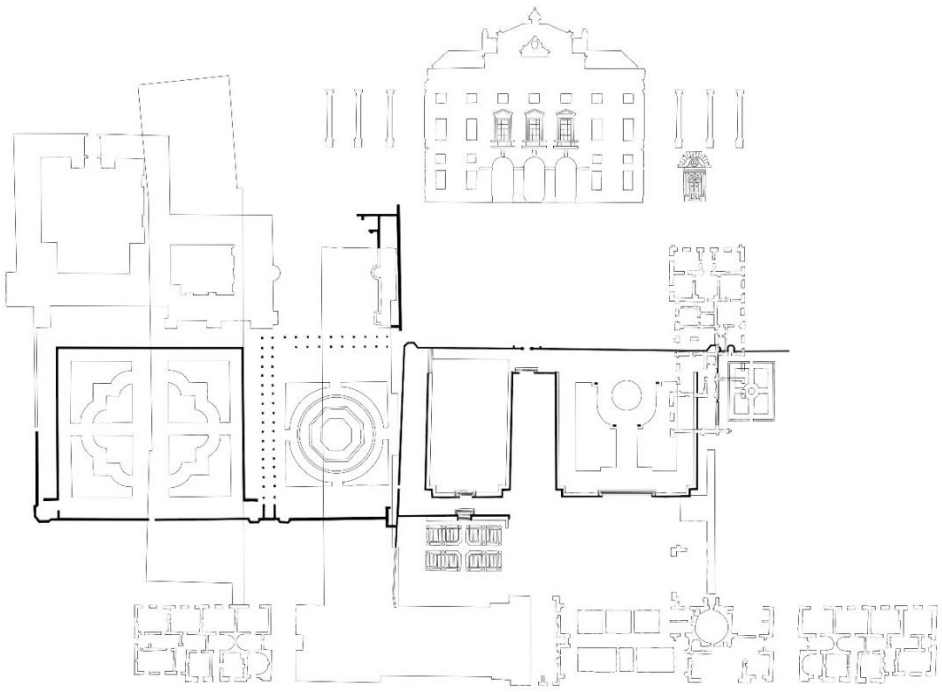

Figure 14. Somerset House, London. Drawing by Author

Following the Great Exhibition in 1851, Britain created an over-ambitious display of their art and industry trade, which was shadowed by other invited exhibiting countries.[33] Cash profits from the Great Exhibition were flooded into South Kensington to create a new 'cultural quarter'[34] and disseminated to major cities – such as Manchester, Birmingham and Glasgow – across the country to establish new Government Schools of Design, following a government-prescribed curriculum. This curriculum, generated within Somerset House would influence 19th and 20th century design and initiate the start of the Arts and Crafts Movement (*Figure 6)*.

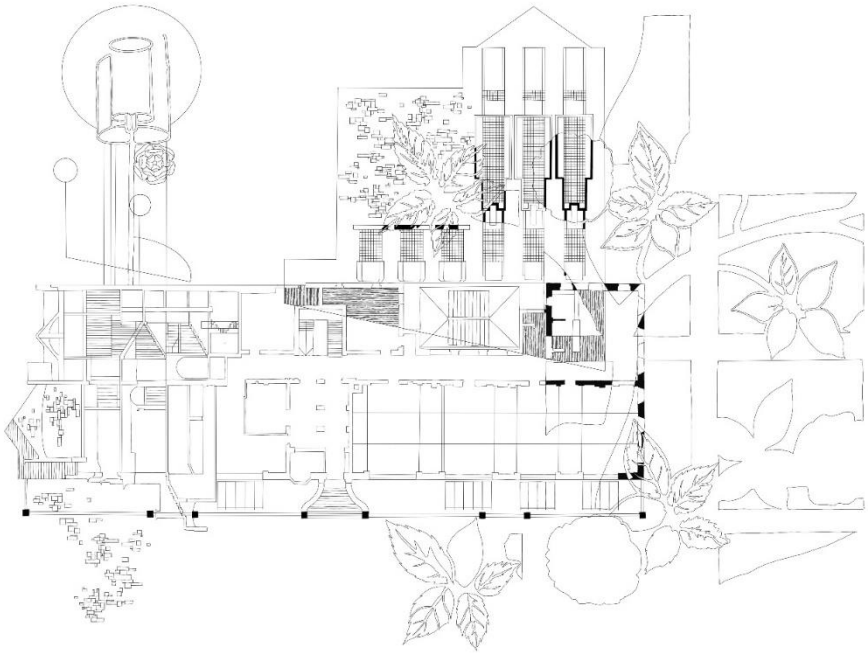

Figure 15. The Arts and Crafts Movement. Drawing by Author

The Government Schools of Design would mark the evolution of non-university-based technical education in the United Kingdom. They offered evening classes to those enrolled on apprenticeships, allowing them the opportunity to learn technical or manual instruction within the School of Design.[35] The Schools of Design offered classes in manual and architectural drawing, fine arts, literary histories and ornamental studies, aligning – in a codified environment – with the traditional teachings of the guilds.[36]

The Institute of British Architects and their Royal Charter

In 1837, the same year as the Somerset Government School of Design was established, the Institute of British Architects received its Royal Charter (RIBA).[37] It was initially established to protect the title of 'architect' from other trades such as builders, carpenters, ironmongers and painters who could 'undermine the professional status of architects'.[38]

The RIBA established a register of architects seeking or offering work as well as taking responsibility for creating a qualification procedure for students who wished to enter the profession after their studies.[39] The RIBA desired students who ideally worked beneath one of the RIBA's Senior Members with an RIBA Associateship (ARIBA) – ie. Those who had passed an examination established and set by the RIBA.

Referred to as 'articled pupillage' architect-educators would have seen approximately £500 being advanced to them for a duration of 5 to 6 years from their student. The architect – in exchange for payment – was expected to nourish and educate their young pupil in all aspects of architecture and preparation for the profession.[40] A student was also expected to attend classes within the Royal Academy or a Government School of Design to learn skills such as drawing and making. In many cases, this apprenticeship was abused by the ARIBA as many young architects were entering the profession with little to no experience or knowledge expected of an architect.[41] This became clear in the 1863 Voluntary Architectural Examination, testing the design skills of articled pupils or students who had learnt architectural knowledge in other institutions such as the Architectural Association (AA).[42]

THE ARCHITECTURAL ASSOCIATION

Ten years before the RIBA received its Royal Charter, two students – Robert Kerr and Charles Gray – challenged the conformist method of educating architects in the 1800s and established the Architecture Association in 1847.[43] The AA proposed a new system of architectural education, providing a systematic course of teaching organised by the students themselves. The students facilitated evening classes for students who were struggling with their RIBA-prescribed studies to attend. Meetings were held by the AA alternating between guests presenting their research, classes on drawing and attempts to resolve imaginary design problems.

Evening classes were popular in the late 1700s and early 1800s in the Government Schools of Design amongst those who were taking apprenticeships during the day, or who were members of their city Mechanical Institute.[44] The AA meetings enabled conversation between architects and students as well as provided a platform for debates or unjudged conversations about topical issues.

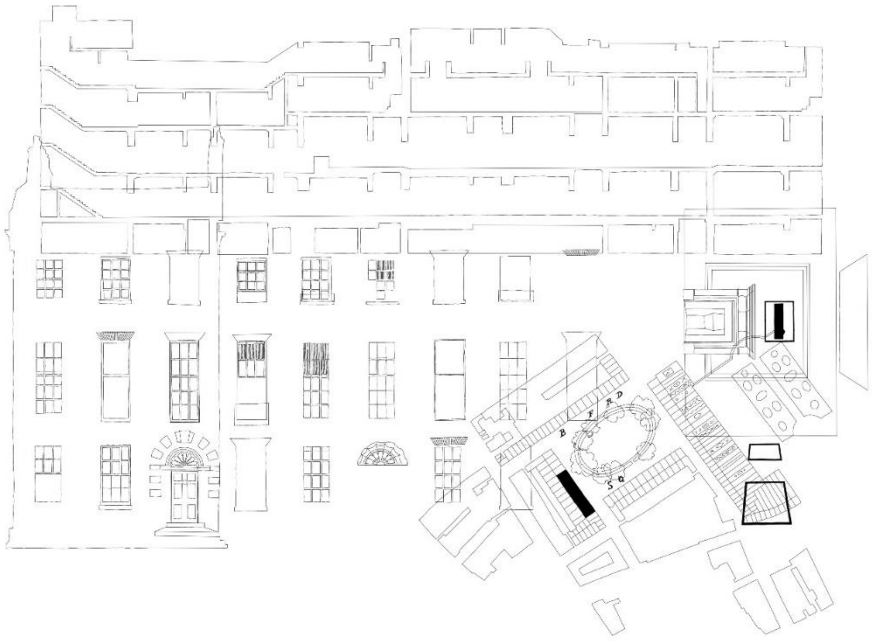

Figure 16. The Architectural Association School of Architecture. Bedford Square. Drawing by Author

The AA School of Architecture

AA Archivist, Ed Bottoms described the aims of the AA as,[45]

- Advancing the study and design of architecture
- Developing true principles and criticism
- Means by which the student may acquire an aptitude for the application, recombination and extension of the present materials at heart
- Enabling (the student with) experimental nature as a system of mutual aid, and the ability to develop the skills of life-long learning and self-education.

The AA School of Architecture formally started to offer classes during the day to educate students in the 1890s, challenging the traditional approach to learning architecture–articled pupillage.[46] In addition to challenging the traditional curriculum of architectural education, the AA is also believed to be the first school of architecture to have introduced vertical teaching to their pedagogy as a method for educating architects across all stages within the school.[47]

E.A.A. Rowse – director of the AA in 1933 – introduced new educators to the school and replaced the five-year architecture programme with 15 design units, organised with 17 students in an attempt to move away from the stratified nature of the Beaux-Arts education system.

CONCLUSION

As well as influences from schools of architecture and architectural organisations, there have been publications from professionals and academics within the field of architecture that challenge our perceptions of what it means to study architecture and what the role of the architect has become.[48]

The École des Beaux-Arts formalised architectural education and the notion of the academic design studio working in duality with the professional workplace – or *atelier*. The Bauhaus addressed the disconnect between the arts and architecture and created an institution focused on the design and reunification of artistic disciplines. Principles of the Bauhaus still carry on in modern schools of architecture and design, creating a valuable relationship between institutionalised courses and their associated faculties.

The AA, now one of the world's learning and internationally recognised schools of architecture still operates on a pedestal, as a form of privatised education. Their ability to challenge conformist methods of architectural education has created a platform for activism amongst students and educational bodies. The influence of these schools has been adapted to suit design institutions and university ideals for modern, contemporary architectural education. Whilst each school in its own right embodies a different ethos and approach to design education, each course of architecture fundamentally operates within the design studio.[49]

The design studio takes many forms, based on the architectural principles which are instilled in a design institution. The value of the design studio remains at the centre of architectural education, almost 500 years later from the first institutionalised version of this learning environment, however, the design studio in academia and the design studio in professional practice have developed a complicated relationship in recent years.

Addresses the historical context of the design studio the wider context of this research recognises that approaches need to be formulated which embrace the new needs of the profession and can strengthen the relationship between academia and practice, starting with the regeneration of design studio pedagogies.

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SOCIALLY AND ENVIRONMENTALLY SITUATED ARCHITECTURAL PEDAGOGIES AT THE UNIVERSITY OF PAVIA: A CASE STUDY IN BORGO TICINO (PAVIA)

Author:
IOANNI DELSANTE, MADDALENA GIOVANNA ANITA DUSE, LINDA MIGLIAVACCA

Affiliation:
UNIVERSITY OF PAVIA, ITALY

INTRODUCTION

The authors discuss a pedagogical case study originating from an ongoing Erasmus+ KA2 project known as "Socially Situated Architectural Pedagogies" or SArPe (www.sarpe.org). This project involves a consortium of the Universities of Pavia, Istanbul, TU Delft, and Malaga, with some non-academic partners as well. SArPe's primary objective is to enhance the responsiveness of the higher education sector to societal challenges through inclusive and participatory activities. It is built upon an integrated approach to teaching, learning, and training activities, combined with deep engagement, outreach, and dissemination targeting both educators and learners. All academic partners do contribute to Teaching & Learning (Work Package 2) and Innovating curricular modules (Task 3.2). As such, regular meetings are organised to exchange updates.

Within the broader academic context, the project addresses three distinct target groups (figure 1) and in particular educators and learners within and beyond academia, but also active groups including non-institutional organisations and grassroots groups. A part of the methodology of the project involves interaction with multiple active groups, aiming at listening to multiple voices, including those of local civil society organisations and communities.

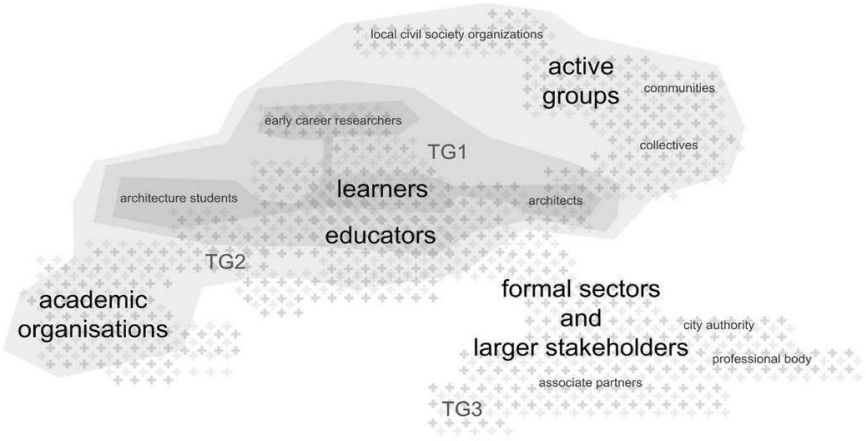

Figure 1. SArPe project target groups.

LITERATURE REVIEW

The SArPe project focuses on three areas of inquiry: critical/radical pedagogies,[1] situated knowledge,[2] commons-oriented knowledge and pedagogy.[3]

Stakeholder mapping and engagement (on-site and/or off site) have been identified as key tools to establish situatedness and deeply engage with the community,[4] considering that any knowledge is influenced by the location and position of the knower or knowledge producer.[5]

The extensive literature available on the subject has provided insights into: organising field activities geared towards 'learning by doing',[6] fostering critical thinking in learners[7]; promoting direct and subjective knowledge of 'reality' in its complexities,[8] involving not only institutional actors but also those sometimes overlooked or not perceived/considered because they are informal or non-institutionalized; developing the 'civic' role of the University in engaging with the urban territory.[9]

Ultimately, one of SArPe's aim is to expand reflections on how architectural curricula can reconnect with the outside world and explore how learners, educators, and non-institutional stakeholders engage.

METHODOLOGY

This paper aims at unfolding those specific tools and tactics that, within the framework provided by SArPe, were used by educators to situate the didactic activities within the social, economic, political and environmental context of the case study.

To do that, it builds on a number of activities performed during the project so far, and in collaboration with academic partners. These (activities) include an extensive literature review, a workshop for educators and learners held at the University of Istanbul (October 2023), and a draft repository of tools and methods (December 2023). However, the paper aims at critically reflecting on a pedagogical case study which run from March to June 2023 during a curricular design studio module (Architettura e Composizione Architettonica 1, a 2nd year Design studio part of BSc+MSc 5 years course in Building Engineering&Architecture). While the didactic activities concluded back in June, the process of unfolding and critically analysing the outcome of the module has then become one of the goals which this paper aims at contributing to.

TEACHING&LEARNING AND MODULE'S METHODOLOGY

The module built on what was delivered during previous academic years (since 2018-19), which includes: a commons-oriented pedagogy and studio themes; a strong emphasis on team working; opportunities for learning by doing with extensive field work and stakeholders' engagement; co-design and self-construction experiments. However, SArPe project has allowed authors to better organise individual activities and approaches within a wider framework provided by the project. Just as an example, semi.structured interviews with 4 cohorts of learners who attended the module. This allowed educators to get deeper and more focused insight than what is collated via official quality questionnaires. The literature review performed up to the beginning of term, together with the above mentioned elements, allowed the educators' team to produce a pedagogical manifesto that resumed the initial positioning and which was explained to learners at the kick off of the module.

Moreover, before the kicking off of the term, a methodology has been drafted (figure 2) with the intention of addressing the most relevant research questions preliminary identified. This approach replicates what is usually done in research and witnesses the willingness of delivering 'research-led' teaching also at undergraduate level.

Case Study

The above mentioned research questions relate to Borgo Ticino, a distinctive neighbourhood of Pavia. It is located beyond the river Ticino, which makes it accessible but also separated (even physically) from the town centre. Historically relevant towards river-focused workers (e.g. laundress), nowadays hosts a diverse but cohesive community. The river, and the neighbourhood, faces very relevant challenges related to (among others) climate change and water floodings; tourism and gentrification; urban development on greenfields.

The module brief identifies the entire Borgo Ticino neighbourhood as site of study, and a smaller area (a public park, named Parco Rossignoli) as specific site for design, managed as an 'urban common' by a local association (Parco Vivo). Contacts were established before the kicking off of the term, thanks to one of SArPe's non-academic partners named 'Spazio Gioco'.

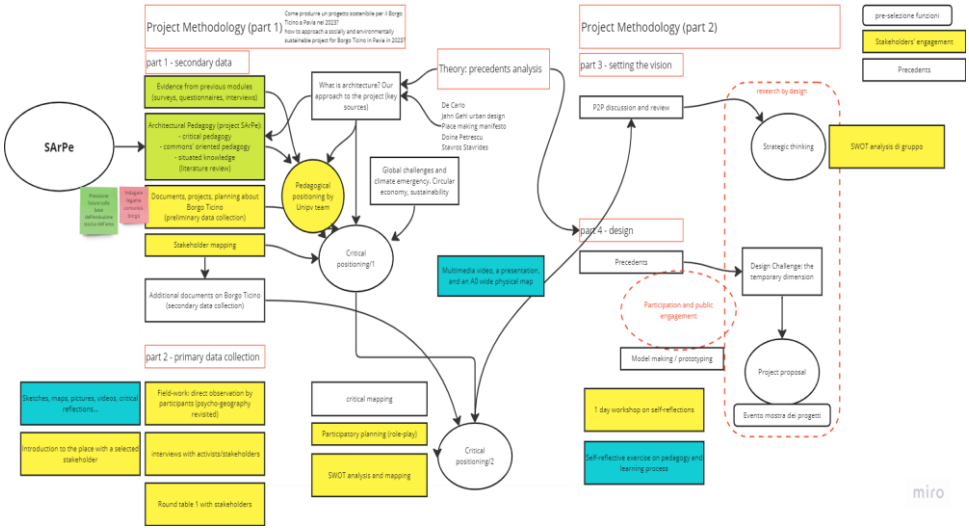

Figure 2. Methodology of the module

PEDAGOGICAL TOOLS AND METHODS

Stakeholders' mapping and engagement

From the very beginning, the module aimed to position the process at Parco Rossignoli, located in the Borgo Ticino neighbourhood. To define the situated process, a crucial role was played by the contact with the local community, the stakeholders who inhabit the space to be designed.

The Architectural Composition 1 module sought to explicitly express its situated characteristic in the context.

During the design process, a total of 10 stakeholders were involved. Two of these belonged to the Parco Vivo association, responsible for the care of Parco Rossignoli, where the design took place. The other eight stakeholders represent a variety of groups, associations, and individuals who contributed to the narrative of the involved area of the city of Pavia. The representatives were selected heterogeneously, each providing a different perspective on the needs and expectations for the place; from a student, through a representative of one of the most important neighbourhood associations, to the individual citizen expressing a nostalgic view of the area.

Direct engagement with stakeholders played a crucial role in developing critical thinking and a broader vision of the area from the beginning of the analysis. The stakeholder engagement process was not linear, sometimes presenting complexities in organising meetings and varying the number and personalities of stakeholders during the module.

Throughout the module, various sharing moments were scheduled, and the interviews were conducted in the classroom, following which the stakeholders' responses were transcribed, highlighting the different positions and perspectives. Stakeholder participation was reinforced through various moments, including design review meetings in the classroom.
Towards the conclusion of the module, two occasions for direct meetings were organised at the park, allowing for more direct and tangible involvement with the reference community.
In October 2023, an exhibition in the local library showed the processes followed by learners during the Architectural Composition 1 module (figure 3). During this event, a roundtable discussion took place, involving some learners who had participated in the module, local residents, and representatives from the third sector of various groups. During this stakeholder discussion, doubts, concerns, forecasts, and future expectations for the neighbourhood were shared through constructive dialogue.
The relationships with stakeholders have highlighted the strengths and weaknesses of such collaboration: it has brought deeper understanding of the place and also a knowledge generated from direct contact. However, such engagement (especially with informal or non-institutional groups) generate risks, such as the non-linear development of collaboration and/or interest, relevance of information collated and also the capacity for dealing with young learners. Nevertheless, learners' response to the process has been very positive, emphasising that increased contact with the reference community gives the project a realistic dimension not easily found in university modules.

Figure 3. Public exhibition in the neighbourhood of Borgo Ticino

Capturing multiple voices and subjectivities: field work and situated knowledge.

Field work has been organised for learners to gain a personal, subjective and deep understanding of place and people.
In more detail, two guided walks in the neighbourhood were conducted by local stakeholders: one alongside the riverbank and the other about contested urban developments on greenfields. Alongside the visit, informal talks and questions were prompted by learners who got the opportunity to discuss more in depth, and on site, their understanding of the matters.

Another activity consisted in a *dèrive* (psychogeographical walk) prompted by educators and then delivered independently by learners. This autonomous understanding of the place was further elaborated through a short movie (figure 4) in which each team included hand notes and sketches, points of interest (architecturally but also socially, environmentally), paired by sounds and pictures captured on site.
The complex of such field-work activities allowed learners to gain, in a relatively short amount of time, a critical viewpoint as well as emerging challenges. This understanding complements what gained preliminary and by hosting stakeholders in the studio. Not only the team of educators has witnessed a deeper engagement of learners with such activities beyond the classroom, but the outcomes have also been impactful on local communities. For example, dissemination activities have been organised beyond term time, which provided incredibly accurate and insightful feedback, and a full range of positive comments were collated. In particular, some stakeholders highlighted the importance of making the accessible on line to 'make them visible to the whole community' and also employ them in further discussions due to their 'evocative power'.

Figure 4. Screenshot from a movie produced out of a psychogeographical walk.

Critical mapping

Methodologically, a gradual approach has been developed for the spatial definition of the area, starting from a sensitive and perceptual analysis, up to the definition of a master plan through a SWOT analysis. Critical mapping recognizes that maps are not static representations but dynamic social constructs. It considers how maps influence and are influenced by social dynamics, including issues of class, race, gender, and other identity markers.[10]
Critical mapping considers how maps can either reinforce or challenge dominant narratives that may exclude or misrepresent certain groups.
The work of graphic representation constitutes a transposition of the experiences accumulated in the preceding days directly onto the project area, fueled by the initial impressions derived from direct contact with stakeholders.
The experience of fieldwork and psychogeographical walks can have a significant impact on participants, evoking a wide range of thoughts and sensations. When these are made explicit through photos, videos, drawings, and thematic maps, a space opens up for creative expression and critical

reflection. The use of paper materials, such as colours, cardboard, post-its, fabrics, and other physical elements, enhances creative expression and provides a tangible medium to capture sensory and emotional experiences (figure 5).

Figure 5. Critical mappings

An additional step in the design process involved introducing learners to two exercises: role play and SWOT analysis. We decided to combine these exercises in order to stimulate a reflection on conflict management in the neighbourhood by the learners. After conducting a study in direct contact with the communities and listening to the various multi-actor voices present in the context, the challenge for the learners is to demonstrate their ability to understand various viewpoints in the neighbourhood's problem-solving and negotiation process.

Role play, in this context, is defined as the act of immersing oneself in the perspective of a specific stakeholder. The output of the role-play is the awareness of learners in the participatory and negotiation process with the community. Meanwhile, SWOT analysis stands for "Strengths, Weaknesses, Opportunities, and Threats." The objective of this sub-phase is to provide an exercise for learners to analyse the context of the neighbourhood they are designing, extract data from the situation analysis, and organise it into a framework suitable for discussions with stakeholder groups (in this case, within the lab with peers). The output of the SWOT analysis exercise serves as a crucial link to the development of the design process, strategies, and actions, using subjective observations derived from the role-play discussion.

The exercises were proposed in a combined manner during a single workshop, it began the day before when the group of educators presented the role-play. One of the requirements was to gather information about the chosen role for interpretation, enabling learners to immerse themselves in these figures. On the day of the exercise, "personal" themes were proposed to initiate reflection, leading to the development of a SWOT analysis process (figure 5).

The analysis was conducted within the role-playing game, developing the four points of the SWOT through the roles played. This was translated onto a white sheet divided into 4 with the characteristics listed. After that, an analysis work was requested on the SWOT in relation to learner’s own perception, and the outcomes changed.

The workshop was designed to expose learners to negotiation processes that routinely occur during idea-sharing moments, enabling them to design, including how different stakeholders relate to each

other, negotiate power within a transformation process (become empowered), identify challenges and opportunities, as well as risks, and ultimately foster a shared vision.

Figure 5. Role play and swot analysis.

DISCUSSION

The first element of reflection is that the module's methodology has been conceived organically and in relation to the aims and objectives (of the module, and preliminary agreed with the local community). Hence, the choice of what 'tools and methods' to use did not descend necessarily from a disciplinary perspective. We can say that the methodology and the module brief have been created by thinking 'out of the box' and by creatively combining various elements (including research by design) on the basis of societal needs and stakeholders' engagement.

From the epistemological point of view, the module focused very much on direct experience of places, and (learners') subjectivity as a perspective lens to look at them, avoiding at the same time the further elaboration of such experiences towards objectivity (both in terms of narrative and in terms of outputs). As such, masterplanning has been substituted with a critical mapping activity: it includes annotations and observations, pros and cons which have been then discussed with stakeholders. The participatory workshop held during the module had this intention, which as a matter of fact marks only the beginning of the process (the masterplan should then be developed via a more elaborated process which involves institutional subjects as well).

The same applies to the design proposals developed by learners in the last part of the module: these are - despite their detailed elaboration - mere hypotheses to be discussed with Parco Vivo association. They mark the beginning of a process, which can potentially culminate with the collaborative making of such pavilions in the park (via self-construction) (figure 6).

Moreover, field work activities and, in general, the situatedness of the module followed various phases and trajectories. In relation to their timing, learners were firstly exposed to documents and information at distance, then experienced the site directly, and then elaborated critically -again- being at distance.

More in detail, such learning trajectories can be expressed for example via their distance from the "object of study" itself: there are activities delivered in the 'studio' as well as others delivered on-site, close to the neighbourhood, and to local communities. The storytelling of the place (by whom, where) and its direct observation by participants (with whom, in what form) contribute to defining part of learners' positioning in relation to it.

Another variable is given by learners' type of engagement in respect to local actors, groups and communities. In some instances, their voices were recorded directly on site, merging people and place.

The above mentioned activities, unfolded coherently with the methodology, has allowed learners to enter gradually but deeply into a complex variety of matters and aspirations.
As such, the investigation took into consideration a multi-actorial perspective, which is deemed necessary to understand the complexity of such a neighbourhood through various (nevertheless selected) voices. These provided different perspectives and opinions, sometimes even in contrast among them (or with the municipality). Learners were not provided with the 'answers' but were left free to critically evaluate those positions.
The last iteration of which corresponds to their personal positioning (even though not individual but as a team) in relation to the challenges and opportunities they were exposed to. It is important to note this is the latest step at urban scale, hence a 'masterplan' was not asked to learners. Given the ethos of the module, such a proposal should generate from a participatory process and involve institutional stakeholders and professionals as well. As such, it is both beyond the scope of the module and incompatible with the constraints given by University term.

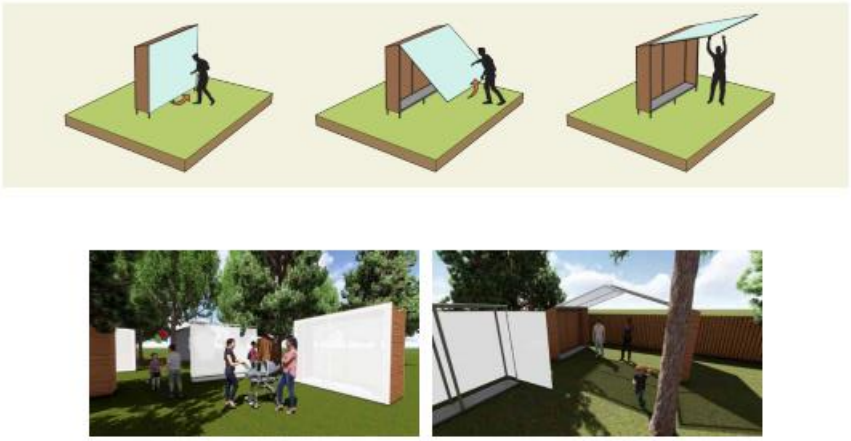

Figure 6. An architectural proposal developed by learners for Parco Vivo

LESSONS LEARNT AND CONCLUSION

The module was designed to incorporate a range of tools and methods to make it socially and environmentally situated. This contributed to the emergence of very significant entanglements in between place, local actors and socio-environmental challenges.
As a matter of fact, most knowledge has been generated on-site and/or from situated activities. In this process, deep engagement with stakeholders has been of primary importance and something challenging.
While the outcomes of the module are perceived to be very positive, few lessons learnt allow authors to look forward to further iterations.
In the first place it should be noted that continuous exchange of information, knowledge and feedback between educators, learners and stakeholders is of utmost importance for the (pedagogical) sustainability of such initiatives. Hence, their effective availability should be assessed and agreed upon from the planning stage. This is particularly important as most associations (and their members) work on a voluntary basis, hence dedicating extra time to such engagement may prove difficult. On the other hand, Universities should reflect on their ability to support such initiatives, even financially.
Moreover, the presence and role of the 'University' should be carefully evaluated in terms of its power relations towards the variety of stakeholders. In fact, the action of positioning and discussing urban

transformations brings in a political dimension. While the ethos of the module is entirely focused on learners' critical understanding of place and their situated knowledge, these circumstances should be properly communicated to the outside world to avoid potential misunderstandings. In short, what is being produced are learners' views and proposals. Nevertheless, some stakeholders raise the point of the University's role in 'the life of the neighbourhood', foreseeing a potential that is not there yet. This could unfold in terms of dissemination (e.g. public events hosted at the University), but also prefigure the potential for improving local groups' visibility. This is particularly relevant to under-represented groups or non-institutional ones (e.g. activists). While in this specific occasion it has been raised as an opportunity, in general it's a point of ethical and political reflection to be carefully tuned towards future endeavours.

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PERMANENT IMPERMANENCE: DESIGNING WITH AND FOR DIGITAL, VIRTUAL, ALIVE AND INERT MATERIALS AND SPACES

Author:
CARLA LEITAO

Affiliation:
RENSSELAER POLYTECHNIC INSTITUTE, USA

INTRODUCTION

In an era where change is the only constant and stability is fleeting, architectural design operates within a paradigm of ‘Permanent Impermanence’. This paper examines principles, methodologies and work produced in thesis sequence seminars and architecture design studios - realized at the School of Architecture at Rensselaer Polytechnic Institute - centered around the theme of 'impermanence', exploring how planning and design can actively engage with the uncertainty of contexts, be they existing constraints or evolving conditions of change. Recognizing the contemporary rethinking of concepts like model and infrastructure,[1] these studios question the longstanding association of architectural design with structural permanence. As digital acceleration and technological advancements reshape our world, there emerges an urgent need to expand the architectural lexicon. This involves challenging established methods, typologies, and materials to adapt to rapidly changing contexts. The design studios collaborate with RPI’s CRAIVE Lab, an immersive and interactive research space, located at RPI Tech Park, that serves as a 'black box' for experimenting across a wide spectrum of materials.

The paper considers methodologies that engage with the multifaceted nature of time - its lines, cycles, spirals, durations, schedules, and contingencies, and its regional and global synchronizations. It critically examines time-based, hybrid models for building and inhabitation that interact with cultural formation, material, and environmental change. The goal is to define criteria for creating new diagrams of cohabitation with time for the present century.

Context

The ‘Impermanence' Thesis Sequence, encompassing a seminar and studio semester, highlighted perspectives on the ephemeral nature of architectural design. It focused on methodologies that cultivate an awareness of time-based processes and interactions.

Frameworks

Frameworks of thought included Mark Wigley's "The Architectural Brain",[2] which explores the shift from hierarchical to network-centric systems in architectural thinking. Wigley offers insights into the impact of network culture on architecture, discussing the horizontality of modern architecture

characterized by its connective, ‘distributive’ ambitions. This perspective prompts students to view ‘buildings’ as assemblies of components and as integral parts of a larger, living network.

Cedric Price’s 1964 Fun Palace project still stands as an iconic representation of time-based change, with its diagrammatic infrastructure of adaptable spaces. It showcases the impact of media culture[3] on rethinking architectural design's interior and exterior conditions. The flexibility and adaptability of this model are evidenced by changing circulation pathways and movable spatial divisions, while media elements effectively create ‘partitions ’and virtual space divisions. The concept of ‘durability ’splits into the curatorial change of spatial production through media and movement, and the ‘long game ’of the neutral envelope and apparatus of the skeletal scaffolding—a material construction, though invisibly maintained.

Edward Ford's "The Theory and Practice of Impermanence" examines the practical aspects of architectural durability, foregrounding different cultural practices in maintaining the built environment.[4] Ford's analysis of the Sainsbury Center and Pompidou Center renovations exemplifies the impermanent nature of even iconic structures. This challenges architects to rethink materiality, construction techniques, the lifespan of structures, their meanings, and the conventional ethos of architectural permanence.

Timothy Morton's "Zero Landscapes in the Time of Hyperobjects" introduces philosophical and ecological depth to concepts of site, context, and narrative.[5] Morton’s discussion of hyperobjects—vast, interconnected entities like ‘global warming ’and ‘nuclear radiation’—highlights forces that are overwhelming and pervasive, yet encountered through discrete human experiences. They can only be truly understood through advanced forms of measurement and mapping. ‘Zero Landscapes ’suggest designing not for isolated, permanent structures but as an aware response within a larger, dynamic ecological system, necessitating new tools for mapping and response strategies.

Chris Reed and Nina-Marie Lister's argument of process in "Ecology and Design: Parallel Genealogies" adds a tangible ecological dimension to all acts of design.[6] They emphasize systemic change in urbanism and landscape architecture, offering a concrete framework for incorporating resilience and adaptability into architectural design. Landscapes become both models and mediums for design, providing guidelines and material components to articulate dynamic processes at the intersections of natural forces and human inhabitation.

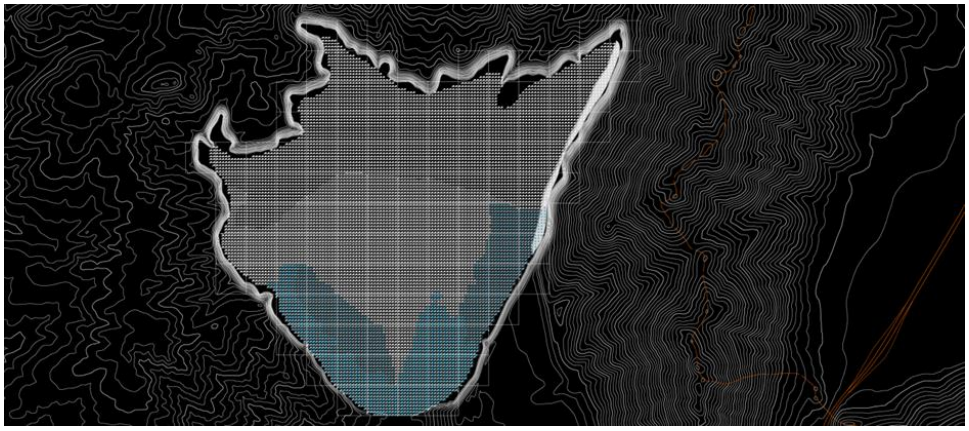

Figure 1. “Regenerated Natures” , Erik Pedersen, FP Thesis at RPI SoA,[7] deployment grid.

The multidimensional approaches of these authors aim to establish a reflective, iterative design process framework that embraces different scales of uncertainty already present at connective moments between

wild landscapes and urban environments. This approach aspires to create active, responsive structures within broader environmental and temporal contexts.

METHODOLOGY

The seminar and studio's mapping and analysis methodologies emphasized the importance of deep timelines of materials in shaping and being shaped by architectural design through the production of matrices of material and cultural 'duration 'timelines. This approach encouraged students to consider how materials change, age, and interact with their surroundings over time.

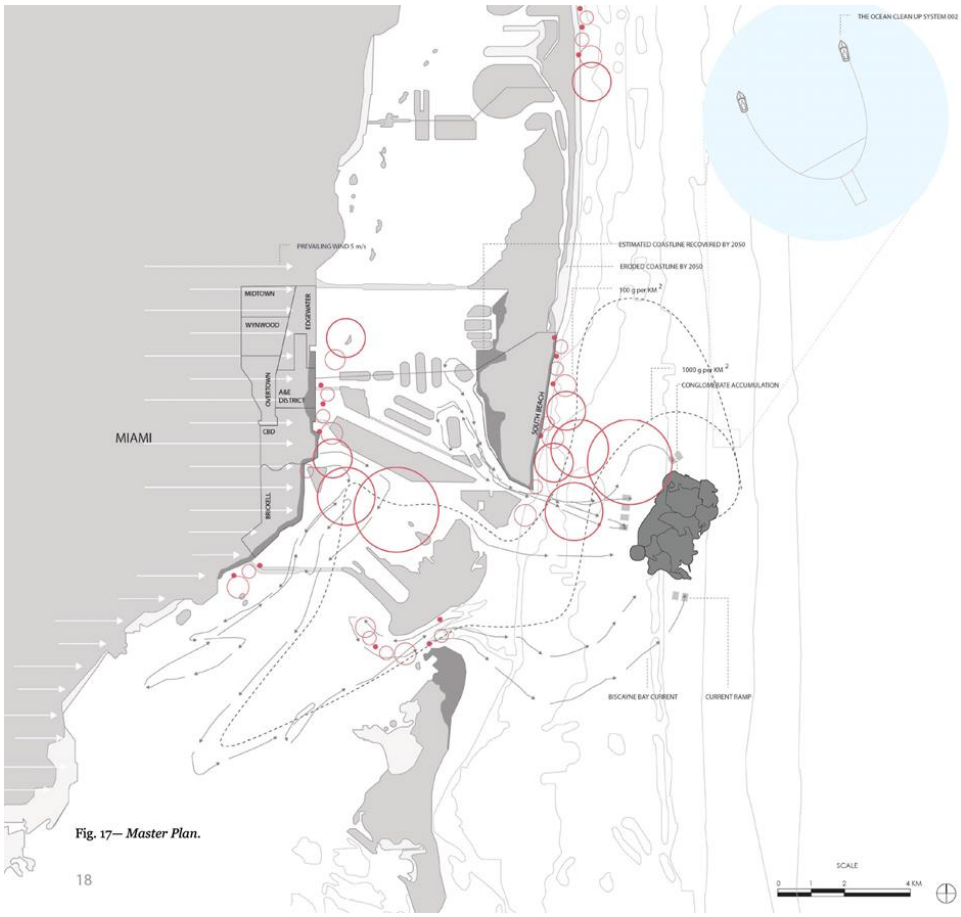

Figure 2. Lauren Mendoza, "Conglomerate Coastlines" FP Thesis at RPI SoA.[8]

Matrixes, Matter and Space

Keller Easterling's concept of Matrix Space is a reminder of the matrix as 'infrastructure '- a means to explore how 'spatial products 'evolve within a larger urban and infrastructural matrix.[9] These matrices include both tangible and intangible infrastructures, aligning with Shannon Mattern's descriptions of broader, interconnected networks and socio-cultural and infrastructural narratives.[10]

Donna Haraway's "Tentacular Thinking: Anthropocene, Capitalocene, Chthulucene" critiques the human-centered mindset of the Anthropocene, proposing the Chthulucene as a new term that emphasizes multispecies, collaborative survival and entanglement.[11] Haraway uses the metaphor of tentacularity to describe life as an interwoven mesh of relations and interactions. Central to her argument is the concept of 'compost', suggesting a continuous, interdependent process of growth, decay,

and regeneration. How can we apply the concept of compostability as a lens for examining connectivities across non-material processes?

Immersion and Deep Context

The CRAIVE Lab offers a unique platform where these theoretical concepts can be virtually tested and visualized. Its immersive environment features interactivity and collaboration, enabling situational testing across various scales of time and space, and viewpoints.[12] The lab's 'deep context 'analysis and synthesis resonate with a shifting perception of the world and an acceleration in "*explication, the revealing-inclusion of the background givens underlying manifest operations…*";[13] a perfect setup for Haraway's *Implosion* project.[14] This focuses on hybridizations of the techno-scientific world, challenging traditional separations between nature and culture, human and non-human, material and virtual, among other binary categorizations. This pedagogical strategy emphasizes the importance of well-informed theoretical models to inspire experimentation and action, equipping thinkers and makers with tools to produce guidelines, criteria, and forms that resonate with their design and work ambitions in the world.

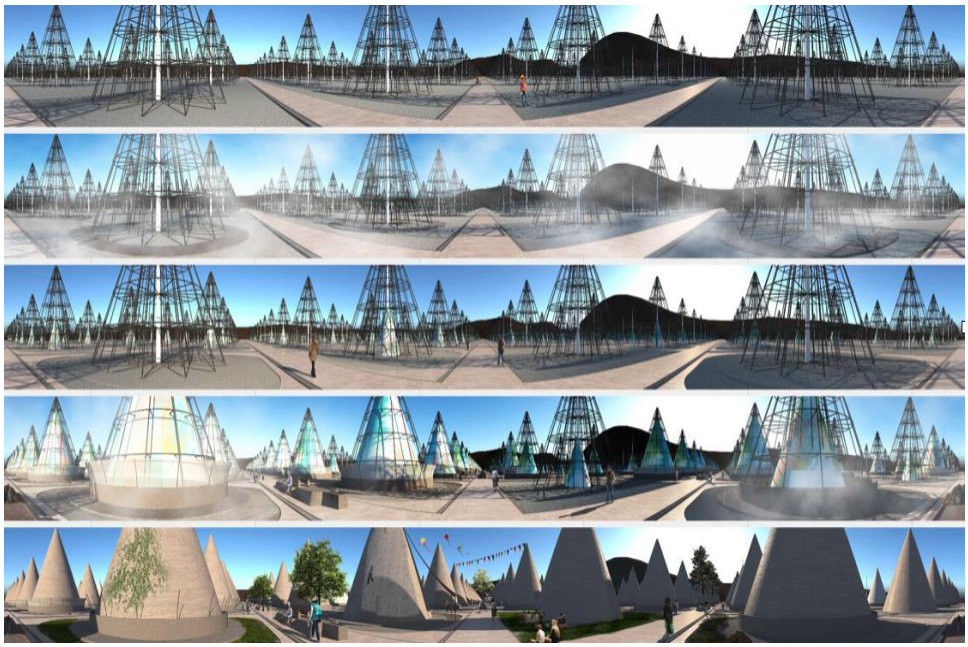

Figure 3. "Regenerated Natures", Erik Pedersen, FP Thesis at RPI SoA,[15] timeline.

CASE STUDIES

The Impermanence studio's focus on materiality, virtuality, and hybrid inquiries responds to contemporary impermanence, where digital and physical materials increasingly intertwine. This fusion demands a dual approach: understanding the physicality of materials, the real virtuality of interactions, and the interplay of immaterial and material aspects of digital interactions. By exploring both tangible materials and virtual processes, the studio addresses the complex, layered reality of contemporary impermanence and the need to engage with both physical and digital worlds in shaping the evolving hybrid fabric of reality.

Matter-centric

Erik Pedersen's thesis, "Regenerated Natures"[16] explores the potential for in-situ remediation in transforming mining landscapes into new ecological systems. Centering on the Yankee Doodle Tailings Pond, the U.S.'s largest superfund site, the project investigates how monuments can raise awareness of environmental issues while fostering natural regeneration. The thesis proposes a phased approach, initially deploying cones for toxin extraction and gradually opening the site for public interaction, evolving into a linear park. Over a century, these cones, filled with toxic materials, transform the site, highlighting the interaction between human intervention, maintenance, and natural processes. Pedersen's vision of a 'New Nature' encapsulates a future where human-made landscapes facilitate emergent ecosystems, incorporating elements of Land Art to bridge public space with ecological healing.

Figure 4. "GEO-SYNTH", Lindsay Manning, FP Thesis at RPI SoA,[17] CRAIVE Lab.

Lindsay Manning's "GEO-SYNTH: Reading (Im)material Landscapes"[18] parallels Keller Easterling's Matrix Space[19] and Haraway's composting concept.[20] It weaves together digital advancements with emerging geophysical realities like 'plastiglomerate', reflecting a composting of natural and synthetic elements into a new, interconnected environmental language. Manning's thesis focuses on the increasingly blurred boundaries between natural and synthetic, local and global, temporary and permanent. Drawing on the discovery of 'plastiglomerate' on a Hawai'i beach and Robert Macfarlane's work in "Landmarks"[21] the thesis discusses the loss of site-specific languages and its impact on landscape perception. By proposing 'Geo-Synth' - an architectural language that uses material sensors and digital input - Manning aims to re-think or re-establish the landscape's communicative role, reframing the roles of language and landscape in the evolution of cultural and natural fabrics.

Lauren Mendoza's thesis, "Conglomerate Coastlines: Accretion Culture of Design",[22] delves into the interconnection of climate change, plastic consumption, and rising sea levels, focusing on Miami's coastline as a prototype for global solutions. Her investigation into artificial landscape models, materiality, and environmentalism emphasizes the use of MIT passive ramps, autonomous technologies like Leihber tractors, and AI programs for material capture and coastline rebuilding. Similarly to Manning, Mendoza also incorporates the concept of 'plastiglomerate', highlighting its dual nature as both an environmental issue and a potential material for sustainable architecture. Her vision for the

future of coastlines is influenced by precedents like *The Ocean Cleanup's System 002* and *MIT's Self Assembly Lab* processes, seeing them as contemporary and near-future tools to transform toxic ecologies into opportunities for environmental rehabilitation and architectural innovation.

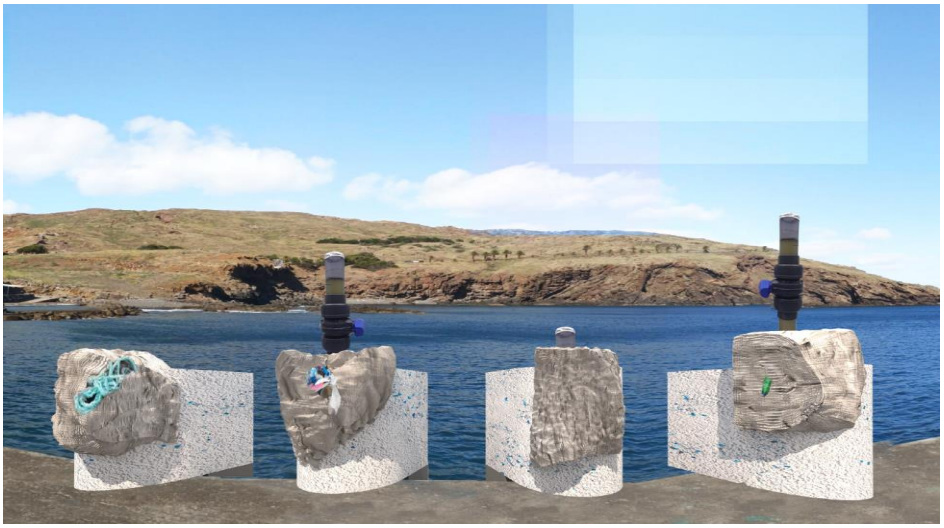

Figure 5. "GEO-SYNTH", Lindsay Manning, FP Thesis at RPI SoA,[23] Deployment.

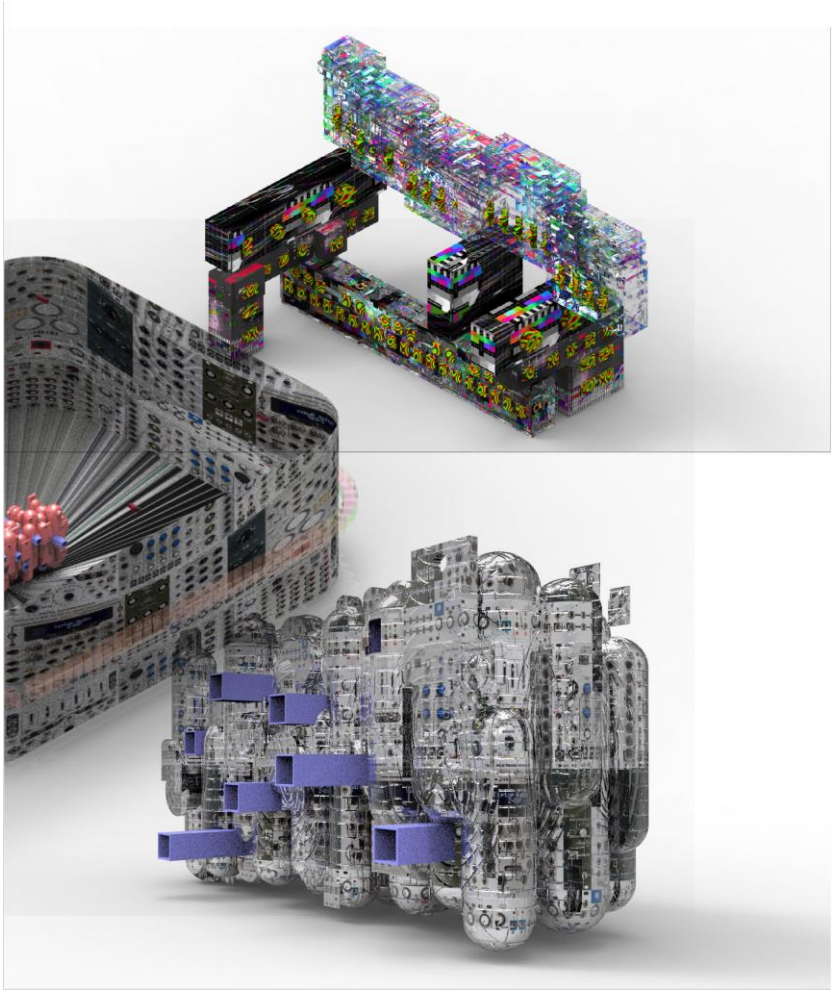

Figure 6. "Intimatopia", Jerry Huang, FP Thesis at RPI SoA,[24] Interfaces.

Hybrid assemblages

Jerry Huang's thesis, “Intimatopia",[25] intersects with the concept of impermanence in architectural design by emphasizing the fluidity of cultural embodiment in a digital era, resonating differently with Haraway's notion of ‘composting’.[26] Huang's vision of a mutable, mixed-reality environment partly echoes Edward Ford's discussion of architecture as a narrative medium,[27] in tune with the impermanence of cultural and societal norms. In Huang's project, this relationship is explored through the evolving multi-sensory and digital interactions flickering within and from architectural constructs, challenging the traditional permanence of physical structures. Huang’s “Intimatopia” presents a visionary exploration of cultural embodiment in the digital age, drawing inspiration from significant 1969 events - lunar exploration and the rise of queer social movements - as well as foremother forms of cultural expression such as the ‘Drum Machine’. Focusing on the transformative impact of digital immersion on cultural production and expression, Huang advocates for an architecture that actively participates in shaping cultural rituals and meanings, emphasizing the need for spaces that resonate with our multi-sensory experiences. In Huang's "Intimatopia," the drum machine’s control interface for spatial environments directly engages with Timothy Morton’s ‘mesh’-like ‘Hyperobjects’[28] - interconnectedness reflected through rhythmic patterns that influence and structure the architectural space. Similarly, Intimatopia’s evolving land-soundscapes resonate with Donna Haraway's call for "sympoiesis" in "Staying with the Trouble”,[29] by drawing collaborative, accreting, layered processes within the urban fabric.

Figure 7. “Intimatopia”, Jerry Huang, FP Thesis at RPI SoA,[30] CRAIVE Lab.

Through “Intimatopia”, Huang proposes a mixed-reality environment that expands or augments physical space within the public urban realm - where architecture transcends traditional boundaries, fostering a sense of collective identity, participation, and togetherness in a trans-cultural, multi-sensory urban landscape. The thesis posits that contemporary culture, increasingly mediated by digital technologies, necessitates a reevaluation of architectural spaces as vessels for cultural embodiment - digital realms intertwine with physical reality, creating a new, interconnected layer of existence that challenges traditional notions of space and place. This layered condition works then much like Easterling's "Disposition" from “Extrastatecraft"[31] - where the drum machine functions like

infrastructural elements that, subtly but powerfully, influence - ‘orchestrate ’rather than control - urban dynamics and cultural interactions, shaping Intimatopia's social and spatial character.

Digital landscapes

One of the projects in the virtual spectrum of the studio, Nya Jackson's thesis “A Refugees Journey”.[32] The thesis inquires into the potential of architecture and technology to assist in humanitarian crises by addressing the complex issue of mass migration due to factors like violence, climate change, and resource scarcity. Focusing on Northern Africa, a region historically and currently entangled in global political and cultural dynamics, Jackson explores the multifaceted challenges faced by refugees. These include fraud, lack of housing and food, and difficult travel/escape conditions. The thesis particularly emphasizes the role of smugglers in the migration process and the exploitation faced by refugees at their hands. Although Jackson is initially inspired by architectural shelters such as Shigeru Ban’s Paper homes, the context is too dynamic for ‘shelter ’to provide ‘shielding’.

Jackson proposes a portable construct that can navigate the nomadic condition: an app influenced by platforms like Waze, which relies on user input to navigate and avoid dangers. This app integrates photo and video capture features, allowing users to document and share their experiences, which are reprojected onto the 3D view of the landscape digital maps of the same platform. What could be considered a quite radical perspective on Ford's view of architecture as an evolving narrative,[33] the construct caters to the transient and uncertain conditions faced by refugees, creating deep maps of inhabitation of the territories users already did or are about to pass through.

On one hand, Jackson's thesis resonates with old models in the discipline such as Christopher Alexander's concept of pattern language[34] - by offering a technological framework that adapts to the fluid and unpredictable patterns of refugee migration. On the other hand, much like how Haraway’s notion of situated knowledges,[35] it underlines the importance of context-specific, adaptable solutions in ever-changing scenarios. Jackson’s thesis is a unique blend of technological innovation and architectural thinking, aiming to provide practical, user-driven solutions for the challenges faced by refugees in their perilous journeys, reflecting a potential evolving role of architects in addressing fleeting human needs, contingency planning, and challenging environments.

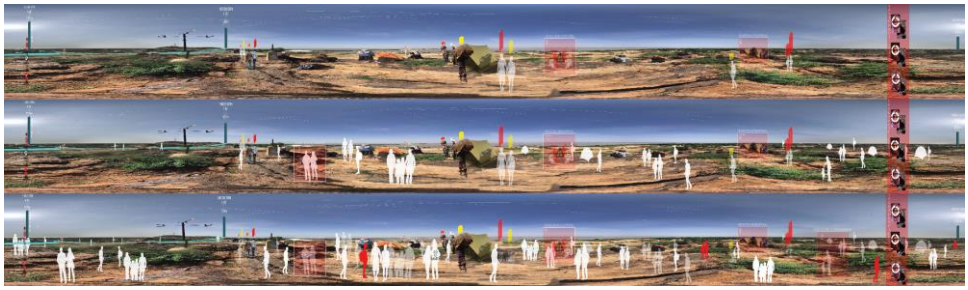

Figure 8. “A Refugee’s Journey”, Nya Jackson, FP Thesis at RPI SoA,[36] Interface-VP.

CRITICAL OBSERVATIONS AND CONCLUSION

The studio's methodology, informed by new framework concepts, and tested through simulations at the CRAIVE Lab, presents an approach to architectural education that emphasizes the dynamic interplay between architecture, time, evolving concepts of materials, and the increasing knowledge we can grasp of complexity in contexts we operate in.

Challenges

Understanding this dynamic creates specific demands to experiment with concepts and practices that foster adaptability and responsiveness to change.

Predicting ‘Material ’Evolution

One significant challenge is accurately predicting and designing how materials will indeed age, adapt, and interact with environmental and societal changes. The unpredictability of future environmental conditions and societal needs poses a substantial challenge to architects - as it increasingly escapes modeling, mapping, qualification.

Ethics, Aesthetics, and Functionality

Integrating the concept of deep material timelines often requires a delicate balance between aesthetics and ethics considerations and functionality of the installed operations. The capacity to ‘zoom in ’and ‘zoom out ’of assemblies produces new abilities to identify agency and new criteria to evaluate responsiveness and adaptation.

Economic, Environmental, and Practical Constraints

The focus on adaptability and the evolution of materials and technologies can be at odds with economic, environmental, and/or practical constraints. Innovative materials or technologies and adaptive designs may often come with higher costs, complex construction processes, and present distribution or accessibility challenges.

Cultural and Societal Paradigms

Co-option and participation are part of seeing innovative solutions as such. A new assembly, while potentially valuable, may present itself as foreign or unreliable or un-relatable - hindering its productive functioning.

Educational Paradigms

Shifting educational paradigms requires rethinking traditional, and sometimes time-tested, models that are familiar to engage with and produce expected outcomes.

These challenges underline the need for a comprehensive and nuanced approach in architectural education and practice. The exploration of the 'Permanent Impermanence' theses and methodologies opens up a realm of opportunities for architectural ideation. Methodologies that emphasize embracing the fluidity of design need to benefit from multidisciplinary collaboration and digital-ecological integration and thinking - towards frameworks for creating spaces that are deeply responsive to environmental and societal shifts. This approach may not only address the challenges of an ever-changing world but also provide an enduring framework for a transformative practice.

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MATERIAUSCOPE: MULTI-SCLALAR ANALYSIS OF BUILDING MATERIALS CHOICE, THE POTENTIAL ROLE OF PEDAGOGICAL TOOL

Author:
NATHALIE TORNAY

Affiliation:
LRA (LABORATOIRE DE RECHERCHE EN ARCHITECTURE), ENSA (ECOLE NATIONALE SUPERIEURE D'ARCHITECTURE) DE TOULOUSE, FRANCE

INTRODUCTION

In a contemporary landscape characterized by the depletion of natural resources and heightened environmental concerns, particularly regarding the carbon footprint, the selection of construction materials assumes a paramount role in the sustainability of architectural endeavors. The pedagogy surrounding geobiobased materials becomes increasingly pertinent in light of these challenges, necessitating the training of architecture students to adopt sustainable approaches in material choices. This contribution explores the dynamic pedagogical concept of referencing, contextualizing the selection of geobiobased materials through a meticulous analysis of precedents and case studies. Delivered to Master's students at ENSA Toulouse since 2017, this educational initiative is centered around the pedagogical design tool, MateriauScope, which facilitates an interactive and multiscale learning experience. Going beyond conventional theoretical knowledge dissemination, this approach immerses students in the practical intricacies of architectural design, fostering action, reflection, and collaborative knowledge construction. The overarching objective is to contribute to the construction of a new generation of architects characterized by awareness, creativity, and the ability to address contemporary challenges.

REFERENCING AS A PEDAGOGICAL CONCEPT

The referencing process, rooted in precedents and case studies, operates to contextualize the selection of geobiobased materials in existing buildings. These structures become archetypes that challenge fundamental knowledge through a multicriteria analysis, enabling a comprehensive understanding.[1] The objective is to identify recurrent mechanisms, each presenting a causal chain of diverse situations. Rather than offering a list of reproducible solutions, the diversity of precedents and their contexts exposes thought processes, inquiries, and biases that can be applied to yet nonexistent situations. This approach encourages action, prompting students to analyze concrete cases, experiment with material choices or concepts, question the impact of materiality, and develop multidisciplinarity. These actions contribute to the continuous process of intellectual construction by exposing students to real challenges in contemporary architecture related to geobiobased materials.[2]

The referencing methodology follows a three-phase trajectory: discovery, appropriation, and acquisition.[3] During the discovery phase, students explore references through case studies to initiate

their understanding of the subject. This introductory step aims to create a study framework, format analysis fields, and highlight the diversity of involved components. The goal is twofold: initiate their understanding of the subject and develop their ability to "see" the nuances of constructive choices and physical phenomena through concrete examples. The appropriation phase represents a deeper stage, prompting students to deepen their knowledge. Faced with the diversity of references, they feel the need to target certain aspects to refine their understanding. This phase encourages the emergence of a reproducible analytical method, allowing learners to distinguish between the fields of sciences and techniques. They learn to classify, organize, and characterize architectural devices, thus preparing the ground for a more nuanced understanding. The acquisition phase aims to provide them with a global and applicable vision in various architectural contexts. At this stage, learners have assimilated in-depth knowledge, enabling them to approach the complexity of architectural design. They are ready to apply these acquired insights personally, with each element of their learning corresponding to the complexity of architectural choices.
It is essential to note that the analysis of precedents is an individual task. Each student is encouraged to explore, understand, and interpret case studies personally, stimulating their own reflection.

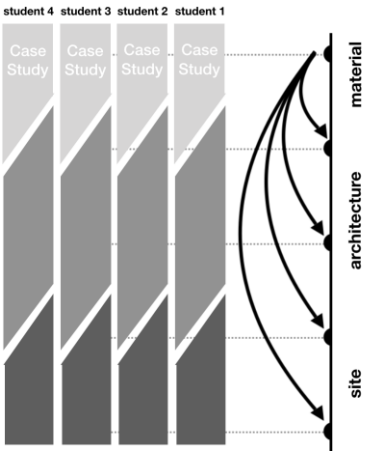

Figure 1. Individual work involving a case study analysis

However, the recognition of concepts and the acquisition of knowledge emerge collectively through what could be called "collective empiricism." Group discussions allow students to confront their individual perspectives, broaden their understanding, and benefit from the diversity of viewpoints within the learning community.

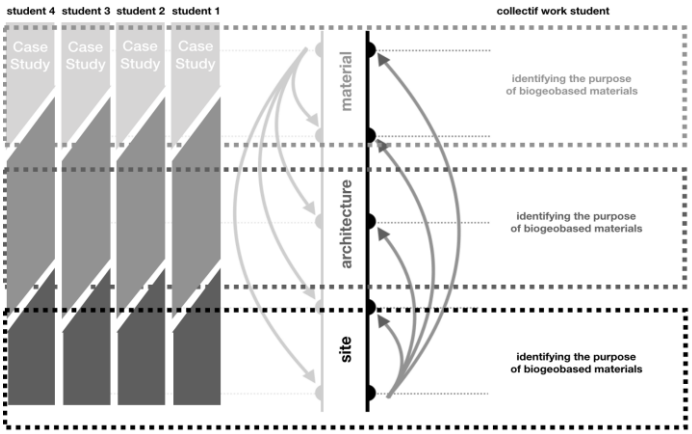

Figure 2. Collective work in identifying the purpose of biogeobased materials

This interactive approach, focused on thought construction and collective empiricism, aims to provide students with a profound understanding of geobiobased materials, fostering their evolving thinking, analysis, and understanding in the field of architecture. The referencing methodology integrates into the project process, guiding students through a systematic progression from initial exploration to contextual mastery, while adopting a systemic approach inspired by the complex thinking.[4]

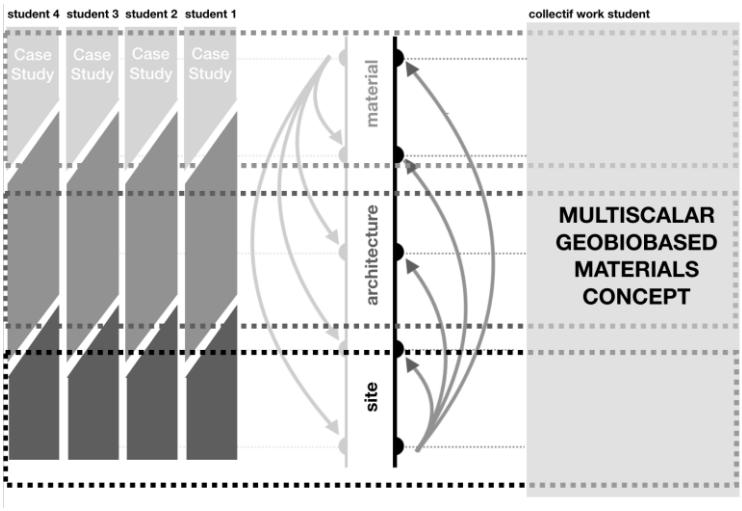

Figure 3. Knowledge built on a referencing process

DESIGN TOOL AS PEDAGOGICAL SUPPORT

The approach developed here for teaching geobiobased materials is exemplified through a design support tool, MateriauScope. This approach is characterized by the desire to develop an interactive and dynamic experience, guiding students between theory and the realities of contemporary architecture.[5]

MateriauScope

MateriauScope is a structured database utilizing the Scenari-Opale editorial chain technology. Each analysis scale is represented by case studies, offering students an interactive and dynamic resource to explore geobiobased materials. Conceptually, this tool organizes knowledge through three analysis scales aligned with multiscale principles. From the territory to the raw material, each scale is characterized by postures illustrated by case studies of existing buildings. MateriauScope relies on a fundamental structure created using hypertext links. This design approach is based on the principle of hyperlinks, interactive connections between different information elements within the database. Each element, whether an analysis scale, a case study, or specific data on a geobiobased material, is dynamically linked to other relevant components. Hypertext links allow users to navigate smoothly and intuitively through different analysis scales and case studies. By clicking on a specific hyperlink, users are directed to related information, facilitating interactive and in-depth exploration of geobiobased materials. This network structure promotes a dynamic learning experience by allowing learners to access specific knowledge while maintaining an overall view that aims to stimulate systemic thinking and understanding of interactions between the macro and micro in material choices. This approach can be compared to using both a microscope and a telescope. On one hand, the microscope allows for an in-depth exploration at the microscopic scale of the material, analyzing its intrinsic properties. On the other hand, the telescope provides a global view, highlighting how these materials integrate into the architectural and urban panorama.

From Theory to Reality

The pedagogical significance of this tool lies in its capacity to transform the abstraction of theoretical concepts into tangible experiences. It enables students to transition from theory to practice by integrating concrete data into their architectural design process. This fosters a deeper understanding of material properties, interactions, and the consequences of choices made at each stage of the design process.[6] MateriauScope transcends the mere transmission of theoretical knowledge by offering students the opportunity to integrate concrete data into the architectural design process. Rather than remaining confined to the abstract realm of ideas, students are guided through concrete case studies, illustrating the implementation of geobiobased materials in real projects. This immersive approach enhances the educational experience by allowing students to visualize, analyze, and comprehend material choices in a real-world context. By introducing concrete data, MateriauScope goes beyond theoretical abstractions, providing students with an in-depth understanding of material properties. Exploring practical examples enables learners to grasp not only the intrinsic characteristics of materials but also their actual behavior in specific architectural conditions. This immersion fosters a practical familiarity with materials, establishing a meaningful link between theory and constructed reality. Rooted in action, this approach contributes not only to a better mastery of geobiosourced materials but also to the development of critical thinking. Students are thus encouraged to cultivate a holistic understanding, challenging one-dimensional solutions and comprehending the complexities of architectural choices.[7] MateriauScope, contextualizing material selection in real situations, prompts critical reflection on the implications of these choices in specific scenarios. This tool encourages them to consider materials not merely as isolated entities but as integrated elements within an architectural and environmental whole. Thus, students develop a profound critical mindset that goes beyond superficial considerations.

Re-drawing

Within the pedagogical approach lies the process of redrawing the analyzed case studies. Students are encouraged to transcend mere analysis by reinterpreting the case studies through the lens of materiality. This creative act of redrawing, highlighting material choices, becomes a synthesis exercise where the complexity of the project is distilled to its fundamental elements. In this context, redrawing signifies more than an artistic activity; it is a strategic targeting exercise that compels students to identify the most crucial aspects of the project. They must comprehend how materiality influences architectural form, site relationships, etc., and express these intentions graphically and didactically. This act of redrawing becomes a pivotal step in the learning process, providing students with an opportunity to develop their practical understanding with a global conceptual approach[8]. By integrating this visual approach into the design tool, MateriauScope transforms redrawing into an interactive and dynamic experience, fostering a profound assimilation of teachings while cultivating the ability to communicate effectively about complex concepts.

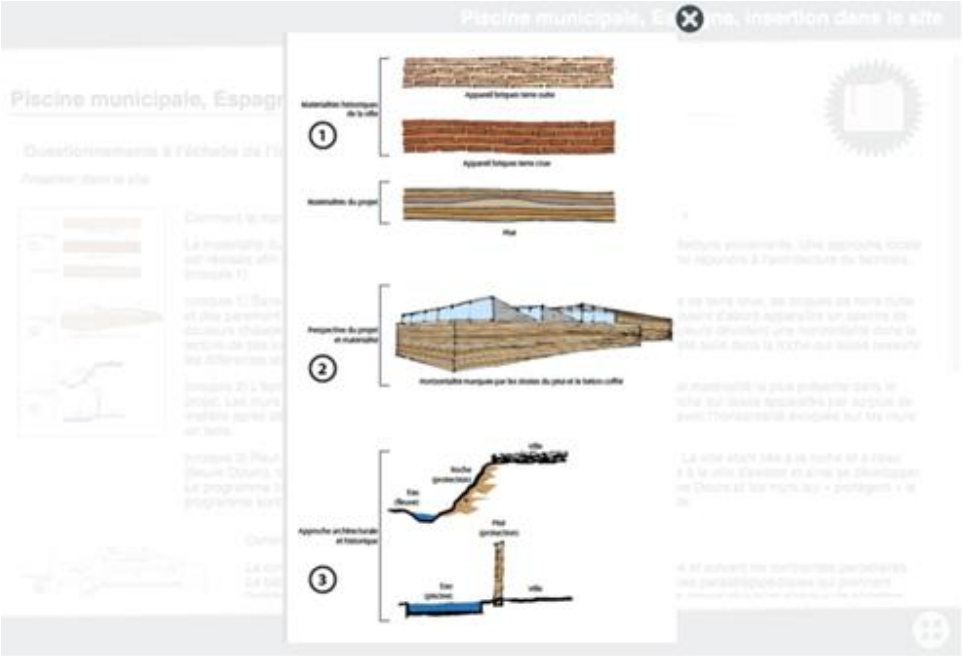

Figure 4. Materials Re-drawing example

In the broader context of architectural education, redrawing becomes a gateway to architectural culture. It enables students to delve into visual codes, graphic languages, and conventions inherent to expressing materiality in architecture. This approach goes beyond the mere imparting of knowledge about materials, integrating them into how architects conceptualize and communicate their ideas. The redrawing process encourages creative exploration. Students are prompted to interpret, experiment with materiality, and articulate their understanding through visual choices. The goal is to stimulate not only appropriation but a form of innovation or originality in the realm of geobiosourced material thinking.

GEOBIOSOURCED MATERIALS AS A DRIVER OF ARCHITECTURAL REFLECTION

This educational program focuses on the use of geobiosourced materials as a catalyst to develop a profound understanding of current architectural challenges.[9] By examining resource availability, environmental impact, and the need for sustainable building design, this program explores in-depth how geobiosourced materials can guide and transform contemporary architectural thinking.[10]

Situational Intelligence

The exploration of geobiosourced materials at various scales, from the territory to the wall, has provided students with a rich contextual understanding.[11] This holistic approach has integrated territorial, urban, and architectural constraints and potentialities into the analysis of material choices (genius loci). Situational intelligence, in the realm of geobiosourced materials, becomes a necessary skill for designing environmentally respectful international buildings scale.[12] Master's level students have acquired the ability to analyze the impact of geobiosourced materials across various dimensions, including technical, ecological, and aesthetic criteria. This multicriteria analysis skill is essential for informed decision-making in the field of sustainable construction. The introduction of multicriteria analysis methods aligns with operations research tradition, with pioneers such as Thomas L. Saaty and Bernard Roy. These methods provide structured frameworks for multicriteria decision-making, addressing complex and uncertain issues.[13]

Techno-Cultural Dimension

The competence to integrate techno-cultural aspects extends beyond aesthetics; it also involves a deep understanding of the technical implications of culturally anchored choices.[14] For instance, the use of local materials can impact the sustainability, resilience, and performance of buildings. Students learn to evaluate these technical aspects based on cultural practices, contributing to the design of sustainable buildings adapted to their environment. This integrative approach transcends disciplinary boundaries, considering cultural and technical aspects simultaneously in design choices. Integrative thinking allows anticipating complex interrelations between material choices, construction techniques, and cultural contexts inherent in architectural design.[15] By incorporating elements of constructive culture, this education empowers future professionals to think critically about the impact of their choices.

PEDAGOGICAL PARADIGM SHIFT

By revisiting conventional teaching methods, this approach aims to transform how knowledge is transmitted,[16] emphasizing interaction, co-construction of knowledge, and preparing students to face the complex challenges of contemporary architectural practice.

Current Inquiries

Taking a multiscalar approach, this program raises students' awareness of contemporary issues related to resource availability, environmental impact, and sustainability.[17] It provides them with an expanded perspective, prompting consideration of the scope of their decisions on territory, city, building, and materials themselves. Adopting a multiscalar approach creates synergy with the importance of learning to question in a context where not all answers are pre-established. This learning goes beyond providing ready-made solutions; it aims to foster curiosity and critical thinking in students facing contemporary challenges. By learning to question, students are encouraged to explore the motivations and consequences of their choices, evaluate possible alternatives, and anticipate long-term repercussions. This extends beyond acquiring fixed knowledge; it is a dynamic process where each answer generates new questions and encourages continuous exploration. Awareness of contemporary issues is conveyed through recognizing interconnections across scales. Understanding how material choices affect not only individual buildings but also the city, territory, and ultimately the global environment leads students to question the real scope of their decisions. Learning to question is also preparation for uncertainty. In a constantly evolving world where new challenges emerge, the ability to ask the right questions becomes an essential skill.[18] Students are thus equipped to address complex and dynamic problems, developing agile and adaptive thinking.

Knowledge Co-construction

Rather than following a traditional model where the teacher unilaterally prepares course content, teaching relies on the co-construction of knowledge.[19] Students are actively involved in the process, participating in defining topics, researching relevant information, and structuring content. Class dynamics become collaborative, where students play an active role in curriculum design. This fosters a dynamic and interactive learning environment where ideas are shared, debated, and enriched by the diversity of perspectives within the group.[20] This model empowers students for their own learning. They are no longer mere recipients of knowledge but become active participants in the educational process. This responsibility aims to enhance their motivation and develop self-learning skills. Knowledge co-construction allows greater adaptability to the specific needs of each student cohort. Topics can be adjusted based on emerging interests, questions raised by students, and developments in the field of architecture, promoting education more aligned with contemporary realities. Students are not just

passive recipients of information; they actively participate in the dissemination of mobilized knowledge. This aims to strengthen their practical understanding and ability to apply learned concepts.

CONCLUSION

This educational program seeks to project itself as a vector of profound transformation, both in substance (geobiosourced materials) and in form (pedagogical approach). The transition from theory to practice, facilitated by the design aid tool MateriauScope, offers students an immersive and interactive experience, thus fostering an understanding of the concrete implications of their choices. Multicriteria analysis and a multiscale approach promote the emergence of systemic thinking, integrating various dimensions into architectural decision-making. By promoting a more questioning and participative approach, this education aligns with a major evolution in pedagogical practices. It redefines the teacher's role as a knowledge facilitator and encourages the acquisition of critical thinking and collective intelligence. Thus, this pedagogical approach to geobiosourced materials, combining scientific rigor and creativity, aims to contribute to shaping a new generation of architects aware of contemporary issues, capable of innovating and rethinking established paradigms. It aspires to participate in an educational approach adapted to the evolving inquiries in the field of architecture.

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ROG / RESTORATIVE OPEN AIR GYM ALTERNATIVE ARCHITECTURAL PEDAGOGIES TOWARDS RESTORATIVE JUSTICE

Author:
PAOLO CASCONE, MADDALENA LADDAGA

Affiliation:
UNIVERSITY OF WESTMINSTER, ARCHITECTURE AND CITIES, UK
POLITECNICO DI MILANO, DASTU, DEPARTMENT OF ARCHITECTURE AND URBAN STUDIES, ITALY

INTRODUCTION

The project was developed in continuity with our research and teaching activities on innovative pedagogical methodologies in the field of collaborative design and community-oriented architectures. Such academic and unacademic experiences, developed between Europe and Africa, have persuaded us that new forms of "radical pedagogy" are needed to train our students to respond to the climatic challenges and the social conflicts that are affecting our society. This approach has driven us to redefine our teaching agenda and to propose alternative ways to exchange knowledge. The aim is to involve students with real-life projects and to question the social role of architects, not just as designers but also as social drivers and environmental activists.

This cultural shift is based on surpassing the traditional notion of design studios and transforming our classrooms into open-air informal laboratories in order to facilitate the creation of a common ground between students of different backgrounds and their capability to deal with disadvantaged communities. Such pedagogical methodology is conceived to improve individual skills through a collective design to accelerate knowledge exchanges and experiment with new tools. At the same time, beyond any humanitarian rhetoric, we have strategically started to connect our courses and master classes to new types of disadvantaged "clients" to train our students towards a critical understanding of social design.

With this premise, the ROG project was realized as a collaboration between the community of the Bollate prison in Milan and the Advanced School of Architecture students during our Masterclass at the Politecnico di Milano.

Beyond any humanitarian rhetoric, the process proposes a paradigmatic response to the critical conditions of Italian prisons. Therefore, the approach aimed at shaping an alternative pedagogical agenda addressing the question of restorative justice and the potential role of architects bridging social design strategies with ecological construction and digital manufacturing techniques. Such agenda aims to empower the prison community to improve their spaces and access professional training, which should facilitate their employability outside the prison. Therefore, with a very multicultural group made up of detainees of the Bollate's women's prison and postgraduate students of the ASA, a series of collaborative sessions was developed in order to map the needs of the prison community and co-design a scale 1 to 1 architectural prototype according to the available spaces to improve their wellbeing. These

initial sessions shaped the brief of the scale 1 to 1 prototype as an open-air gym for the detainees' courtyard.
The whole project was validated by the prison community and presented to the former Italian Ministry of Justice, Dr. Cartabia, with the aim of discussing further developments of such a collaborative approach and eventually adapting this to other Italian prisons.

LIFE IN PRISON AND RESTORATIVE JUSTICE

To address such controversial issue of prisons we have started to analyze the situation in Europe: the official density rate in European prisons is 107.4%, as in the last report by the Council of Europe's SPACE I, that present regularly data on the populations of penal institutions within all the Member States of the Council of Europe. Considering that countries have different counting rules to estimate available places, the report states: "The prison density is a measure of how crowded a prison system is. It is expressed as the number of inmates per 100 available places in penal institutions. If the prison density is greater than 100, that means there are more prisoners than available places, indicating overcrowding." [1]
In Italy in 2020, in the first days of lockdown restriction due to pandemic COVID19, there was a "wave" of protests in many prisons across the country. "The riots began on Sunday over rule changes that including the suspension of family visits in jail".[2] As reported by many news at that period, the protest started from the beginning of restriction for the cancelled meetings with the families of all the detained in Italy. Moreover, during the restriction, six deaths amid protests were reported across the country. The situation was complex, and the covid restriction further stressed the prisoners and the staff.
It is also true that before COVID19, there was an overcrowding situation in many Italian prisons. The prison occupancy rate is the number of prisoners with the official capacity of jails multiplied by 100. Overcrowding occurs when the occupancy exceeds 100. In 2021, the overcrowding rate observed in Italy was 108.[3] After the pandemic, prison overcrowding is still a problem in Italy.
The report on prison Italy overcrowding by the national guarantor for the right of persons detained or deprived of personal liberty argues: "The detained population is 60.382 prisoners with an operational capacity of Italian prisons is 47.300 inmates, and the overcrowding indicator is 127,48%. on January 2024."[4]
Nevertheless, it should be considered not just counting places and spaces with the population in prison, but also the quality of space and how the quality of prison space could help the inmate to restore.
The critical aspect is the inmate's mental health and the possible activities to help himself and his mental health. The Antigone association reported that in Italy in 2023, "every five days there was a prisoner suicide",[5] the association also investigates annually the quality of the space of singular cells and common space inside the Italian prisons. It is also true that the prison building stock in Italy is still inappropriate for both quality and quantity, as well as the public budget to renovate it.
For the abovementioned reasons, it is essential to bridge the architectural design pedagogy with the prison architecture heritage and address the question of renovating the quality of the built system with a new methodological approach in the restorative justice process.
Restorative justice is an extensive topic, and its meaning is declined in a variety of ways and theories, bringing together restorative values. Addressing the meaning of restorative values that include respect, care, self-determination, participation, interconnectedness, trust and transformation.[6] As reported in the literature, the meaning of restorative justice could be represented by a series of restorative practices, which have also contributed to reduced recidivism.[7]
Many activities are engaged in Italian prisons to achieve this concept of restorative justice and there are many programmes and activities from education to job skills development, art activities, job placements

, etc. that focus on restorative justice practices in prisons.
most popular is the introduction of art performance through theatre. This is well described in the beautiful movie *Cesare deve morire / Caesar Must Die*[8] by the Taviani brothers. The movie shows the work in progress of theatre activities performed by Rebibbia detainees and directed by Fabio Cavalli for the show Giulio Cesare by Willaim Shakespeare.
Furthermore, architecture or design schools conduct many activities worldwide in prison.

BEST PRACTICES

The 25-year Design Against Crime Research Centre, founded in London in 1999 at the University of the Arts London in Central Saint Martins, is one of the most interesting case of design educational programme to co-create crime prevention strategies and crime diversion projects. The approach includes a co-creation process and adopts a "user, misures and abuser driven innovation approach" to define a socially responsive design methodology working on three main topics: crime and justice, public social innovation and public space with diverse practice-led research projects. Many programs and projects have been realized in fashion design, object design, furniture design and public space renovation. *Cell furniture* is a project that collaborates with prison staff, prisoners and designers to innovate current cell furniture designs. Other realized design outputs are bikes, bags, open-air benches, furniture, etc. As explained by Gamman and Thorpe: "Our process is one where human-centred and participatory design approaches are adapted, depending on the project, to help the team understand and evidence lived experience and behaviour in the context of crime problems. So we engage with a broad range of multidisciplinary knowledge, as well as interdisciplinary creative techniques, and service and product design approaches and toolkits, to iteratively generate design responses."[9]

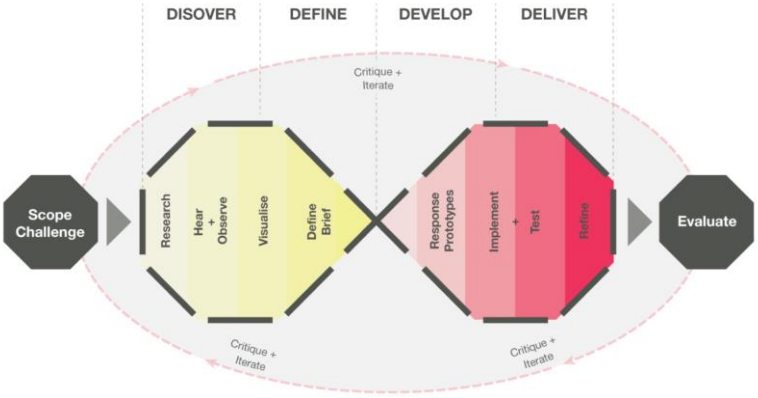

Figure 1. Design Against Crime Research Lab methodology. Credit: DACRL

Moving to the Italian case studies: In 2014 and 2015, 27 students from the school of Architecture and design of Politecnico di Torino realized a project *Spaziviolenti* of self-construction and design in the "Lorusso e Cutugno" Prison in Turin. The outcomes were the open-air space for family meetings and renovating a space with wood furniture and a stage inside the prison. In the self construction, the students and the prison staff were involved. After this, the Altieri association was founded with new collaboration and projects in other prisons.[10]
Prof. Marella Santangelo, for several years, investigated with the students of the Final Synthesis Laboratory in Architecture of the University of Naples "Federico II" in the prison space of Secondigliano in Naples. Furthermore, in her book, she argues the workshop experience as a codesign method between students and detainees for a project in the Poggioreale prisons in Naples.[11] During the Venice Biennale of Architecture 2016, a series of workshops with students and prisoners were made in

Naples, Padova and Treviso; in Padova prison was designed a workspace inside the prison, coordinated by Prof. Santangelo.
In the last years, Politecnico di Milano, with ACTS, A Chance through Sport, a project in Bollate prison of codesing and self-construction to investigate the detention spaces through sports activities and implement the space for sport inside the prison.

SOCIAL DESIGN METHODOLOGY

The Bollate prison is developing many programmes to improve the prisoner's skills and to work in the direction of helping with job development during and after the detention period.
Therefore, based on the existing relationship between Bollate prison and Politecnico di Milano, the location of the design project of the master class was based in the open-air space inside the department of women, and the project aims to improve collective spaces.
The masterclass is 10 days of intensive work with a group of 20 postgraduate students of ASA Advanced School of Architecture, director Pierre-Alainn Coset, who invited us to lead two opening year master classes for two consecutive years.
The methodology was based on three steps to gradually connect the world of the prison with our architectural students through a sequence of sessions: mapping and codesigning, prototyping and testing and self-building on a scale of 1 to 1 the project inside the prison.

Mapping and codesigning

The first session started a collaborative process based on listening activities, beginning with a visit to Bollate prison to meet the women inmates and the prison staff involved in the project. The conversation between the 20 international postgraduate students of Politecnico di Milano and a multicultural group of friendly prisoners was reached and interesting. The team's first actions in the process were hearing, observing, and mapping. The map of needs helps the process as a track, opening a dialogue between the school (students, tutors) and the prison community (prison staff, inmates).
The first meeting was essential to learning from the detainees about their everyday lives as well as to analysing the physical and spatial constraints of the prison with the aim of proposing new programmatic activities to improve their physical and mental well-being.
At the same time, this participatory approach was strategically developed to overcome the mutual scepticism among the participants involved. The exchanges during the meeting in prison have generated the brief of the masterclass and highlighted the need for a relational and performative space to be used during free time in the open-air courtyards.
With this premise, we have negotiated with the Director of the prison a set of rules and constraints according to its security regulations to inform the dimensions of the structure and its construction logic in relation to the existing concrete building.
Such constraints were transformed into creative drivers for the co-design process, where our students were asked to translate the need of an open air gym to a construction kit for a flexible and modular light structure.
Therefore, the design methodology was based on the idea of an open system, a fast deployment device that provides ergonomic variations according to the different users' exercise needs and climatic conditions.
The methodology was based on the idea of sharing the construction kit with the group of detainees to allow them to become autonomous in making similar infrastructures also for the other courtyards of the prison.

Figure 2. Bollate prison inmates, students and staff meeting .Credit picture: Yi Xing Sean Chow

Prototyping and testing

The project was also an opportunity to develop a prototype in the field of eco-digital construction while reflecting on the relationship between advanced design and natural materials. This with the aim of developing a system that could improve the environmental conditions of prisons. In contrast with the typically brutalist concrete structures for such buildings, with our materiality strategy based on the use of local timber, we wanted to promote the right of beauty and warmness for our community.

At the same time, we have asked our students to strategically develop a range of prototypical variations of the initial module to generate a catalogue of possible solutions that can be assembled and adapted to the external courtyards and generate different spatial configurations.

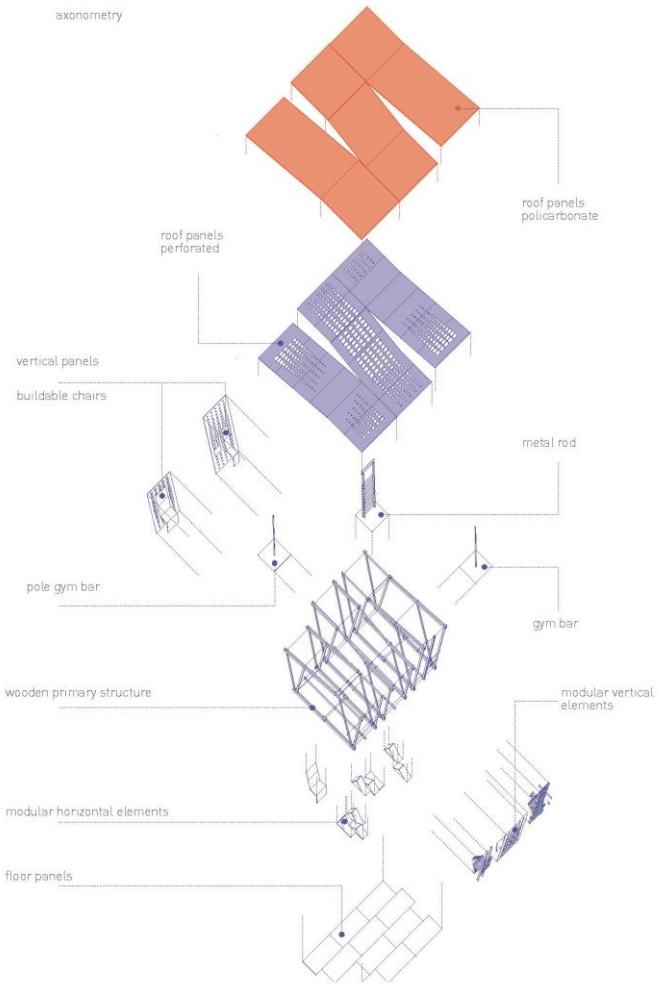

Figure 3. ROG project, axonometric view.

With this premise, we have split the team into two teams in order to develop a series of both physical and digital prototypes to test the structural and environmental performances. The physical models were developed initially at scale 1 to 10 to test the construction logic as well as the joinery, while the digital models made with rhino grasshopper were functional to test the overshadowing and the ventilation performance. All the design process was informed by an environmental analysis, especially according to the sun and wind dynamics to protect users from solar radiation in summer and from rain in winter.
The panelling perforations were based on the idea of improving ventilation during the summertime according to the solar radiation and wind analysis. At the same time, we have also taken advantage of the environmental simulation to optimize the position of photovoltaic panels to produce renewable energy. This prototyping and testing work was condensed into one concept design that has been shared and validated with the different representatives of the prison community.

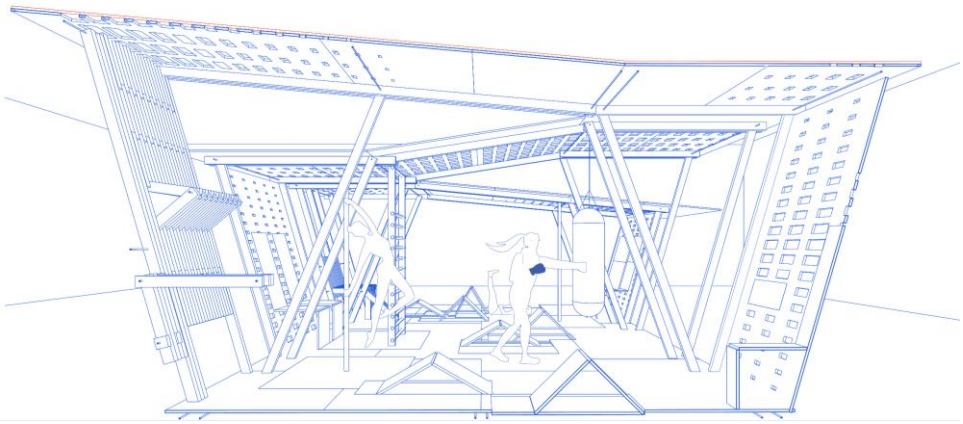

Figure 4. ROG project, prospective section

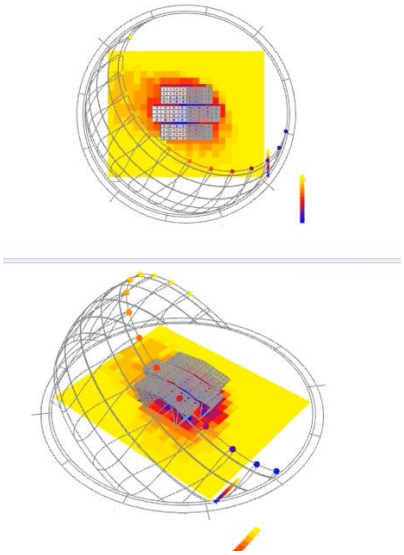

Figure 5. ROG project, sun path analysis

Ecologic self-construction

With this premise we have structured the digital fabrication and self-construction session in two phases. In the first one, we developed, in collaboration with the LABORA lab and SAPER lab of the Politecnico, the components of the final version of the scale 1 to 1 prototype. The prototype was realized lightweight and built in the university courtyards to simulate the step-by-step construction logic.

The primary structure is made with timber carpentry and has a wooden roof, following a parametric logic to define its spatial qualities. The secondary structure is made of wooden panels with mobile devices (such as seats and benches) for physical activities. The construction kit was designed to be built by a maximum of 3 persons with simple tools available in the prison, respecting the safety protocols. Since users could customize the device during exercises and activities to meet the different ergonomic requirements of a gym session the construction strategy follows an incremental logic. The project was designed for single users, in pairs, or for a gym class as required by the inmates, but the modules could be easily transported and disassembled according to specific needs.

The timber was provided by local suppliers and treated for outdoor performances. The frames of the light structure and the panels were digitally manufactured to simulate a sort of scalability logic thanks to the combination of manual and digital manufacturing techniques. The detainees were systematically

involved in the process, and at the end of this phase, we invited them to the Politecnico to share the construction kit of the scale 1 to 1 prototype. The meeting was organized inside the prototype to allow students and detainees to discuss the characteristics of the structure and how to build this with them in the prison.

The last step was a little bit more complicated as, for bureaucratic reasons, we had to wait some months to get the permissions also to allow the detainees to work on the construction, and this is probably the most controversial aspect we learned from our experience. It was very hard to keep both students and the people from the prison motivated during such a long break while the structure was dismantled in the courtyard. Once we had obtained all the permissions, we organized a sort of training session of four intensive and very hot days to self-build three modules with the purpose of allowing the detainees to take ownership of the structure and continue the work in a more autonomous way.

Figure 6. Self-Construction process

Figure 7. ROG. Credit picture: Yi Xing Sean Chow

CONCLUSION

The experiment was really challenging for all the people involved, from both the university and the prison sides. As a matter of fact, the whole process was quite successful in terms of the engagement of the people involved; according to feedback received from the team of students and detainees , this was a transformative experience that changed their way of thinking about the role of architecture. The students and the detainees were also able to present together their work to the (former) Ministry of Justice Dr. Cantabria, which highly appreciated the initiative as a potential pilot project that could be replicated in other Italian prisons. Unfortunately, after a few months, a new minister and also a new director of the Bollate prison were nominee, and we couldn't follow up such interesting perspective as the actual political coalition at government now in Italy has cut the resources.

At the same time, academically speaking, there is still a lot to do to transform such learning experience into a more systematic pedagogical programme. This would need more time to train both students and

detainees and facilitate the solution of bureaucratic issues connected to the constraints of a prison. If the detainee's and students' engagement was very high, the lack of flexibility and the scepticism of both institutions was sometimes critical, especially because it was a very new format also for them. In order to improve such pedagogical activity, a cultural and political shift is needed to transform the format of the masterclass into a longer teaching module more connected with NGOs and also industrial partners. This will give students an even more interesting experience in terms of employability considering such social design agenda as a new professional opportunity. Since there is a growing need for trained workers in the building construction sector in Europe this kind of training activity in connection with schools of architecture could generate some very interesting employability opportunities also for detainees. In addition to this, if we consider also the tremendous impact on the prison buildings that could be regenerated with such activities, this approach could contribute to a radical change in our society. For these reasons, despite many difficulties, we consider the ROG project a very meaningful paradigm to be evolved and applied to other similar contexts in the nearly future.

ACKNOLOWGMENT

The team would like to thanks the Dean of the AUIC School of Politecnico di Milano Prof. Ilaria Valente; the director of ASA Advanced School of Archietcure Prof. Pierre-Alain Croset , the Bollate's prison detainees and guards and the students involved in the project: Mackenzie Bailey, Dipon Bose, Yi Xing Chow, Martina Curia, Valentina de Bartolo, Christian Renan Endara Vargas, Tabea Rebecca Fahr, Vanessa Fung Hing Wai, Eduardo Gamez Ruiz, Federico Gangi, Fulya Basak Genc, Alberto Gualdi, Li Mengyuan, Krzysztof Grzegorz Lichocik, Katarina Misovic, Toma Murtic, Juliette Marie Caroline Sainlez, Maria Luz Saldutti, Mira Spasova, Aristoula Stergiou.

Figure 8. ROG. Credit picture: Yi Xing Sean Chow

Figure 9. ROG. Credit picture: Yi Xing Sean Chow

Figure 10. ROG. Credit picture: Yi Xing Sean Chow

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AMPS PROCEEDINGS SERIES 36

Front cover image: Andrea Castelli

Glasgow School of Art, Louisiana State University, Wenzhou-Kean University.
15-17 November, 2023