Teaching-Learning-Research

Design and Environments

AMPS Proceedings Series

AMPS PROCEEDINGS SERIES 22.2

Manchester School of Architecture; AMPS Manchester: 02-04 December, 2020

Teaching-Learning-Research: Design and Environments



EDITORS: Laura Sanderson & Sally Stone

EXECUTIVE EDITOR: Eric An

COPYEDITOR: Amany Marey

© AMPS

AMPS PROCEEDINGS SERIES 22.2. ISSN 2398-9467

INTRODUCTION

Teaching-Learning-Research: Design and Environments

This is Manchester: We do things differently here

Manchester, once the 'Industrial Capital' of the world, has long been a test bed for architectural and urban experimentation. From the early settlements that challenged the resilience of the Romans, and then the Vikings, through the massive boom of the industrial period, when such was the frenzy in the city that it earned the sobriquet Cottonopolis, beyond the economic melancholia of the late 20th century, to the unbridled optimism of the 21st. As a progressive city, Manchester has continually reinvented itself. The present reincarnation was led through cultural regeneration facilitated by the adaptive reuse of those great redundant industrial structures, it is a city that encourages smart technologies and embraces a community of 24 Hour Party People.

Where better then to hold a conference that explores progressive architectural pedagogy – especially a virtual one!

The architectural, landscape, and design studio is a laboratory for experimentation where students are encouraged and expected to question and disrupt the status quo, to explore possible different futures, and to propose radical solutions to unsolvable problems. The need to fuel this move away from more traditional tabular rasa education is the responsibility of academics, and this conference was a wonderful vehicle to explore, expound, discuss, and debate the future of architectural education.

During the pandemic we have had to learn to do things differently, not to be down heartened by the difficulty of interacting solely through the computer, but to embrace the nearness that digital communication provides. We have adapted methods of teaching and learning to accommodate this extraordinary situation, we have creatively responded to the pandemic and developed strategies that encourage endeavour, promote wellbeing, and support scholarship. Extraordinary strategies are needed for an extraordinary situation.

It was a great pleasure to be able to host the AMPS Teaching – Learning – Research: Design and Environments conference at the Manchester School of Architecture. It was lovely to welcome so many virtual guests to the city. The great success of the online event was the demonstrated by the enthusiasm with which speakers engaged with the conference, the quality of the post-session debate combined with the international dialogue and collaboration, (especially in this time of uncertainty) created by such global citizens. It is an honour to introduce the conference proceedings, presented here as collection of well argued, forward thinking, deliberately controversial, and valuable papers.

TABLE OF CONTENTS

 Chapter 1

 EXPLORING UNDERGRADUATE ARCHITECTURAL STUDENTS' PERCEPTIONS TOWARDS
 1

 EVIDENCE-BASED DESIGN

 Fan Zhang, Rongrong Yu, Zhonghua Gou

Chapter 2

MIXED-USE URBAN PROJECT IN DESIGN STUDIOS. A RESEARCH BY DESIGN 13 PEDAGOGICAL EXPERIENCE AT THE BARCELONA SCHOOL OF ARCHITECTURE Carles Crosas, Eulalia Gomez-Escoda

Chapter 3

RESEARCH INFORMED HEALTHCARE FACILITIES DESIGN: INTEGRATION OF 24 DISSERTATION RESEARCH WITH SENIOR GRADUATION PROJECT DESIGN Ahmed Sherif, Engy Taher, Lorna El Moghazi, Yasmina El Gezeiry

Chapter 4

ENGAGED PHOTOGRAPHY AS URBAN COMMUNICATION PLATFORM IN SUSTAINABLE 40 DEVELOPMENT CONTEXT Jitka Cirklová

49

Chapter 5

TYPES OF PEER ASSESSMENTS IN GROUP PROJECTS	
Michele Florencia Victoria	

Chapter 6

BEYOND THE FRAME: COLLABORATING ON AN UNDERGRADUATE RESEARCH 59 EXPERIENCE Lindsay Mamchur, Susan Close

Chapter 7

ARCHITECTURE DESIGN STUDIO AS RESEARCH INCUBATOR: THRESHOLDS, EDGES, 69 BOUNDARIES Ross T Smith, Cecilia De Marinis

Chapter 8

THE THIRD TEACHER: THE INVOLVEMENT OF CHILDREN IN THE DESIGN PROCESS AND 78 ASSESSING THEIR DEVELOPMENT Eda Can, Göksenin İnalhan

Chapter 9

PERCEPTUAL QUALITIES OF CONCRETE: A CHANGING PARADIGM? 87 Tara Harb, Tatjana Leblanc 87

Chapter 10

TEACHING ONLINE: THE PARADIGM OF HIGHER EDUCATION IN DESIGN IN TIMES OF 103 PANDEMIC André Casteião, Susana Barreto

Chapter 11 WERNER SELIGMANN AND THE SYRACUSE SCHOOL OF ARCHITECTURE (1976-1990). A PEDAGOGICAL LEGACY Caterina Frisone, Mark Shapiro	113
Chapter 12 FROM FLATS TO POLICIES: BREAKING THE BOUNDARIES BETWEEN DISCIPLINES - A JOINT 'STUDIO' FOR ARCHITECTURE AND PLANNING STUDENTS Manuela Madeddu, Johanna Muszbek	122
Chapter 13 ROLE OF THE MODEL: NOUN AND VERB Col Fay, Stella Lange	135
Chapter 14 VERTICAL SCHOOLS AND MEDIATED SPACES; THE NECESSITY OF INTERACTION WITH NATURAL ENVIRONMENT Elia Ebrahimi Salari, Rosangela Tenorio, Nigel Westbrook	145
Chapter 15 DESIGN AS A META-MODE OF INQUIRY FOR ADVANCING SOCIAL INNOVATION: PROBLEM-BASED LEARNING IN SERVICE DESIGN PEDAGOGY Fanke Peng	157
Chapter 16 THE ANSWERS TO THE QUESTIONS OF TODAY LIE WITHIN LANDSCAPE ARCHITECTURE Mojtaba Hassanzadeh	167
Chapter 17 ARCHITECTURAL FOREST OR APPLYING RHIZOME-LEARNING TO TEACHING ARCHITECTURE Isabel Barbas	177
Chapter 18 VIRTUAL MATERIALITY: DESIGN PEDAGOGY IN THE AGE OF COVID-19 Galit Shvo, Jonathan Ventura	186
Chapter 19 DIGITAL TOPOGRAPHIES: REMOTE-ONLINE SPOT ELEVATION SURVEYING AS A LEARNING METHOD Vincent Javet	196
Chapter 20 EMBEDDING STUDIO CULTURES DIGITALLY: AN INVESTIGATION ON STUDIO CULTURES IN PHYSICAL AND DIGITAL LEARNING ENVIRONMENTS Stella Pangilinan, Javier Ánton Sancho, Álvaro Velasco Perez	204

Chapter 21 FOUNDED ARCHITECTURE; REFLECTIONS ON HOW INTENSIVE ONLINE WORKSHOPS COULD SHAPE A NEW PEDAGOGICAL CULTURE IN ARCHITECTURE AND URBAN ANALYSIS AND DESIGN. Arian Heidari Afshari, Angel Cordero Ampuero	214
Chapter 22 SITE COMPLEXITIES AND LEARNING OUTCOMES Anne Margrethe Wagner, Bettina Lamm	221
Chapter 23 MUINÍN CATALYST - TOWARDS A PLACE-BASED STEAM, DESIGN-THINKING CURRICULUM FOR TRANSITION YEAR Anita McKeown, Rebecca White	231
Chapter 24 STUDIO IN ISOLATION: ARCHITECTURAL EDUCATION IN THE VIRTUAL CONTEXT Vincent Hui, Tatiana Estrina, Alvin Huang	238
Chapter 25 MODELING COMPETENCE: PRACTICE-BASED RESEARCH BETWEEN DESIGN, ARCHITECTURE, SCIENCE HISTORY AND BIOLOGY DIDACTICS Joosten Mueller	245
Chapter 26 FROM THE ACADEMY TO THE PRACTICE. TWO STEPS BACKWARD, ONE STEP FORWARD – TOWARDS A PERIPATETIC HYPOTHESIS João Soares	256
Chapter 27 RE-INVENTING A HYBRID PROFESSION Helen O'Connor, Kirsty Macari, Rebecca Foy	263
Chapter 28 DESIGN THINKING DIAGRAM: A TOOL FOR DECISION-MAKING Graham Livesey, Enrica Dall'ara, Fabian Neuhaus, Sandra Abegglen, Mary-Ellen Tyler	271
Chapter 29 STUDENT AS SITE: EMBODIED LANDSCAPE RESEARCH Emily Wettstein	282
Chapter 30 FROM DESIGN STUDIO TO RESEARCH LABORATORY: AN INTERIOR DESIGN CONTRIBUTION TO URBAN REGENERATION STUDIES Sadiyah Geyer, Andrew Gill	290
Chapter 31 MERGING TEACHING & RESEARCH IN FOUNDATION COURSES FOR A NEW INTERDISCIPLINARY DESIGN EDUCATION PROGRAM Mirko Daneluzzo, Carlos Montana-Hoyos	301

Chapter 32	
THE AGENDA OF ARCHITECTURAL THEORY AS A DATA SET	310
Melis Baloğlu, Yüksel Demir	
Chapter 33	
LIVING WHERE THE IMMATERIAL MATTERS_ TOWARDS THE COMMONS	319
Maria Hadjisoteriou, Yiorgos Hadjichristou	
Chapter 34	
ANTI-AMNESIA AS A LEVER FOR ACTIVE PEDAGOGY: ARTICULATING DESIGN AND	330
MEDIA TOWARDS CRAFT AND INDUSTRIAL HERITAGE PRESERVATION IN PORTUGAL	

Jorge Brandão Pereira, Heitor Alvelos, Abhishek Chatterjee

EXPLORING UNDERGRADUATE ARCHITECTURAL STUDENTS' PERCEPTIONS TOWARDS EVIDENCE-BASED DESIGN

Author: FAN ZHANG¹, RONGRONG YU¹, ZHONGHUA GOU²

Institution:

¹ GRIFFITH UNIVERSITY, AUSTRALIA; ² WUHAN UNIVERSITY, CHINA

INTRODUCTION

The change of social and architectural values in recent decades call for more scientific rigor in architectural designs. In the architectural context, *evidence-based design (EBD)* refers to the judicious use of the best available evidence from research and practice to make informed design decisions. EBD has rarely been incorporated into undergraduate architectural education as a systematic design methodology.

The current project has engaged undergraduate architectural design students with fact-based predictive design thinking and equipped them with essential knowledge and skillsets to carry out EBD. The project employed pre- and post-surveys to examine students' perceptions and experiences about design values, design methods and EBD before and after the introduction of EBD. Results showed that students' design methods shifted from intuition- and practice-based methodologies towards fact- and research-based ones. Compared with the pre-survey, students displayed a stronger intention to develop and implement clear design values in future projects and appreciated the learning of factual knowledge and incorporation of building occupants' needs and preferences in their design processes.

EVIDENCE-BASED DESIGN

The term *evidence-based design (EBD)* is inherited from *evidence-based medicine (EBM)*. EBM was first developed in the United Kingdom in 1972 and advocated the treatment of individual patients according to the best available clinical evidence ¹. The concept of EBD has expanded to numerous disciplines including architecture. EBD, in the architectural context, is defined as "a process for the conscientious, explicit and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project" ². EBD is most welcomed and well received in the health sector ³, while gradually evolving in other building types. The very essence of EBD is to ground architectural solutions in quality research to achieve optimum design outcomes.

Design values

Design values refer to the attitudes, beliefs, orientations, and ideologies of designers ⁴. One of the earliest architectural design values claims that architecture must "be built with due reference to durability, convenience, and beauty" ⁵. However, due to the lack of a "factual" or empirical basis for design decision-making, architects are more dependent on individual values and value sets in their design processes ⁶.

Architectural values in the 20th century were largely dominated by *Modernist Architecture*, a style that emerged in the context of postwar reconstruction and that era's craving for efficiency and mass production. Features of *Modernist Architecture* comprise the notion of "form follows function" (functionalism), the rejection of ornaments, generous use of glass and open, and flowing floor plans. In the present, architectural design methodologies and education are deeply affected by *Modernist Architecture* and the International Movement ⁷. One of the most important legacies of the Modernist era is the lack of consideration towards human needs and environmental impact. Following the human rights movement in the 1960s, there was a growing tendency to reject the ideology that saw buildings as pure sculptures without considering their social functions ⁸. During the 1970s, the oil crisis resulted in unprecedented energy concerns which prompted architects to include environmental topics and methods in architectural design processes. Entering the 21st century, social values, including architectural values, are shifting towards more human-centered and environment-conscious ideologies ⁹. Consequently, the theories of the 1950s and 1960s have been outdated.

Traditional vs. Evidence-based design methodologies

Design methodology, in the architectural context, can been defined as a set of strategies to collect, analyze, and synthesize relevant information to inform appropriate architectural solutions ¹⁰. Exploration of architectural design processes started as early as the time of Vitruvius more than two thousand years ago. The Roman architect Vitruvius stated that "architectural designing is the process of selecting parts to achieve a whole" ¹¹. Contemporary architects hold diverse opinions about architectural design methodologies and design processes. Many architects, perhaps the majority of them, see architecture as a "geometric abstract art", and architectural design as an intuitive and indescribable process" ¹². Some view design as "a process of making" ¹³; others think of it as "trial-and-error process" ¹⁴. Still others believe that design is a process of "learning by doing" ¹⁵ in which problems and solutions appear together.

One of the most important contributions in the research of design methodology is John Christopher Jones' book *Design Methods* ¹⁶. In this book, Jones critically reviews traditional design methods, such as "design-by-drawing", pointing out that they can no longer satisfy the complex design requirements needed today. Jones sees design methods as a way to reconcile conflicts between art (an intuitive process known as a "black box") and science (a rational process known as a "glass box") ¹⁷. He proposes new design methods and procedures, such as logical procedures, data gathering procedures, brainstorming procedures, and evaluative procedures, integrating both creative and rational skills. EBD is one such design methodology that brings the creative, intuitive, and logical rational process together and is advocated by many scholars ¹⁸.

Shortcomings in architectural education

Nowadays, architectural design values have changed. Research in recent decades demonstrates that the costs of labor/personnel in any enterprise are orders of magnitude higher than building services and operation costs ¹⁹. Therefore, socially, it is expected that architectural design should positively promote building occupants' health, comfort, productivity, and well-being. Environmentally,

increasingly severe global warming is forcing architects to reduce the carbon footprints of their designed buildings.

Obviously, the new design values call for a change in architectural education. However, our architectural education has not responded well to this demand. Tzonis ²⁰ argues that the poor quality of architectural education should be in part charged with causing irreversible damage to the environment, ecology, culture, and economy. He believes that one reason for this huge gap between an outdated institutional education and the "dynamic real world" is the inability of architectural schools to fit exploding new architectural knowledge into the current curriculum, since teaching the existing knowledge is already difficult enough. This is why architectural schools choose to teach classical and core knowledge only and leave the new knowledge to be learnt by graduates themselves when they enter the job market ²¹.

Tzonis is not the only one to criticize architectural education. In fact, many academics and scholars have criticized the traditional design studio teaching method, mainly for its lack of consideration for building users and the lack of design methodology ²².

In his book, Salama ²³ argues that most architectural educators deem students' drawing skills to be the key capability determining their academic performance, implying that the majority of architectural educators care about things that are crucial to their fellow architects only, rather than to their clients and building users ²⁴. Salama also claims that current studio teaching focuses more on the final design outcome rather than teaching students how to identify design problems and adopt appropriate design methodologies to solve these problems ²⁵.

The lack of design methodology in studio teaching is echoed by many educators. Abdelhamid sharply criticized the lack of a "clear methodology or scientific step-by-step process that should lead the student to a design" in most architectural design studios ²⁶. Gross and Do have a similar observation:

"The lack of formal methods in architectural design puzzles each generation of students entering studio; they learn the 'how to' skills through imitation of their teachers and more senior classmates...It is the rare teacher indeed who shows students how to follow a systematic method"²⁷.

Amir Mahmoodi investigated educators' and students' views about architectural design teaching in top architecture schools in Iran, concluding that one major shortcoming of the current design teaching is students' confusion about design process:

"Many students argue about the lack of procedure/methodology in their design exercises. They are confused in the process of design and they need to learn about the appropriate steps to take for solving a design problem and developing a design solution."²⁸

Interestingly, the above-mentioned shortfalls of studio teaching have been criticized from 25 years ago until now. This large time span itself serves as eloquent evidence of the unresponsiveness of architectural education to changing demands, as pointed out by Tzonis. The time for an innovation in design teaching is long overdue. Architectural design education should embed a theoretical framework grounded in scientific rigor and systematic research that will guide students to make informed design decisions.

Aims of this research

So far, an evidence-based design philosophy has gained some momentum in architectural practice but has not been widely introduced into architectural curricula. This project intends to incorporate the new and innovative evidence-based design philosophy into undergraduate architectural education and examine students' perceptions and attitudes towards it before and after the introduction of EBD. EBD will be embedded into the course *Innovation in Design*, one of the last core courses that architectural students must take during the Bachelor of Architectural Design program in Griffith University.

METHODS

The course *Innovation in Design* aims to introduce students to various recent innovations in the building industry, including innovations in design philosophies, design processes, building materials and building technologies. The course is delivered over 12 weeks, comprising 2h lectures and 2h tutorials every week. Due to the COVID-19 outbreak in 2020, the course adopted a full online delivery mode, with all lectures being pre-recorded, and all tutorials delivered live via Microsoft Teams. Week 1 to Week 4 were dedicated to innovation in design philosophies, and the contents are shown in Table 1.

Week	Lecture	Tutorial	
No.			
	Introduction: What is		
Week 1	innovation in		
	architecture?	Course structure, schedule, assessments, pre-survey	
	Design values and		
Week 2	methodologies, the	Discussions about five main categories of design values:	
	changing concept of	artistic design values, traditional design values, social	
	creativity, evidence-	design values, environmental design values, gender-base	
	based design	design values	
	Human-centred design		
Wook 2	philosophies, such as	Introduction to Assignment 1; modes of enquiry for human	
week 5	social design, biophilic	behaviour studies: questionnaire, interview, naturalistic	
	design, and active design	observation, observing physical traces	
	Environment-conscious	Modes of enquiry for environment studies: evaluation	
Week 4	design philosophies, such	against sustainable design principles and theories,	
	as Green, Sustainable	monitoring indoor environmental quality, energy audit,	
	and Zero-energy building	building performance simulation	

Table 1. Lecture and tutorial contents for innovations in design philosophies

In Assignment 1—*Practicing evidence-based design philosophy*, students were required to select a specific evidence-based design philosophy and implement it into a building redesign project. The main tasks included literature review, scientific inquiry, architectural solutions, and reflection.

Research design

Unlike the one-off survey which assesses the long-term opinions/perceptions of the respondents towards the investigated topic, the pretest-posttest designs ²⁹ utilize an identical or similar questionnaire structure(s) to examine the effect of a research intervention. In this project, the overarching research question is to find out how the architectural students' perceptions and understandings about evidence-based design ³⁰ evolve along the course period. Therefore, the pretest-posttest design is adopted in this study, in the form of online questionnaire surveys. The pre-survey contained 11 multiple-choice questions and 2 open-ended questions and was assigned in Week 1 to find out students' views about architecture and architectural design, creativity, design values, commonly used design methods and processes, and satisfaction with previous studio courses. The post-survey included 12 multiple-choice questions only and was assigned to students in Week 5. Both questionnaires were delivered by Google Forms during tutorial time. The similarly constructed

questions facilitated the comparison between the pre- and post- survey results, indicating the development of views and attitudes towards design methodology and EBD.

Participant profile and data analysis

There were 73 enrolled students in the 2020 cohort for the course *Innovation in Design*, including 6 engineering students (third year or fourth year), 15 second-year and 52 third-year architectural students. It was announced in class that the surveys were open to architectural students only.

Data in similarly structured Likert scale questions in pre- and post- surveys were first tested for normality using the Shapiro-Wilk test. Non-normally distributed data were then analyzed by independent-samples Mann-Whitney Test. The significance level is set at p < 0.05. Statistical analyses were carried out in SPSS (version 26). For 7-point Likert scale questions regarding attitudes and tendency to agree/disagree, votes of 5, 6, and 7 were deemed as positive responses, votes of 4 as neutral responses, while votes of 1, 2, and 3 as negative responses. Other multiple-choice questions were analyzed by descriptive statistics.

RESULTS

The pre-survey collected 52 responses from 67 eligible students, and the post-survey collected 32 responses. The response rates were 77.6% and 47.8% respectively. The reduced response rate in the post-survey was likely caused by deadlines in Week 5 for other courses. Nevertheless, it was still close to 50%, and the sample size (32) was a statistically large sample.

Design values

In both pre- and post- surveys, participants were asked to select their conception of architecture on a scale between the art pole (represented by 1) and the science pole (represented by 7), and their views of the architectural design process between creation of art (represented by 1) and solving a science problem (represented by 7). The average score and standard deviation for view of architecture were 3.77 ± 1.06 for pre-survey and 4.09 ± 1.17 for post-survey, indicating that students had viewed architecture slightly towards the art pole prior to introduction of EBD, while slightly towards the science pole after EBD was introduced. Similarly, the average score and standard deviation for the students' view of the architectural design process were 4.15 ± 1.61 in pre-survey, and 4.38 ± 1.36 in post-survey, indicating that students viewed the architectural design process slightly towards solving a scientific problem in both pre- and post-surveys.

Figure 1 illustrates the frequency distribution for both surveys, along with the independent-samples Mann-Whitney test result for (a) view of architecture, and (b) view of architectural design process. Figure 1(a) displays a post-survey histogram slightly skewed towards higher scores, indicating that students' perceptions of architecture were closer to the "science" pole compared to the pre-survey. However, this difference was not significant (p = 0.115). Figure 1(b) demonstrates a similar distribution in pre- and post-surveys, with most students selecting middle scales (between 4 and 6). The pre- and post-survey results were not significantly different (p = 0.424).



Figure 1. Comparison of participants' conception of architecture and architectural design process in pre- and post- surveys

In both pre- and post- surveys, students were asked whether they have developed/intend to develop clear design values in design projects (1 strongly disagree–7 strongly agree). Figure 2 demonstrates the results. The average score and standard deviation were 4.85 ± 1.46 for pre-survey and 5.97 ± 1.26 for post-survey. The independent-Samples Mann-Whitney test showed a highly significant difference (p < 0.001) between the pre- and post-survey results. The post-survey histogram is highly skewed towards higher scores (6 and 7), indicating students' stronger tendency to have a clear design value in their future design projects.



Figure 2. Comparison of participants' views of design values in pre- and post- surveys

In both pre- and post-surveys, students were asked whether they have considered or intend to consider building users' needs and preferences in their previous/future design projects. Results are illustrated in Figure 3. The average score and standard deviation were 5.60 ± 1.62 for pre-survey and 6.47 ± 0.76

for post-survey. In the pre-survey, although 82.7% of respondents expressed the view that they have taken users' needs into design consideration, only 15.4% of participants selected talking to and surveying building users as a normal research activity in their previous designs (see Table 3). This implied that students might have made design decisions based on their assumptions about users' needs, rather than based on users' own utterances. The post-survey reported 96.9% positive responses (participants voting 5, 6, and 7) of incorporating users' needs into design processes. This differences between pre- and post-surveys were significant (p < 0.01) by independent-samples Mann-Whitney test.



Figure 3. Participants' views about incorporating building users' needs and preferences in their design considerations in the pre- and post-survey

Previous and current design methodologies

To better understand students' design methodologies, the pre-survey asked students to select all methods they have adopted to develop design concepts in their previous studio projects. The number of votes for each method and the percentage values in total votes were reported in Table 2. In the pre-survey, the first ranked method was to find inspiration from nature and/or art, with 73.1% of votes from respondents. This was followed by investigating and analyzing design problems (61.5%), and doodling, drawing, and modelling (55.8%). It is worth mentioning that only 23.1% of respondents selected "reading research articles and scientific reports" as a common method for developing design concepts, which ranked last in the pre-survey. After EBD was introduced to students in the course, the post-survey asked about their intended methods for developing design concepts in the future (Table 2). The top three methods were "doodling, drawing, and modelling" (78.1%), "finding inspiration from nature and/or art" (71.9%), and "reading research articles and scientific reports" (68.8%).

Ways to develop design concepts	Pre-survey	Post-survey
	No. of votes (percentage	No. of votes (percentage
	in total votes)	in total votes)
Finding inspiration from nature and/or art	38 (73.1%) ¹	$23(71.9\%)^2$
Investigating and analysing the design	$32 (61.5\%)^2$	17 (53.1%) ⁴
problems		
Doodling, drawing, and modelling	$29 (55.8\%)^3$	$25 (78.1\%)^1$
Imitating and replicating precedents	25 (48.1%) ⁴	17 (53.1%) ⁴
Intuition	25 (48.1%) ⁴	$11 (34.4\%)^6$
Reading research articles and scientific	12 (23.1%) ⁶	22 (68.8%) ³
reports		

(The numbers in superscripts denote the ranking of methods for developing design concepts) Table 2. Top three methods to develop design concepts reported in pre- and post-surveys

Students were also asked about their normal research activities in their previous and future studio projects, and the results were reported in Table 3. The top three research activities mentioned in the "browsing architectural journals" (75.0%), "talking pre-survey were to peer/senior students/professional architects" (71.2%), and "walking through and experiencing similar buildings" (59.6%). However, these common design processes would not qualify for research processes unless they have adopted systematic methods of evaluation ³¹. Meanwhile, the research-based design processes, i.e., "reading research publications and design theories" (38.5%), and "surveying building users" (15.4%) were among the least selected activities in previous design studios. After EBD was introduced, there was an obvious increment in the uptake of research methods in the design process, including "reading research publications and design theories" (62.5%, ranked 6th in post-survey), "surveying building users" (75.0%, ranked 4th in post-survey), and "observing building users" behaviors" (78.1%, ranked 3rd in post-survey). This indicated a trend of change in students' design methodologies from intuition-based methods and processes towards research-based methods and processes.

Research activities in design studios	Pre-survey	Post-survey
	No. of votes	No. of votes (percentage
	(percentage in total	in total votes)
	votes)	
Browsing architectural journals with design	$39(75.0\%)^1$	$27 (84.4\%)^2$
precedents		
Talking to peer/senior students/professional	$37 (71.2\%)^2$	$28 (87.5\%)^1$
architects		
Walking through and experiencing similar	$31 (59.6\%)^3$	23 (71.9%) ⁴
buildings		
Reading building codes/standards about specific	30 (57.7%) ⁴	19 (59.4%) ⁷
regulations		
Observing building users' behaviours in a similar	30 (57.7%) ⁴	25 (78.1%) ³
building		
Searching for art works (fine art, sculptures,	$27 (51.9\%)^6$	13 (40.6%) ⁸
product designs, etc.) for inspiration		
Reading research publications about related	20 (38.5%) ⁷	20 (62.5%) ⁶
design theories		
Talking to/survey building users to understand	8 (15.4%) ⁸	24 $(75.0\%)^4$
their needs and feelings in a similar building		

(The numbers in superscript denote the ranking of research activities)

Table 3. Normal research activities in design studios reported in pre- and post-surveys

CONCLUSION

This research project has incorporated the innovative evidence-based design (EBD) philosophy into undergraduate architectural education. The pre- and post-surveys were carried out to capture students' perceptions and attitudes toward design values, design methodology and EBD before and after EBD was introduced. Results showed that before this course, students commonly combined intuition, design-by-drawing, and some investigations and analyses in their design processes, but rarely utilized scientific modes of inquiry. The "research" activities that they have commonly carried out in design studios did not qualify for systematic research evaluation. After EBD was introduced, students demonstrated an awareness of developing clear design values, taking building users' needs and preferences into consideration, and an appreciation of learning factual knowledge to inform design decision-making. There was an uptake of research-based design methods and processes.

NOTES

¹ D L Sackett et al., "Evidence Based Medicine: What It Is and What It Isn't," *BMJ (Clinical Research Ed.)* 312, no. 7023 (January 13, 1996): 71–72, https://doi.org/10.1136/bmj.312.7023.71.

² (Hamilton & Watkins, 2009, p.9)

³ Roger Ulrich et al., *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity* (Concord, California: Robert Wood Johnson Foundation, 2004), https://www.healthdesign.org/system/files/Ulrich_Role of Physical_2004.pdf.

⁴ Ivar Holm, Ideas and Beliefs in Architecture and Industrial Design: How Attitudes, Orientations, and Underlying Assumptions Shape the Built Environment (Oslo: Arkitektur- og designhøgskolen i Oslo, 2006).

⁵ Marcus Vitruvius Pollio and Morris Hicky Morgan, *Vitruvius the Ten Books on Architecture* (Dover Publications, 1960).

⁶ Holm, Ideas and Beliefs in Architecture and Industrial Design: How Attitudes, Orientations, and Underlying Assumptions Shape the Built Environment.

⁷ Amir Saeid Mahmoodi, "The Design Process in Architecture: A Pedagogic Approach Using Interactive Thinking" (The University of Leeds, 2001), http://etheses.whiterose.ac.uk/2155/1/uk_bl_ethos_543080.pdf.

⁸ Robert Sommer, *Social Design: Creating Buildings with People in Mind* (New Jersey: Englewood Cliffs, N.J: Prentice-Hall, 1983).

⁹ Mahmoodi, "The Design Process in Architecture: A Pedagogic Approach Using Interactive Thinking"; A. Aksamija, *Integrating Innovation in Architecture*, 1st ed. (Wiley, 2016), https://doi.org/10.1002/9781119164807; Ashraf M Salama, *New Trends in Architectural Education*, 1st ed. (Raleigh, North Carolina, USA: Tailored Text and Unlimited Potential Publishing, 1995).

¹⁰ Mahmoodi, "The Design Process in Architecture: A Pedagogic Approach Using Interactive Thinking."

¹¹ (Lang, 1987, p.37)

¹² Salama, *New Trends in Architectural Education*; Mahmoodi, "The Design Process in Architecture: A Pedagogic Approach Using Interactive Thinking."

¹³ Donald A. Schon, *The Reflective Practitioner: How Professionals Think in Action.* (Aldershot: Ashgate Publishing Limited, 1991).

¹⁴ Leon Van Schaik, *Mastering Architecture : Becoming a Creative Innovator in Practice.* (Wiley-Academy, Hoboken, NJ, 2005).

¹⁵ Bryan Lawson, *How Designers Think - The Design Process Demystified*, 4th Editio (Oxford: Architectural Press, 2006).

¹⁶ Christopher John Jones, *Design Methods: Seeds of Human Futures*, 1st ed. (Wiley-Interscience, 1970).

¹⁷ Jones.

¹⁸ Byran Lawson, "Evidence-Based Design for Healthcare," in *Hospital Engineering and Facilities Management*, ed. W Swaby (London: International Federation of Hospital Engineering, 2005), 25–27; Ulrich et al., *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity*; Caren S Martin and Denise A Guerin, "Using Research to Inform Design Solutions," *Journal of Facilities Management* 4, no. 3 (January 1, 2006): 167–80, https://doi.org/10.1108/14725960610673751; Hamilton and Watkins, *Evidence-Based Design for Multiple Building Types*.

¹⁹ (e.g. Roelofsen, 2002; Seppänen, 1999; Woods, 1989)

²⁰ (2014)

²¹ Tzonis.

²² Tarek Galal Abdelhamid, "A 10-Step Design Process for Architectural Design Studios," in *Sustainable Development and Social Responsibility*—Volume 1. Advances in Science, Technology & Innovation (IEREK Interdisciplinary Series for Sustainable Development), ed. M. Mateev and J. Nightingale (Dubai, UAE: Springer, Cham, 2020), 1–11, https://doi.org/https://doi.org/10.1007/978-3-030-32922-8_1; Mark D. Gross and Ellen Yi-Luen Do, "The Design Studio Approach: Learning Design in Architecture Education," 1997 EduTech/NSF Design Education Workshop (Atlanta, 1997), https://doi.org/10.1002/cyto.990030307; Mahmoodi, "The Design Process in Architecture: A Pedagogic Approach Using Interactive Thinking"; Ashraf M. Soliman, "Appropriate Teaching and Learning Strategies for the Architectural Design Process in Pedagogic Design Studios," Frontiers of Architectural Research 6, no. 2 (2017): 204–17, https://doi.org/10.1016/j.foar.2017.03.002; Burkay Pasin, "Rethinking the Design Studio-Centered Architectural Education. A Case Study at Schools of Architecture in Turkey," The Design Journal 20, no. sup1 (2017): S1270–84, https://doi.org/10.1080/14606925.2017.1352656; Salama, New Trends

in Architectural Education; Ashraf M Salama, "A Theory for Integrating Knowledge in Architectural Design Education," *Archnet-IJAR - International Journal of Architectural Research* 2, no. 1 (2008): 100–128, https://doi.org/10.26687/archnet-ijar.v2i1.180.

23 (1995)

²⁴ Salama; Salama, "A Theory for Integrating Knowledge in Architectural Design Education."

²⁵ Salama, "A Theory for Integrating Knowledge in Architectural Design Education."

²⁶ Abdelhamid, "A 10-Step Design Process for Architectural Design Studios."

²⁷ Gross and Do, "The Design Studio Approach: Learning Design in Architecture Education."

²⁸ (Mahmoodi, 2001, p.226)

²⁹ Daniel Tan-lei Shek and Xiaoqin Zhu, "Pretest-Posttest Designs," in *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation (Vols. 1-4)*, ed. Bruce B. Frey (Thousand Oaks,, California: SAGE Publications, 2018), 1293–95, https://doi.org/10.4135/9781506326139 NV - 4.

³⁰ Hamilton and Watkins, *Evidence-Based Design for Multiple Building Types*.

³¹ Jeremy Till, "Architectural Research: Three Myths and One Model," RIBA Research Wiki, 2007, https://jeremytill.s3.amazonaws.com/uploads/post/attachment/34/2007_Three_Myths_and_One_Model.pdf.

BIBLIOGRAPHY

Abdelhamid, Tarek Galal. "A 10-Step Design Process for Architectural Design Studios." In Sustainable Development and Social Responsibility—Volume 1. Advances in Science, Technology & Innovation (IEREK Interdisciplinary Series for Sustainable Development), edited by M. Mateev and J. Nightingale, 1–11. Dubai, UAE: Springer, Cham, 2020. https://doi.org/https://doi.org/10.1007/978-3-030-32922-8_1.

Aksamija, A. Integrating Innovation in Architecture. 1st ed. Wiley, 2016. https://doi.org/10.1002/9781119164807.

Gross, Mark D., and Ellen Yi-Luen Do. "The Design Studio Approach: Learning Design in Architecture Education." *1997 EduTech/NSF Design Education Workshop*. Atlanta, 1997. https://doi.org/10.1002/cyto.990030307.

Hamilton, D K, and D H Watkins. *Evidence-Based Design for Multiple Building Types*. John Wiley & Sons, 2009. https://books.google.com.au/books?id=h9DcaOuEw5cC.

Holm, Ivar. Ideas and Beliefs in Architecture and Industrial Design: How Attitudes, Orientations, and Underlying Assumptions Shape the Built Environment. Oslo: Arkitektur- og designhøgskolen i Oslo, 2006.

Jones, Christopher John. Design Methods: Seeds of Human Futures. 1st ed. Wiley-Interscience, 1970.

Lang, Jon. Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design. Van Nostrand Reinhold Company, 1987.

Lawson, Bryan. *How Designers Think - The Design Process Demystified*. 4th Editio. Oxford: Architectural Press, 2006.

Lawson, Byran. "Evidence-Based Design for Healthcare." In *Hospital Engineering and Facilities Management*, edited by W Swaby, 25–27. London: International Federation of Hospital Engineering, 2005.

Mahmoodi, Amir Saeid. "The Design Process in Architecture: A Pedagogic Approach Using Interactive Thinking." The University of Leeds, 2001. http://etheses.whiterose.ac.uk/2155/1/uk_bl_ethos_543080.pdf.

- Martin, Caren S, and Denise A Guerin. "Using Research to Inform Design Solutions." *Journal of Facilities Management* 4, no. 3 (January 1, 2006): 167–80. https://doi.org/10.1108/14725960610673751.
- Pasin, Burkay. "Rethinking the Design Studio-Centered Architectural Education. A Case Study at Schools of Architecture in Turkey." *The Design Journal* 20, no. sup1 (2017): S1270–84. https://doi.org/10.1080/14606925.2017.1352656.

Roelofsen, Paul. "The Impact of Office Environments on Employee Performance: The Design of the Workplace as a Strategy for Productivity Enhancement." *Journal of Facilities Management* 1, no. 3 (2002): 247–64.

- Sackett, D L, W M Rosenberg, J A Gray, R B Haynes, and W S Richardson. "Evidence Based Medicine: What It Is and What It Isn't." *BMJ (Clinical Research Ed.)* 312, no. 7023 (January 13, 1996): 71–72. https://doi.org/10.1136/bmj.312.7023.71.
- Salama, Ashraf M. "A Theory for Integrating Knowledge in Architectural Design Education." *Archnet-IJAR International Journal of Architectural Research* 2, no. 1 (2008): 100–128. https://doi.org/10.26687/archnet-ijar.v2i1.180.

- Salama Ashraf M. *New Trends in Architectural Education*. 1st ed. Raleigh, North Carolina, USA: Tailored Text and Unlimited Potential Publishing, 1995.
- Schaik, Leon Van. *Mastering Architecture : Becoming a Creative Innovator in Practice.* Wiley-Academy, Hoboken, NJ, 2005.
- Schon, Donald A. *The Reflective Practitioner: How Professionals Think in Action.* Aldershot: Ashgate Publishing Limited, 1991.
- Seppänen, Olli A. "Estimated Cost of Indoor Climate in Finnish Buildings." In *Proceedings of Indoor Air 1999*, 13– 18. Edinburgh, Scotland, 1999.
- Shek, Daniel Tan-lei, and Xiaoqin Zhu. "Pretest-Posttest Designs." In *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation (Vols. 1-4)*, edited by Bruce B. Frey, 1293–95. Thousand Oaks,, California: SAGE Publications, 2018. https://doi.org/10.4135/9781506326139 NV 4.
- Soliman, Ashraf M. "Appropriate Teaching and Learning Strategies for the Architectural Design Process in Pedagogic Design Studios." *Frontiers of Architectural Research* 6, no. 2 (2017): 204–17. https://doi.org/10.1016/j.foar.2017.03.002.
- Sommer, Robert. Social Design: Creating Buildings with People in Mind. New Jersey: Englewood Cliffs, N.J: Prentice-Hall, 1983.
- Till, Jeremy. "Architectural Research: Three Myths and One Model." RIBA Research Wiki, 2007. https://jeremytill.s3.amazonaws.com/uploads/post/attachment/34/2007_Three_Myths_and_One_Model.pdf.
- Tzonis, Alexander. "A Framework for Architectural Education." *Frontiers of Architectural Research* 3, no. 4 (2014): 477–79. https://doi.org/10.1016/j.foar.2014.10.001.
- Ulrich, Roger, Xiaobo Quan, Craig Zimring, Anjali Joseph, and Ruchi Choudhary. *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity*. Concord, California: Robert Wood Johnson Foundation, 2004. https://www.healthdesign.org/system/files/Ulrich_Role of Physical_2004.pdf.
- Vitruvius Pollio, Marcus, and Morris Hicky Morgan. *Vitruvius the Ten Books on Architecture*. Dover Publications, 1960.
- Woods, J E. "Cost Avoidance and Productivity in Owning and Operating Buildings." *Occupational Medicine* 4, no. 4 (1989): 753–70.

MIXED-USE URBAN PROJECT IN DESIGN STUDIOS. A RESEARCH BY DESIGN PEDAGOGICAL EXPERIENCE AT THE BARCELONA SCHOOL OF ARCHITECTURE

Author: CARLES CROSAS, EULALIA GOMEZ-ESCODA

Affiliation: BARCELONA URBANISM LABORATORY, SPAIN

INTRODUTION: URBAN PROJECT AND MIXEDNESS OF ACTIVITIES

This article compiles a research by design experience in the framework of an on-going investigation on Urban Mixticity within the Barcelona Urbanism Laboratory, related to the postgraduate course 'Urban Project. Ideas and Praxis'. The Design Studio has been held during six consecutive academic years at the master program *Contemporary Project* leaded by the UPC-Barcelona TECH.¹ The master course has two objectives as starting point: on the one hand, the definition of the Urban Project discipline and, on the other, the construction of a theoretical framework on the mix of activities in the construction of the city.

On Urban Project

During the 1980s, Barcelona led the urban debate on the so-called 'Urban Project' as a design strategy focusing on interaction between architecture, public space and infrastructure. On the one hand, with the outstanding theorization of Professor Manuel de Solà-Morales,² and on the other, with a number of successful mid-scale urban transformations that configures an internationally renowned practice. Since then, new approaches and new paradigms have appeared on scene, in Barcelona and abroad, composing all together an interesting design practice that is the core of the course.

Urban Projects can be understood as an instrument of mediation between the city and architecture, and at the same time, they constitute a way of acting and doing research. A design tool that is different either from the conventional planning or the macro-architecture, and that is driven to conceiving projects for operative fragments of the city well delimited in space and time. Urban Projects reformulate the architecture of elements and public space in order to generate a new and more efficient urbanity characterized by its greater clarity and emotion. Urban Projects have territorial effects beyond their area of intervention; are complex and present interdependent character of programs; are developed at the intermediate scale; voluntarily assume a commitment to adopt an urban architecture; and imply a significant public component in investments and in collective uses of the program.

On Urban Mixticity

The investigation implements a methodology tested and promoted by the authors, both researchers at the Barcelona Urbanism Laboratory - LUB^3 and teachers at the master course. The research is based on the hypothesis that urban sustainable mixedness is one of the most essential qualities that nourish the myth of the good compact city.

Although paradoxically citizens have not always considered mixed functional use as a panacea, in functional terms, the act of "mixing" facilitates social diversification and spatial contiguity of different functions, while opposition to the mix creates large homogeneous urban areas, which are not therefore exempt from conflicts. According to theoretical approaches to the concept,⁴ urban mixtcity (and the synonym concepts mixedness, functional mixed-use or mixture) means a responsible and sustainable use of the city as it implies a wider use of the urban infrastructure combining different time slots; provides an urban setting that substantially increases the level of social interaction; saves energy consumption minimizing everyday movements, increasing soft mobility and pedestrian uses; and activates strong synergies among compatible uses, encouraging new compounds that will be able to provide appropriate responses to forthcoming demands.

The approach takes as starting point that the distribution of activities on the ground floor level in Barcelona responds to some rationale rules of location and relation to population and geography, so critical balances and distances between them can be established.



Figure 1. Activities in the ground floor level in Barcelona. Source: Authors' elaboration

The analysis of the combination of activities can be refined to a grid fitted in the dimensions of the Eixample, the central district of Barcelona, where the methodology has started to be tested. According to official databases, besides housing, activities in the city are divided into seven large groups (retail, hospitality, services, industry and logistics, public facilities, private services and non-occupied premises) that in their turn are subdivided into up to 99 different programs. Activities are analysed according to existing databases complemented with fieldwork to verify mismatches. Each program is assigned a colour —retail (orange), hospitality (yellow), services (maroon), industry and logistics (purple), public facilities (magenta), non-occupied premises (dark grey), storage (medium grey), and housing (light grey)— and each block is represented both on the ground floor and in axonometry, to make visible those non-residential activities that take place in upper floors and that the official censuses do not record. Next, fragments of the grid around forty hectares —about 24 blocks— are

selected to compare the proportions between the various uses found in each of the blocks. This comparative parameterization makes it possible to find the measure of an average block to which all those of the set can be referred by comparison.⁵



Figure 2. Fragment of the Eixample. Analysis of the ground floor level mixticity by block (top) and by street layout proximity (bottom). An average block of the urban fragment (on the left in the upper half of the figure) has a total surface of 12,804m2 of activities rather than housing and 94 active premises on the ground floor level. Source: Authors' elaboration

A PEDAGOGICAL EXPERIENCE

The Urban Design Studio held on Spring 2020^6 dealt with Urban Mixticity in one of the most paradigmatic transformation tissues in the south of Europe: the 22@ district in Barcelona, taking its northern part as main laboratory. The 22@ district occupies the eastern side of the grid designed in the mid-nineteenth century by the engineer Ildefons Cerdà. Despite being an isotropic grid, it developed unevenly, with notable differences between the eastern and western sides/extremes.

This fact responds to two reasons. Firstly, due to the composition of the soil, made of alluvial lands that formed the delta of the Besòs river. This characterized the crops that were developed in this area, irrigated and more profitable for agricultural uses than those of dry land, which were urbanized before. Secondly, because the same soft composition of the soil and the wetlands that existed in the place made it an unhealthy site, so the city allocated industries and productive uses there.

The course participated in a recently launched municipal debate that seeks to set up new urban conditions for the non-redeveloped areas. The Studio depicted new scenarios taking into consideration

the new demands for more housing, social and innovation activities, a better balance between heritage and new facilities, and ecology and sustainability factors. Analysis and proposals both at the block and superblock scale were tested, exploring quantities and qualities of urban mixticity over the layout of the Cerdà's grid in three different assignments.

Urban Analysis: 22@ blocks

The first exercise speculated on the most optimal urban forms to define the principles that set specific features of urban mixticity focusing on the sector delineated by Bilbao, Perú, Maresme, Espronceda Streets and Diagonal Avenue, taking into consideration the new demands for more housing, social and innovation activities, the balance between heritage and new facilities, ecology and sustainability, among other factors.

The mixticity of the place was understood through x-raying some of the urban elements that compose it. A collaborative analysis of a number of blocks, according to a number of parameters was developed, in which students looked at (1) occupation, density, FAR and number of inhabitants per plot and per block; (2) uses on the ground floor: commerce, services and access —and temporary uses: terraces, festivals and farmers markets; (3) uses on the upper floors: households, agencies and offices; and (4) material heritage and unique buildings.

The systematic analysis of 25 blocks offers some interesting details on the morphological configuration of the tissue. From a bird's eye view, the coloured wide variety of building combinations inside a regular street layout expresses the mixed-use condition of the fabric. Built over a century, the blocks are normally compact, made out of one or two-story buildings with some exceptional higher buildings. Among the blocks' assortment, different groups can be identified: (1) the most common regular blocks with a mix of new and old buildings; (2) the completely renovated blocks, showing starting from scratch new layouts; (3) the typical divided blocks with internal passageways; and (4), the shrinking blocks cut by some diagonal traces.

The series of resulting drawings illustrates the diversity of urban types that compose this urban landscape. Regarding housing, typical row houses are set over the passageways, whereas multifamily buildings are isolated among other services and only few recently renewed blocks show the perimeter ring of multifamily housing.

Dark colours point out the opportunity for re-use and intensification. The darkest ones correspond to buildings with activities that are not operating anymore. Lighter ones are plots hosting car parking and storage. Bars and restaurants in yellow and retail in orange, occupy normally smaller plots inside the traditional tissue, although few new hotels and big commercial areas have been recently built. The traditional FAR for former industrial area used to be 1.00 to 1.70: even though the majority of the blocks have less than two, the totally and partially transformed blocks rise up to three and four. Beyond the total floor area per block, it's interesting to illustrate the proportion of different uses in each block. Dwellings are predominant in one third of the blocks. Logistics, which were very important in this area till 2000, have nowadays a comparable weight to services. By contrast, hospitality is residual in this area and is significant in only 10% of the cases.



Figure 3. Analysis of the mixticity block-by-block. Source: Urban Project. Ideas and Praxis. Spring Semester 2020.

Urban Design Proposals: Block-by-block Approach

Once the blocks analysed, the course focused on transformation design processes in the area with Horizon 2040 in mind and with two different strategies, exploring potential at the block scale and at the three-by-three aggregation scale. According to the official urban agenda, the development of 22@ can assume 20% more roof dedicated to housing —30% total— to solve the structural lack of households in central Barcelona⁷. The assignment responded to this need by intervening in one block providing a final composition that had to meet the following requirements: (1) total FAR had to be 3.00—for standard blocks measuring 12,320m² land, that would mean 36,960m² of total roof; (2) 30% of the total roof had to be used for housing: for standard blocks —for standard blocks, 11,088m² combining existing and added; (3) 10% of block occupation had to be dedicated to green areas.

The first step followed was to analyse the composition of the block to determine which buildings could be demolished and which deserved to be preserved, taking into account the official catalogue of architectural heritage but adding other well-founded considerations. Fieldwork and *in situ* survey, since it is a place in constant transformation, were essential in this phase of work.

Once the resulting composition of the block was understood after the hypothetical elimination of some buildings, the design work was developed in parallel from two aspects. On the one hand, determining new volumes until reaching a FAR equal to 3.00 and provisioning the minimum open spaces and facilities required. On the other hand, the consideration that the combination of preserved volumes plus the new proposed ones had to fulfil the formula that guarantees that at least 30% of the roof was for residential use. The variety of composition in the blocks of this area in transformation also gave a wide range of results: from those very exceptional blocks in which designs had to start almost from scratch to produce a new mixed fragment; to those in which the preexistences were concentrated in a sector of the block; or those in which what was kept was dispersed so the new volumes had to be twinned with the existing ones. At the same time, small but valuable pieces of public space and public facilities were added.

To respond to the high density requested, proposals with a higher proportion of preserved buildings opt for commercial or service plinths of between two and four floors; on which residential or office buildings are supported. Exceptional cases are those blocks divided by a road, in which the scarcity of space forces the superposition of new uses with the preserved industrial ones. Finally, in blocks with a lower proportion of heritage buildings, the design tries to faithfully respond to the traditional compactness of the grid and the mix of uses is distributed around the perimeter in an almost homogeneous height.



Figure 4. Three mixed block design proposals. In the left column the existing situation, in the right column the proposals. Source: Hanin Elghol and Sofia Gonzalez (top), Lukas Jakober and Milee Kim (centre) and Soledad Martínez, Xin Chen and Yang Lan (bottom). Urban Project. Ideas and Praxis. Spring Semester 2020.

Urban Design Proposals: From the Block to the Superblock

After the analysis and proposal of a new layout for a single block, the discussion on the intensification of the 22@ district was addressed on the scale of a 3-by-3-block area, considering the 'superblock'⁸ strategy that is currently being implemented in the central city of Barcelona. The grid plan has an inter-distance between blocks of 133 meters, so that the sum of three blocks coincides with a distance of 400 meters, often considered a 5-minutes walkshade in terms of urban proximity analysis.⁹ Between 1930 and 1935, the Macià Plan designed by the modern architecture group GATCPAC would take the distance of three Cerdà blocks as the basic structure of their proposal for the city. Inheritance of this fact are the bridges that cross Gran Via, west of Glòries Square, every 400 meters; or the piers that interrupt the coastline, also every 400 meters. In the most contemporary context, the 3-by-3-block matrix is also the measure at the origin of the superblocks project.

The proposal was aimed to provide a new layout for a specific area around Pere IV axis through extrapolation of some of the strategies tested and learned at the single-block scale. In the reconfiguration of the existing fabric, the general urban regulations for the 22@ transformation were considered, including the 30% of built floor for housing. Each proposal had to find the most convenient way to distribute the new volumes according to a global criterion: it was not mandatory in this exercise for each block to comply with the new regulations, but for all nine blocks to do so,

compensating each other to meet the parameters working together. Each work group will take the collective analysis of this 3-by-3-block area and establish urban strategies to define a modern mix-use by the following these given parameters shown on screen, equivalent in proportion to the ones in the previous exercise:

	Existing	In Progress	To be added (empty block)
FAR	1.35	3.00	3.00
Private Land	103,000 m2	9,200m2	77,000m2
Public Space	-	1,255 m2	19,000m2
Public Buildings	-	1,165 m2	7,000 m2
Floor Area	139,000 m2	33,825 m2	309,000m2
Housing	21,500 m2	3,380 m2	92,000m2 (+800 dwellings)

Table 1. Urban variables to meet in the new design proposal

The process in this exercise follows the same three steps as in the previous one and begins with the critical analysis of the buildings to be maintained. In this case, the interrelationship between urban blocks becomes the main argument that triggers the design process and the search for sequences between open spaces. The definition of facades and landmarks or the construction of new voids inside the grid is a common thread for the design proposals developed. Considering the incorporation of a pacified street grid into the intervention area triggers consideration on different categories of public space. At the same time, the possibility of transferring roof from one block to another allows very clear volumetric definition strategies: giving greater importance to one of the facades, increasing the perimeter in height, or spreading the high points as landmarks in the area. Ultimately, the work forces a double scale of thought, that of the block and that of the superblock, defining strategies of composition in the first but setting a rhythm in the larger area.

The distribution of uses also benefits from this double scale of work, allowing overlapping logics that are established between the distribution of retail, offices and dwellings. The disruption of Pere IV axis is seen as a design opportunity, and some proposals exaggerate the difference between the two halves, one with a greater number of activities that should survive and another with a large number of buildings already consolidated that will determine the shape of the new volumes.

Despite the fact that the mix of programs in this case responds to more conventional logics in terms of height distribution, the interpretation of possible subzones within an area such as the superblock opens a discussion to be considered. The opposite strategy of densification of the very core of the superblock, fragmenting the open space as public block interiors is also an explored opportunity (figure 5, top left and right). Office and residence activities are distributed in height landmarks, but while housing faces the edges of the superblock, offices are the main ingredients in terms of program in this new centre that the intervention defines.



Figure 5. Superblock proposals. Source: Roubair Ashraf Fekry and Mourad Medhat Moheeb Abdalqader (top left); Youssef Rafik Mustafa and Youijan Pan (top right); Ana Maria Amarillo and Ana Lucia Diaz (bottom left); and Hanin Elghol and Sofia Gonzalez (bottom right). Urban Project. Ideas and Praxis. Spring Semester 2020.

CONCLUSION

The teaching experience tests the validity in the design phase of a research methodology defined in the Barcelona Urbanism Laboratory. The 22@ district in Barcelona makes it possible to use this methodology in an area in transformation that precisely seeks a new mix of uses. The drawings and texts shared here are part of an ongoing research by design process that, from the disciplinary field of urbanism, tries to contribute with new empirical and objective approaches to the non-residential issues of the contemporary city and the combinations between them to form mixticity.¹⁰

NOTES

¹ Master linked with a dual program at the University of Tongji, which selects about thirty international students with outstanding professional experience each year.

² Among his contributions, it is worth highlighting in this regard Manuel de Solà-Morales, "La segunda historia del proyecto urbano," *UR: urbanismo revista* 5 (1987): 21-27. This seminal work was compiled years later in Manuel de Solà-Morales (ed.), *A Matter of Things* (Rotterdam: NAi Uitgevers, 2008), 18-29.

³ A summary view of the research carried out at the LUB since 1969 can be found at: https://lub.upc.edu/web/arxiu_LUB/a_recerques_ang.html

⁴ Jill Grant "Mixed use in theory and practice. Canadian experience with implementing a planning principle," *APA Journal*, winter, Vol. 68, 1 (2002): 71-84. Accessed October 15, 2019. doi: 10.1080/01944360208977192.

⁵ Carles Crosas and Eulàlia Gómez-Escoda, *METRO.MIX. Proximity and Mixedness for Healthier Cities. Criteria and Tools for the Assessment and Promotion of Mixed-use Activities in Compact Metropolitan Areas*, Ongoing Competitive Research Project (since 2019).

⁶ Enrolled students: Ana Maria Amarillo Arenas, Roubair Ashraf Fekry, Xin Chen, Ana Lucia Diaz Calderon, Hanin Abduladim Atia Elghol, Sofia Victoria Gonzalez Caballero, Hasnaa Azami Idrissi, Lukas Bernhard Jakober, Milee Kim, Yang Lan, Shuren Li, Jing Lin, Han Liu, María Soledad Martínez Iñiguez, Mourad Medhat Moheeb Abdalqader, Li Mojun, Youjian Pan, Youssef Rafik Mustafa, Yonatan Leandro Sarmiento Soler, Alejandro Tabares Arango, Meng Tian, Zhiwen Wang and Mingjie Zhang.

⁷ To delve into 22 @, two recent publications should be highlighted: Ajuntament de Barcelona and BIT Habitat, *Agreement: Towards a more inclusive and sustainable 22* @ *within Poblenou*, Barcelona: Ajuntament de Barcelona, 2019, and Aurora López et al., *22* @ *Barcelona: 10 years of urban renewal*, Barcelona: Ajuntament de Barcelona, 2011.

⁸ The most updated information about current urban strategies on the superblock can be consulted at: https://ajuntament.barcelona.cat/superilles/ca. Accessed January 10, 2021. Also Salvador Rueda, "Les superilles per al disseny de noves ciutats i la renovació de les existents: el cas de Barcelona", Papers Regió Metropolitana de Barcelona, 59 (2017): 78-93.

⁹ Also in GIS applications regarding distances, as Walk Score (https://walkscore.com Accessed July 30, 2020) or Open Route Service (https://openrouteservice.org, accessed on 30 July 2020).

¹⁰ Carles Crosas, and Eulàlia Gómez-Escoda. "Mapping Food and Health Premises in Barcelona. An Approach to Logics of Distribution and Proximity of Essential Urban Services," *ISPRS International Journal of Geo-Information 9*, no. 12 (2020): 746. Accessed January 20, 2020. doi: 10.3390/ijgi9120746.

BIBLIOGRAPHY

- Ajuntament de Barcelona. *PECAB, Pla especial d'equipament comercial alimentari de Barcelona* [Special Plan for Commercial Food Equipment in Barcelona]. Barcelona: Ajuntament de Barcelona, 1986.
- Ajuntament de Barcelona. Hàbits de consum i polaritat comercial de la ciutat de Barcelona [Consumer Habits and Commercial Polarity of the City of Barcelona]. Barcelona: Ajuntament de Barcelona, 2018.
- Ajuntament de Barcelona. "Urban data of the city blocks in Barcelona." Accessed November 15, 2019. https://opendata-ajuntament.barcelona.cat/data/en/dataset/taula-map-illa.
- Ajuntament de Barcelona. "Inventari de locals de la ciutat de Barcelona" [Inventory of Premises in the City of Barcelona]. Accessed December 20, 2019. https://opendata-ajuntament.barcelona.cat/data/en/dataset/cens-activitats-comercials.
- Ajuntament de Barcelona and BIT Habitat. Agreement; Towards a more inclusive and sustainable 22 @ within Poblenou. Barcelona: Ajuntament de Barcelona, 2019

Area Metropolitana de Barcelona, Joan Busquets, Carles Crosas (ed.), and Eulàlia Gómez-Escoda (c.). *Metropolis Barcelona*. Barcelona: Area Metropolitana de Barcelona, 2015.

- Baum, Martina, and Kees Christiaanse (ed.). *City as loft: adaptative reuse as a resource for sustainable urban development.* Zürich: GTA Verlag, 2012.
- Bentham, Justin, et al. "Manifesto for the foundational economy". *Working paper* n.131, Manchester: Centre for research on socio-cultural change, 2013.

- Busquets, Joan, and Eulàlia Gómez. "The public layout", in Busquets, J. and Miquel Corominas (ed.) *Cerdà and the Barcelona of the future. Reality versus Project, Barcelona*, Diputació de Barcelona and Centre de Cultura Contemporània de Barcelona, 2010.
- Crosas, Carles, and Eulàlia Gómez-Escoda. "Mapping Food and Health Premises in Barcelona. An Approach to Logics of Distribution and Proximity of Essential Urban Services". *ISPRS International Journal of Geo-Information* 9, no. 12 (2020): 746. doi: 10.3390/ijgi9120746.
- Crosas, Carles, and Eulàlia Gómez-Escoda. *METRO.MIX. Proximity and Mixedness for Healthier Cities. Criteria and Tools for the Assessment and Promotion of Mixed-use Activities in Compact Metropolitan Areas.* Ongoing Competitive Research Project, 2019.
- Crosas, Carles, and Alvaro Clua. *Re-Mix: Urban Productive Landscape*. Barcelona, L'Hospitalet de Llobregat-LUB -UPC, 2018.
- Crosas, Carles; Jiménez, M. et alt. "Àreas de Centralitat i Innovació / Áreas de Centralidad e Innovación / Areas of Centrality and Innovation". *Quaderns PDU Metropolità*, n.10. Barcelona: Àrea Metropolitana de Barcelona, 2017.
- Fernández Per, Aurora, Javier Mozas, and Javier Arpa. *This is hybrid: an analysis of mixed-use buildings*. Vitoria-Gasteiz: a+t architecture publishers, 2011.
- Fuertes Pere, and Eulàlia Gómez-Escoda. "La forma urbana del menjar fresc = How Fresh Food Shapes Barcelona." *Quaderns d'arquitectura i urbanisme* About Buildings & Food, 271 (2018): 87-101. doi: 10.3846/20297955.2016.1194606.
- Fuertes Pere, and Eulàlia Gómez-Escoda. "Supplying Barcelona. The Role of Market Halls in the construction of the Urban Food System." *Journal of Urban History*, 2020. doi: 10.1177/0096144220971821.
- Font, Antonio, et al. *Urban patterns of economic activities*. Barcelona: Barcelona Metropolitan Region Barcelona, and Institut d'Estudis Territorials, 2012.
- Glaeser, Edward. Triumph of the City: How Our Greatest Invention Makes us Richer, Smarter, Greener, Healthier, and Happier. New York: Penguin, 2011.
- Grulois, Geoffrey, Nadia Casabella, Carles Crosas, and Jorge Perea. Upcycle Barcelona. Cogenerative Design Strategies for a Sustainable Urban Metabolism. Brussels: LoUISE & ETSAB, 2015.
- Grant, Jill. "Mixed use in theory and practice. Canadian experience with implementing a planning principle". *APA Journal*, Vol. 68, n.1 (2002): 71-84. Accesed October 15, 2019. doi: 10.1080/01944360208977192.
- López, Aurora, et al. 22 @ Barcelona: 10 years of urban renewal. Barcelona: Ajuntament de Barcelona, 2011.
- Miralles-Guasch, C., and Oriol Marquet Sardà. "Dinámicas de proximidad en ciudades multifuncionales". *Ciudad y Territorio Estudios Territoriales*, 45(177) (2013):501-510.

https://recyt.fecyt.es/index.php/CyTET/article/view/76228

- Rowe, Peter G., and Har Ye Kan. Urban Intensities: Contemporary Housing Types and Territories. Basel: Birkhauser, 2014.
- Rueda, Salvador. "Les superilles per al disseny de noves ciutats i la renovació de les existents: el cas de Barcelona" [Superblocks for the design of new cities and the renovation of existing ones: the case of Barcelona], *Papers Regió Metropolitana de Barcelona* 59 (2017): 78-93.
- Solà-Morales, Manuel de. "La segunda historia del proyecto urbano". UR: urbanismo revista, 5 (1987): 21-27.
- Solà-Morales, Manuel de (ed.), A Matter of Things. Rotterdam: NAi Uitgevers, 2008), 18-29.

Uytenhaak, Rudy. Cities full space: qualities density. Rotterdam: Uitgeverij 010, 2018.

RESEARCH INFORMED HEALTHCARE FACILITIES DESIGN: INTEGRATION OF DISSERTATION RESEARCH WITH SENIOR GRADUATION PROJECT DESIGN

Authors: AHMED SHERIF, ENGY TAHER, LORNA EL MOGHAZI, YASMINA EL GEZEIRY

Institution: THE AMERICAN UNIVERSITY IN CAIRO, EGYPT

INTRODUCTION

Healthcare facilities design requires a special understanding of different users' needs. Healthcare buildings should support patient welfare and treatment, and help reduce staff stress. Patients and their families experience fear, anxiety, and stress. They also feel vulnerable due to the lack of control over the situation and the suspension of normal activities, as well as the uncertainty of outcomes. The unfamiliar environment of the hospital adds more to this stressful experience¹. The healthcare environment is a key predictor of the overall satisfaction with the services provided in a hospital and has a direct influence on healthcare outcomes². The physical settings play an important role in the healing process by providing a more pleasant experience for patients and by enabling the caregivers to provide services more easily and efficiently³. It can help reduce stress of patients and staff⁴ and help reduce length of patients' hospital stays^{5.} The healthcare environment can also help reduce the need for medications⁶. Healthcare facilities design has recently witnessed a change of focus, from designing places of curing, to designing places for healing. A shift from a disease-centered design, to a peopleoriented design. Evidence shows that adjusting the design to meet patients' needs can make the healing environment more comfortable and aesthetically pleasing. This can improve the mood and other psychological feelings of patients and staff⁷. Learning design of healthcare facilities has a number of challenges. Students should be acquainted with the nature of these buildings and the unique status of their users. Students need to be engaged with research activities that allow them to appreciate the psychological needs and social environment of the users of these buildings in addition to the technical and functional operational requirements. These are not captured by typical research activities of a design studio. This paper reports on three case studies in the Department of Architecture at the American University in Cairo, Egypt. Students have chosen to conduct their dissertation research on a topic closely associated with their healthcare facility design senior project.

CASE STUDY 1

This case study's aim was to conduct a dissertation research that identifies the factors that can generate a better, less stressful environment for patients and their families in Emergency Departments. This research was used to identify the nature of critical healthcare facility departments and determine main design considerations for the senior graduation design project of a Trauma Hospital.

Dissertation Topic

The main defined problem for this dissertation was that the focus of current Emergency Departments is centered on the advancement of their technologies, which leads to the neglect of the design of spatial elements that could affect the wellbeing, comfort and stress of the main stakeholders; the patients, their families and staff⁸. Accordingly, the main research objective was to identify architectural design considerations that activate a less stressful healing process and environment for patients and their families in Emergency Departments. The primary research question was what are the factors which can generate a better less stressful environment for patients and their families in Emergency Departmentary research points were used to further understand how to achieve this less stressful environment for the users. These included identifying current design models of Emergency Departments, understanding how current issues in Emergency Departments affect the wellbeing of their stakeholders, and determining the effect of integrating stress reducing elements on healthcare facilities users.

Research Methodology

The main research methods used included looking into literature and performing field research. Firstly, the main theoretical framework was defined which included the study of phenomenology and understanding how spatial qualities can affect the direct experience of users⁹. Secondly, by looking into literature, the current design standards in Emergency Departments and how they influence their users was identified¹⁰. In addition to that, stress reducing elements in healthcare design were determined to identify their effect on healthcare facilities' users¹¹. Finally, for the field research, a structured interview was done to determine the perception of an architect on the current design of an existing Emergency Department and identify proposed solutions to the current issues in the design. A qualitative survey was also used directed to recent visitors of Emergency Departments to understand their experience and determine if the addition of stress reducing design elements would have eased their comfort during their visit.

Research Findings

From the previous research methods, it was determined that the main stress inducing factors in Emergency Departments are crowding, lack of privacy and incorrect allocation of staff workspaces. Firstly, crowding increases stress levels inside the department and can be harmful for vulnerable patients¹². Secondly, privacy is an overlooked design aspect Emergency Departments that prevents the availability of individual secure zones for users¹³. Lastly, incorrect allocation of staff workspaces such as nurse stations has a direct impact on the efficiency and work outcome of staff which may lead to increased stress if located incorrectly¹⁴. In addition to that, stress reducing elements in current healthcare design were determined to be Green Integration and Natural Daylight Exposure. For the green integration, it was observed that exposure to natural elements in waiting areas reduced the imposed stress on patients within the space than in regular waiting areas¹⁵. As for the natural daylight exposure, it was determined that integrating daylight in spaces with critically ill and highly stressed patients can increase their overall comfort and wellbeing¹⁶.

Senior Project

Based on the previous findings from the conducted dissertation research, the focus of the graduation project of a Trauma Hospital was to integrate stress reducing elements to enhance the overall wellbeing of the hospital's stakeholders. Accordingly, the thesis statement of the project was that the focus of design in a trauma hospital should not only be on functionality but also aim at reducing

traumatic stress for its different stakeholders. Thus, the main design concept was enabling stress-free healing through an interplay of biophilic design and the extensive integration of nature as an entity and a source of light and natural views. Which led to the main design driver being exposure to nature as a form of reducing traumatic stress. This was divided into three main elements: exposure to natural views, integration of biophilic design and exposure to natural daylight. These elements were identified from the dissertation research and implemented in the project. The natural views were maximized by placing the project on the Nile front, having direct access and exposure from all points. Figure () Biophilic design was implemented by integrating gardens at different levels throughout the hospital to induce stress free healing in the most critical zones. Four types of garden were planned. Different levels of gardens were planned for patients through their healing process. Ranging from individual private healing gardens to group interactive & exposed gardens (Figures 1 to 4).



Figure 1. The central garden for group activities



Figure 2. Terraced roof gardens for individual rooms



Figure 3. Healing gardens with aromatic and medicinal plants



Figure 4. Social activity sections in outdoor gardens

Daylight exposure was achieved by imposing natural daylight penetration in public spaces and integration of large atriums. Large atrium spaces were used to maximize the exposure to natural daylight and to create openness within the hospital (Figures 5 & 6).



Figure 5. Daylighting of the main atrium space



Figure 6. A cross section of the main atrium space

In addition, the emergency department was designed to reduce stress of patients and staff. A central garden was located within the Emergency Department, where the most critical rooms are surrounded. Also, the external healing garden could be directly accessed from the department for stress relief (Figures 7 & 8)


Figure 7. Integration of gardens with the emergency department



Figure 8. Exposure to nature in the resuscitation room design

Also, the surgical department was designed with the aim of reducing staff stress. The surgical operating rooms were exposed to daylight and natural views, and private gardens were linked to the staff zones (Figures 9 & 10).



Figure 9. Integration of gardens with the surgical suite



Figure 10. Introduction of natural light and external view in the surgical operating room design

CASE STUDY 2

The purpose of the dissertation of the second case study was to identify ways for remodeling healthcare physical environments to help regulate the three parts of a human, deemed essential to become a healthy person: Body, Soul and Mind. By focusing on designing a healing environment, a new typology of healthcare facilities that caters for patients, their families and the society was sought.

Dissertation Topic

The research delved into ways in which aspects of "salutogenesis" could be achieved, specifically focusing on how deploying the proportions of built, green and aquatic environments could result in a more restorative and healing spaces. Instead of asking what causes disease, the salutogenic approach looks for wellness factors, what causes and maintains healthy people aiming to promote healthy living¹⁷. Salutogenesis is "the process of healing in all dimensions of a person" in which then healing is defined as reaching a person's optimum health (physical, mental, social, and spiritual) through the

processes of recovery, renewal, and reintegration¹⁸. The research addressed whether deployment of water features in built environments could have a positive impact on users when compared with green spaces. It looked into the potential dose-response relationship of controlling the proportion of water visible in users' scenes.

Research Methodology

An online survey was conducted containing pictures of 9 environments. Participants were asked to rate them based on a Perceived Restorativeness Scale. The 9 environments presented different combinations of Built, Aquatic and Green scenes. Results were cross compared with the findings of a similar previous study in the UK^{19} .

Research Findings

Research output revealed that preferences of the Egyptian participants were different from those of the UK (Figure 11). The introduction of green space has led to a higher preference rating. Also, as the proportion of greenery increased in a scene, the scene was rated more positively. Moreover, scenes with higher proportions of nature received higher scores. Furthermore, built environments containing aquatic surroundings were rated more positively than single built environment. Also, participants preferred built environments with nature (green or water).



Figure 11. Comparison between the research results with those of a similar UK study

Senior Project

The senior design project focused on developing a Salutogenic Cardiac Facility in Suez, Egypt. The design aimed to provide a holistic care environment (body, soul and mind) for the users of this highly acute facility. The architectural approach aimed to provide active physical engagements for patients, families, and the public. Figure 12 demonstrates the utilization of public corridors along an atrium at the heart of the facility to encourage walkability foe the different types of population. The lower levels were opened to the public while the upper levels were dedicated to the heart patients.



Figure 12. Utilization of the atrium as a centre for activities at different floors

A biophilic design approach was adopted. Also, the facility was perforated to emphasize community care and social inclusion. The ground and first floors were designed to lure the public into the facility in order to engage them with health-related activities catering for the body, soul and mind. Figure () shows the main public access way which penetrates through the hospital. It is a bridge that allows the public to access the wellness activities, healthcare information facilities and organic/health food shops located on the lower floors of the facility. Figures 13 and 14 shows the first-floor plan where this penetration occurs.



Figure 13. A pedestrian bridge encouraging the public to access to the healthcare facility



Figure 14. Wellness and healthcare information activities for the public on the first floor

The levels of porosity were carefully designed to allow for the separation of the critical patients from the public. Figure 15 demonstrates the gradual shift of porosity and intensity of activities from the lower floors of the facility to the upper more quite floors.



Figure 15. Levels of porosity and intensity of movement

CASE STUDY 3

This case study presents a dissertation research that was conducted to examine the extent to which the current healthcare model caters for existential and experiential needs of Breast Cancer patients. Research findings were then used to inform design decisions and considerations made to realize the senior graduation design project of a Breast Cancer Treatment Center.

Dissertation Topic

The main problem statement which triggered this research is that "the blindspot which healthcare itself cannot see, is human existence and the sheer lived experiences of suffering." In other words, medical facilities are addressed with a highly mechanized and pathogenic manner that fails to accommodate the complexity of human experience, and obstructs patient's capability to deal with the hardships of their disease. Therefrom, the main research objective was to examine the translation of existential and experiential connotation of suffering in breast cancer patients into architectural design criteria. The primary research question was "How can the experiential connotation of suffering in Breast cancer be translated to architectural design elements?" and it was supplemented with sub-questions which gave a more comprehensive view of the ontological perspective of suffering in Breast Cancer, the corresponding patient needs and the extent to which a fraction was accommodated by the Breast Cancer care model in Egypt.

Research Methodology

Research findings were arrived at through a qualitative study that entailed a multistep research methodology. First step involved a philosophical and theoretical background to deduce main themes relevant to the existential notion of suffering in Breast Cancer patients from literature. This step was then followed by a delve into Architectural theory to translate philosophical and existential background into design criteria and approach. Then, for the field work, qualitative research with the focus on how a sense of comprehensibility is achieved in design was conducted at Baheya Foundation, Cairo, Egypt. The main research tool was observational analysis; documented in the form of sketches and photographs, to evaluate the implementation of extracted design criteria on site. The second research tool took the shape of semi-structured interviews to test users' sense of comprehensibility while they navigate through the building and study their perception of and interaction with the targeted design cues.

Research Findings

Research findings typically stemmed from two channels: literature and applied field work. Findings from literature included the thorough understanding of the ontological perspective of suffering in Breast cancer patients, and in turn the identification of the three phases of suffering that need accommodation in design; Having Suffering, Being Suffering and Becoming Suffering. Having suffering represents the muted type of suffering which occurs to a patient upon their diagnosis of cancer. It is characterized by shock and sudden disintegration. Being Suffering represents the intermediary phase where the patient has started to deal with the news. In this phase, suffering starts becoming lived in time and space and is characterized by the patient's need for communion and compassion from the surrounding context. Third phase is Becoming Suffering which involves transcending beyond the patient's condition and is characterized by spirituality, re-attunement to nature and reintegration back into their daily lives. The second track of findings from literature involved the corresponding design approach and spatial qualities which lied within the precinct of Phenomenological Architecture, as it gave access to existential terms of architecture hence, was

identified as the most suitable approach to tackle ontological and existential conditions of human experience. Findings from applied field work included strong insight into the socio-cultural background of the user group. This was acquired through the observation of and interaction with subjects in Baheya Foundation and it included an understanding of the Egyptian Fallaha's context of living, lifestyle and behavioral patterns. Applied field work findings also included the actual qualitative survey results indicating that Baheya Foundation was capable of meeting the majority of the design cues leading to a sense of comprehensibility. The most prominent shortcoming, however, was the failure to achieve visually distinct zones.

Senior Project

In alignment with research findings, the senior graduation project was a Breast Cancer Treatment Center in rural Suhag that aims to re-humanize the cancer care model by curating an existential caring encounter that fosters inner coherence and wholeness. Accordingly, the architectural concept approach was a phenomenological design approach that portrays values of essentiality, fragility and sensation through the ontological roots of architecture. Research findings directly affected three main design drivers, first of which is the incorporation of existential conditions of Breast Cancer Patients into the design (Table 1). Each of the suffering phases had corresponding architectural as well as sensory stances.

Existential Conditions of Breast Cancer Patients	Having Suffering: Muted Suffering	Architectural: Shock Absorption, Stillness, Directionality Sensory: Low Stimulation, Muteness		
	Being Suffering: Lived in time and space	Architectural: Sensory Integration, Communion		
		Sensory: Dualistic Expression, Contrast		
	Becoming Suffering Transcended Suffering	Architectural: Re-attunement to rhythms of nature, Sense of Collectivity		
		Sensory: High Stimulation, Reintegrative		
Sociocultural Context	Fallaha's Perception of Dwelling: Rituals of the Nile, Agriculture, Color, Geometry, Sense of Place (House of the Fellah)			
Sense of Comprehensibility through Design	Wayfinding Study: Circulation Hierarchy, Wayfinding Vistas, Distinct visual characters			

Table 1. The design drivers

The first phase of "Having Suffering" had the architectural stance of shock absorption, stillness and directionality, and the sensory stance of muteness and low stimulation. These are illustrated in Figures 16 and 17.



Figure 16. The detection entrance transition into muteness, stillness, essentiality and directionality



Figure 17. The imaging waiting nook's stillness of nature and low stimulation

The second phase of "Being Suffering" corresponded to an architectural stance of sensory integration for communion, alongside a sensory stance of dualistic expression and contrast in experience (Figures 18 & 19).



Figure 18. The central node's spatial articulation, sensory integration, wayfinding, and communion



Figure 19. The radiotherapy entrance's sensory integration, communion, and rhythm

Finally, the third phase of "becoming suffering" remained consistent with an architectural stance that fosters re-attunement to the rhythms of nature and a sense of collectivity alongside a reintegrative, high stimulation sensory stance (Figures 10 & 21).



Figure 20. The psychotherapy clinics environment of reconciliation, exposure to nature and calmness



Figure 21. The community node's re-atonement to nature and community scape

The second design driver to be directly affected by research findings is the integration of the user group's socio-cultural context by studying and extracting the architectural rituals that govern the Egyptian fallaha's perception of dwelling, most important of which were the rituals of the Nile, agriculture, color, geometry and the sense of place (Figure 22). Finally, the third design driver to be impacted by research findings is the induction of a sense of comprehensibility throughout the design, which was achieved by incorporating a clear circulation hierarchy, wayfinding vistas and distinctive visual characters along different project nodes.



Figure 22. The introduction of sociocultural rituals in design

CONCLUSION

Dissertation research has helped students improve the depth of their understanding of the values that should be embedded in the design of their healthcare facilities projects. The research activities helped improve students' appreciation of some of the sociocultural and/or other needs of the different user groups. As a result, student projects focused on the creation of places for healing, rather than places of treatment. A clear shift was observed in student projects from the disease-centered design approach to people-oriented design. The design approach was a reflection of the lessons learned from research activities. The first case study the variables which contribute to stress reduction of patients, family and staff were addressed. Accordingly, the design approach focused on adopting a variety of biophilic design techniques. This included the integration of gardens and natural daylight in the design. In the second case study, the Salutogenic approach causes and maintains healthy people was adopted. Accordingly, a perforated and active design approach was adopted. The third project was approached from the perspective of re-humanizing the cancer care model. It aimed at curating an existential caring encounter which fosters inner coherence and wholeness. Accordingly, a phenomenological design approach which portrayed the values of essentiality, fragility and sensation was adopted.

NOTES

¹ Devlin, A. S., Andrade, C., & Lima, M. L. "Hospital rooms and patients' well-being: Exploring modeling variables," *Grant report to the Academy of Architecture for Health Foundation*. (2014) Retrieved from http://aahfoundation.org/research/ongoing-research-initiatives/.

² Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H. B., Choi, Y. S., & Quan, X. A Review of The Research Literature on Evidence-Based Healthcare Design. *HERD: Health Environments Research and Design Journal*, 1(3) (2008): 61–125.

³ Iyendo, T. O., Uwajeh, P. C., & Ikenna, E. S. The therapeutic impacts of environmental design interventions on wellness in clinical settings: A narrative review. *Complementary Therapies in Clinical Practice*, 24 (2016): 174–188.

⁴ Ulrich, R. S., Zimring, C., Joseph, A., & Choudhary, R. *The Role of The Physical Environment in The Hospital of The 21st Century: A Once-In-A-Lifetime Opportunity* (Concord, CA: The Center for Health Design, 2004).

⁵ Beauchemin, K M and Peter Hays. Dying in the dark: sunshine, gender and outcomes in myocardial infarction," *Journal Of The Royal Society Of Medicine*, 91 (1988).

⁶ Walch J, Rabin B, Day R, Williams J, Choi K, Kang J. "The effect of sunlight on postoperative analgesic medication use: A prospective study of patients undergoing spinal surgery," *Psychosomatic Medicine*, 67 (2005):156-163

⁷ Ulrich, R. S., Zimring, C., Joseph, A., & Choudhary, R. "The Role of The Physical Environment in The Hospital of The 21st Century: A Once-In-A-Lifetime Opportunity," (Concord, CA: The Center for Health Design, 2004).

⁸ John C Moskop et al., "Another Look at the Persistent Moral Problem of Emergency Department Crowding." Ann Emerg Med, 2018, https://doi.org/10.1016/j.annemergmed.2018.11.029.

⁹ Amedeo Giorgi and Barbro Giorgi "Phenomenology. In J. A. Smith (Ed.), Qualitative Psychology: A Practical Guide to Research Methods." London: Sage, 2004.

¹⁰ Yarvin N. Marmor,et al. "Designing patient flow in emergency departments." IIE Transactions on Healthcare Systems Engineering, 2012. http://doi:10.1080/19488300.2012.736118.

¹¹ Camiel J. Beukeboom, et al. "Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room." The Journal of Alternative and Complementary Medicine, 2012. http://doi:10.1089/acm.2011.0488.

¹² Debajyoti Pati, et al. "Security Implications of Physical Design Attributes in the Emergency Department." HERD: Health Environments Research & Design Journal, 2016. http://doi:10.1177/1937586715626549.

¹³ Mary Kilcoyne, and Maura Dowling. "Working in an Overcrowded Accident and Emergency Department: Nurses' Narratives." Australian Journal of Advanced Nursing, 2008. http://doi:0813-0531.

¹⁴ Lucio Naccarella, et al. The Influence of Spatial Design on Team Communication in Hospital Emergency Departments. HERD: Health Environments Research & Design Journal, 2018.

http://doi:10.1177/1937586718800481.

¹⁵ Camiel J. Beukeboom, et al. "Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room." The Journal of Alternative and Complementary Medicine, 2012. http://doi:10.1089/acm.2011.0488.

¹⁶ Hongliang Zhang and Jiang Wu. "How Natural Light Affects Critically III Patients with Subarachnoid Hemorrhage." Critical Care, 2011. http://doi:10.1186/cc10146.

¹⁷ Dietscher C, Winter U, Pelikan JM. "The Application of Salutogenesis in Hospitals," in: Mittelmark MB, Sagy S, Eriksson M, et al., editors. *The Handbook of Salutogenesis*, (Cham: Springer; 2017). Chapter 27. Available from: https://www.ncbi.nlm.nih.gov/books/NBK435835/ doi:10.1007/978-3-319-04600-6_27.

¹⁸ Sakallaris, B., MacAllister, L., Voss, M., Smith, K., & Jonas, W. "Optimal Healing Environments," *PubMed Central* (2015) doi:10.7453/gahmj.2015.043.

¹⁹ White, M., Depledge, M., Snelling, D., Pahl, S., Humphryes, K., & Smith, A. "Blue space: The importance of water for preference, affect, and restorativeness ratings of natural and built scenes," *Journal of Environmental Psychology*, (2010). Retrieved from

https://www.academia.edu/2508636/Blue_space_The_importance_of_water_for_preference_affect_and_restorati veness_ratings_of_natural_and_built_scenes.

BIBLIOGRAPHY

- Adams, A., Theodore, D., Goldenberg, E., McLaren, C., & McKeever, P. "Kids in the atrium: Comparing architectural intentions and children's experiences in a pediatric hospital lobby." *Social Science & Medicine*, *70*, No 5 (2010): 658–667.
- Kutash, M., & Northrop, L. "Family Members' Experiences of The Intensive Care Unit Waiting Room." *Journal of Advanced Nursing*, *60*, No 4 (2007): 384–388.
- Malkin, J. A Visual Reference for Evidence-Based Design (1st ed.). Concord, CA: The Center for Health Design (2008).
- McLaughlan, R. "Psychosocially Supportive Design: The Case for Greater Attention to Social Space Within the Pediatric Hospital." *HERD: Health Environments Research & Design Journal*, *11*, *No* 2 (2017): 151–162.
- Shepley, M. M., & Song, Y. L. "Design Research and the Globalization of Healthcare Environments." *HERD: Health Environments Research and Design Journal*, *8*, No 1 (2014): 158–198.
- Shepley, M. M. "The Role of Positive Distraction in Neonatal Intensive Care Unit Settings." *Journal of Perinatology*, 26 (2006): S34–S37.
- Sherif, A., H. Sabry, A. Wagdy, I. Mashaly, R. Arafa "Shaping the slats of hospital patient room window blinds for daylighting and external view under desert clear skies," *Solar Energy*, 133 (2016): 1–13.
- Sherif, A., H. Sabry, R. Arafa and A, Wagdy (2014) "Enhancement of daylighting and external view as means for achieving a Salutogenic hospital" *World Health Design*, 7, No: 1 (July 2014): pp. 64-67.
- Tucker, C. M., Arthur, T. M., Roncoroni, J., Wall, W., & Sanchez, J. "Patient-centered, culturally sensitive health care." *American Journal of Lifestyle Medicine*, 9, No 1 (2015), 63–77.
- Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H. B., Choi, Y. S., & Quan, X. "A Review of The Research Literature on Evidence-Based Healthcare Design." *HERD: Health Environments Research and Design Journal*, 1 No 3 (2008): 61–125.
- Ulrich, R. S., Zimring, C., Joseph, A., & Choudhary, R. The Role of The Physical Environment in The Hospital of The 21st Century: A Once-In-A-Lifetime Opportunity. Concord, CA: The Center for Health Design. Concord, CA: The Center for Health Design (2004).
- Ulrich, R. S. View Through a Window May Influence Recovery From Surgery. *Science*, 224, No 4647 (1984): 420–421.

ENGAGED PHOTOGRAPHY AS URBAN COMMUNICATION PLATFORM IN SUSTAINABLE DEVELOPMENT CONTEXT¹

Author: JITKA CIRKLOVÁ

Institution: UNIVERSITY OF FINANCE AND ADMINISTRATION, CZECH REPUBLIC

INTRODUCTION

The teaching and research project takes a value-based approach that examines the public space in terms of relationships, social well-being, and sense of community. The goal is to help students better understand and manage, sustainably the examined public space. Through the method of engaged photography, students has brought together a range of stakeholders including local inhabitants, businesses, heritage organizations, artists, and communities, to exchange knowledge, and expand the interdisciplinary conceptual and public policy debates about public space in the particular area.

PRODUCTION OF PUBLIC SPACE

The project begins with the theory that that urban space is produced both materially and through discourse. The author of this theory is the French sociologist Henri Lefebvre². According to Lefebvre cities are a complicated combination of power relations, different ways of life and different identities. The urban space is the most fascinating way in which the environment reflects human relationships and the processes by which society is formed. According to Lefebvre , those who manage and own the city premises have a great influence and power. At the same time, he argues that urban spaces belong to their regular users who should be given the opportunity to use the spaces to materialize their needs and interests. Lefebvre thus calls for the creation of an urban space that promotes human freedom and creativity, offers the possibility of activities that supports community participation and self-realization of all its inhabitants. Therefore, social processes were placed at the center of the teaching as well as of the ethnographic and visual analysis of the selected location. By approaching space as text, we could study the spatial codes produced in and through society.

This approach not only helps students understand Lefebvre's levels of social space based on the relationships between subjects, objects and activities in urban setting, but it also opens up the discussion about the complex structure of the term *sustainable landscape* as a combination of environmental, social, economic, political and aesthetic elements. We observe the contemporary practice in which public administrative institutions and architects alike trying to find solutions to dynamic social changes. The corporate spectacularism in the cities is being increasingly complemented by specific local projects that seek to solve the problems of local communities by finding a sustainable solution³.

Throughout the whole project we worked with categories of public space that is presented by Barcelona based multidisciplinary group Raons públiques ⁴ (Figure 1). This is an inclusive and integrated approach to urban design with an aim to use participation as a tool of contemporary city planning. By further elaborating on the categories of public space, students were able to perform structured data collection, understand the composition of particular categories and visualize the relationships between different parts of public space, material objects, users and inhabitants.



The selected diagram helps students to understand how material and non-material elements of public space influence current and potential social life in location. After participating in this seminar, the students were able to address the complexity of relations found in public space such as the tension between living heritage, memorialized, apparent or hidden histories of the place and its current identity. Students will also see the link between the local identity and the implementation of sustainable management in economic, aesthetic, and environmental governance mechanism.

Teaching the Research in the Field - Project-based Learning

For undergraduate students enrolled in programs of Marketing Communication, Social Policy, Law or Communication Studies program, but not Sociology, this project was their first encounter with the complete process of qualitative ethnographic research, from research design to data interpretation. They had to actively search for and apply relevant qualitative methodology in changing social context. The project enhanced significantly their understanding of classical research methods such as Participant observation, Semi-structured interviews, Content analysis, and Focus Groups. We decided to methodologically unify our data collection and to combine the classical methods with research techniques of Engaged Photography and Netnography⁵ that proved to be an attractive research tool for the undergraduate students.

Engaged Photography as a research tool helps students better understand the diversity of cultural perspectives, the intergeneration time frame in the use of public place, and the connection of the researched location with the wider metropolitan space. The method of Engaged Photography not only provides data within a certain research, but also helps to create social connections between

respondents who become actively searching for visual stories in a familiar environment⁶. The photographs brought a deeper awareness of belonging to the local community for both the locals and the student researches. The photographs also became a form of artistic performances of the local community and a tool which students use to establish communication with the local residence. Using Engaged photography, students brought together a range of stakeholders including artists, local inhabitants, small business owners, members of heritage organizations, local cultural clubs and associations. Through mutual knowledge exchange, the students learned how conducting research can enhance and expand the interdisciplinary conceptual and public policy debates about public space in particular area.

FRAMING THE RESEARCH IN THEORETICAL CONCEPTS - THE MIDDLETOWNS

Although the authors of presented diagram categorize the public space of a large city, we decided to conduct student research in the space of a smaller town, which simplified the context of the researched locality. The choice of location was influenced by two, now classical studies of life in a small town which students found interesting and they repeatedly and spontaneously returned to these studies for inspiration in data interpretationand comparision between current social problems and historical ones. The first of the two classic studies examined the daily life in a typical small village community and became a trend-setting sociological research. The book *The workers from Marienthal* was published in 1933 by research team Marie Jahoda, Paul Lazarsfeld and Hans Zeisel who investigated the unemployment situation in the village Marienthal in Lower Austria. The research was revolutionary. Scientists Marie Jahodová, Paul F. Lazersfeld and Hans Zeisel were actively engaged in the events of Mariental and provided rich description of the village life. Their research is considered a classical reading for Sociology students who wish to understand and make good use of of qualitative research. For the teaching of qualitative methodology, the students were acquainted with the principles of qualitative research:

• Objective observation as well as introspective reports should be obtained for each phenomenon studied;

• Case studies should be appropriately combined with statistical information;

• Information on the present should be supplemented by information on earlier stages of the development of the phenomenon under study;

• Natural and experimental data should be combined: experimental data means using questionnaires and sample surveys, natural data is obtained by "non-influencing (non-interfering) methods";

• Data must be obtained from the people's daily life without the intervention of the researcher.⁷ The research of Mariental was inspired by the study carried by Robert and Helen Lynd in the mid-1920s using the approach of Social Anthropology that examined the daily life of a typical small american town Muncie in Indiana⁸. Their study became the inspiration for a six-part television series. Using this study, students not only learned about classical research and methodology but also critically discuss the trend of current reality shows, which are often presented in the media as social research or scientific experiment.

Qualitative research, using the emic perspective and fortified by content, narrative and visual analysis of available material, such as town chronicles, contemporary local newsletters, and national media coverage of the area, allows researchers to monitor the dynamic of changes in the social structure of the observed community and its daily life.

Engaged photography was chosen as the main methodological tool of the research. For students growing up in a visually rich communication and media environment, Engaged Photography has

proven to be an easily accessible and graspable method at the beginning of research. In selected research locality were respondents asked by the students to provide a photograph (in person or to guide our student to take a picture) of a place in town which:

- they like and consider to have a positive effect on local life;
- or they don't like and consider to be a negative element of their town.

Within the two-week-long fieldwork in October 2020, 47 local residents had participated in the research (21 women, 26 men). The age range of participant was 21-70 years. All are permanent residents of the town Davle.

The town of Davle⁹, located 22 kilometers south of the capital city of Prague, is a popular destination for day trips from Prague. At the last census in 2018, the town had 1,660 inhabitants. In 2008, Davle was established as a township, settlement independent of Prague.

The civic amenities are at a satisfactory level. In Davle, there are a nine-year primary school, a kindergarten, a post office, a dental office, a pharmacy, a pediatrician and a general practitioner for adults, a retirement home, a church, a chapel, a cultural and social center, a multifunctional sport hall, an outdoor sport complex, two fire stations, a library, five playgrounds, water supply and sewerage system. The town is stretching upstream of the river Vltava and has a long timber rafting history. The bus and train system in Davle is a part of Prague Integrated Transport, providing fast and efficient connection to the capital city. All students assumed this last point would be considered by the local residents as the most positive element about the small town Davle.

RESEARCH RESULTS – CONSTRUCTING LIVED SUSTAINABLE LANDSCAPE

Since the global pandemic crisis of 2020, there has been an increasing demand for a new understanding of social and public place, locality, and community. We are increasingly confronted with the search for concepts that take into account the need for residents to remain in their place of residence. Public space, its accessibility, security or sustainability thus becomes a discussed topic not only for local self-government, but especially for ordinary residents, for whom public space was often just a backdrop to their daily activities.

Previously, the small town daily events were researched on different levels of the meanings for participants on an individual subjective level. The goal was to understand the relations existed between history and local folklores, and between some forms of political revolt against communism and the new dimensions of communities after 1989 transformation. The changes taking place in the complex social systems towards sustainability and social responsibility need to be better understood from the perspective of sociology. The outcomes of student involved research can help to open a dialogue about the need to regain social and environmental balance and encourage sustainable practices to be openly articulated.

The reserch of Davle proved that the identity of the place, the memory of the distinctive local identity matters to its' inabittans the most. It can be categorized as an apparent history.

In this category, a dominant example is the old iron bridge in Davle across the Vltava built in 1905. In 1968, it served as a backdrop for filming a war story based on the actual event "Bridge at Remagen". The bridge followed by an old train station and the memorial of timber rafting was mentioned among the most improtant positive element of lived public place.



Figure 2. The Iron bridge



Figure 3. Timber rafting memorial



Figure 4. Revitalized public space and parks

Respondents positively assessed the changes in the city. There has been an increase in the share of urban greenery with newly planted trees in the town center, a promenade on the river bank, a new park near the school, hiking nature trails that lead from the city directly to the surrounding countryside.

For the purpose of a student research, we set only three age categories: pre-productive age, productive and post-productive. The aim of was to bring students to think about different models of social interaction and activities in the use of public space.

However, across all age groups, there is a positive evaluation of the possibilities of activities that increase the cohesion of the local community and allow people to spend their free time actively. Some common examples given were sports clubs for children and community programs for seniors



Figure 5. Sport activities and clubs



Figure 6. Hiking trails

Already during data collection, students started to understand how complex a social phenomenon is a functional urban community, and how Lefebvre's theory, which states that cities are combinations of complex relations, lifestyles and identities, manifests itself in reality.

The research helped students understand how the inhabitants value the opportunities to interact socially in public space such as in local small shops and pubs – the term *active social capital* has been given a clear form and content.

Surprisingly, the availability of transport and medical service was in the closing category of perceived positive elements of the lived public space. The town inhabitants enjoy creating and cultivating quality relationships within the community and with the natural environment. The students' hypothesis that the locals would appreciate the fast transport because it offers them a quick escape from a small town to the capital turned out to be invalid.

Perceived negative elements were summarized into five catgories. The leading set of complains was about the limited capacity of the public library, the parking problems, the restriction of dogs in park, the unfinished sidewalks and the limited night anchorage by the river.

Davle's proximity of the capital and its location by the river makes it a popular excursion destination. There are always new faces around town. Residents also complain about the large number of cottages that become noisy during weekends and holidays.

The expected negative element was about the messy areas around the recycling bins, vandalism with senseless graffiti and tags, and irresponsible dog owners.

As for disruptive elements of the shared public space, respondents pointed to the yet-unrevitalized communist-era buildings and even specifically mentioned design details, such as the entrance door of the town hall. For residents in the age cohort of 40 years and older , the door was a clear, material reminder of the communist regime.



Figure 7. Yet-unrevitalized elements of buildings



Figure 8. Messy areas, vandalism, tags, restrictions of access



Figure 9. Chaotic parking in front of communist-era architecture

This has sparked a discussion among students about the power of design details that create the image and identity of a place. Marketing communication students discussed the possibilities and risks of using retro elements in marketing campaigns. They also learned that different interpretations of visual details which point to certain group-shared values have the potential to unite or divide the community.

FROM RESEARCH TO ACTIVATING OF COMMUNITIES OF PRACTICE

Our engaged photography project initiated a discussion on the implementation of possible changes in the town – starting with previously overlooked details. The results of the joint photographic participatory project were discussed in the local library with great social engagement. Participants used the photographs to initiate a dialogue with local authorities about improving the local environment. The coming together of like-minded individuals who previously had never met created a new supportive social network which in turn became an active example of a community of practice.

Communities of Practice became a new topic that was possible to introduce to the class towards the end of the research project. The community of practice originally denoted a group of people who share a craft or a profession. The concept was expanded to indicate a process of collective learning within groups with a common concern or interest¹⁰. In our case it was the need for a new municipality door that was agreed by the participants.

Communities of Practice are organizational forms that are very compatible with the current knowledge economy that produces a reliance on shared information among social groups in-action. According to

sociologist Zygmunt Bauman community, it is nowadays another name for "lost paradise"¹¹. Communities of practice are now seen as a strong actor in the greater engagement for social transformation towards sustainability on local level, improving the lives of society members, cultivating sustainability literacy and encouraging community involvement.

CONCLUSION

The direct personal experience with research and fieldwork have captured students' interest in topics that we addressed after evaluating the research results. Among them was the deep understanding of the significance of face-to-face contact with the respondents while collecting the data compare to using electronically distributed questionnaires, which are associated with ever lower trust and low return on responses. Students also learned the importance of understanding the existing social structure, infrastructure and local context before implementing structural changes.

The vulnerability of the world we live in has been discussed for many years. The fact that the coronavirus crisis gives us new opportunities is slowly becoming a cliché. What do we want our society to look like and what reality we will return to? Are we going to invest our time, money, creativity both – socially, economically, ecologically?

Successful management and development of cities, towns, and urban areas are based on the understanding of the real needs and experiences of those who live in them – its citizens. Traditional ways to city management and decision-making often run on little data or without an in-depth analysis of the key stakeholders and their needs. A low level of satisfaction creates an endless spiral of inefficiencies and animosity. it is possible to meaningfully engage stakeholders in a process of any complexity and to create an environment of constant information flow and social consensus-building while making decisions that would improve the quality of life of all and help create sustainable cities and communities with strong and transparent institutions.

Our students created a visual patchwork of an annotated photos of examples of good practices they consider important and would like to keep as part of the better post-COVID society we all wish for. Here we can find elements and reality that is completely new, some activities are rediscovered under new circumstances, material objects as well as intangible values, perspectives, and standpoints. While all images reflect unique and personal demands, they are all interrelated. For teaching and student reasearch purposes, the public space became a laboratory where they could examine the dynamic processes of the social construction of reality. The town provided the opportunity to visualize the needs of our time, complexity of connections between place and people where the representation of identity and history provides basis for desirable transformation.

NOTES

¹ The result was created during the solution of the student project " 7427/2020/05 Customer attitudes to communication strategies of companies in the field of sustainable fashion. European perspective" with the use of targeted support for specific university research of the University of Finance and Administration.

²Henri Lefebvre, The Production of Space, (Oxford, England: Blackwell, 199).

³Jitka Cirklová, "Art to come: histories of contemporary art by Terry SmithDurham: Duke University Press, 2019ISBN: 978-1-4780-0305-2," *Visual Studies 1-2* (2020).

⁴ "Approach: Categorizing Public Space," Learning From Barcelona. Accessed July 26, 2018. https://learningfrombarcelona.wordpress.com/approach/.

⁵Robert Kozinets, *Netnography* (Los Angeles: Sage Publications, 2015).

⁶Gary Bratchford, Gina Giotaki, and Liz Wewiora, "Socially Engaged Photography and Wellbeing: Reflections on a Case Study in the Northwest of England." *London Journal of Primary Care* 10 (4) (2015): 82–88. https://doi.org/10.1080/17571472.2018.1477439.

⁷Marie Jahoda, Paul F Lazarsfeld, Hans Zeisel, and Christian Fleck, *Marienthal The Sociography of an Unemployed Community* (Editorial: Routledge, 2017).

⁸Robert Staughton Lynd and Helen Merrell Lynd, *Middletown: a study in contemporary American culture*. (London: Constable, 1979).

⁹"Davle Township," Municipality of Davle website, Accessed January 20, 2021. https://mestysdavle.cz.

¹⁰Carl A. Maida and Sam Beck, *Global Sustainability and Communities of Practice*. (Bergham Books, 2018), 236p.

¹¹Zygmunt Bauman, Community: Seeking Safety in an Insecure World. (Hoboken: John Wiley & Sons, 2013).

BIBLIOGRAPHY

Bauman, Zygmunt. Community: Seeking Safety in an Insecure World. Hoboken: John Wiley & Sons, 2013.

- Bratchford, Gary, Gina Giotaki, and Liz Wewiora. 2018. "Socially Engaged Photography and Wellbeing: Reflections on a Case Study in the Northwest of England." *London Journal of Primary Care* 10 (4): 82–88. https://doi.org/10.1080/17571472.2018.1477439.
- Categorizing Public Space. "Approach: Categorizing Public Space." 2011. Learning From Barcelona. Accessed July 26, 2018. https://learningfrombarcelona.wordpress.com/approach/.

Cirklová, Jitka. "Art to come: histories of contemporary art by Terry SmithDurham: Duke University Press, 2019ISBN: 978-1-4780-0305-2 (paperback)." *Visual Studies* (2020), 1-2.

Davle Municipality Website. "Davle Township." Accessed January 20, 2021. https://mestysdavle.cz.

Jahoda, Marie, Paul F Lazarsfeld, Hans Zeisel, and Christian Fleck. *Marienthal The Sociography of an Unemployed Community*. Editorial: Routledge, 2017.

Kozinets, Robert. Netnography. Los Angeles: Sage Publications, 2015.

Lefebvre, Henri. 1991. The Production of Space. Oxford, England: Blackwell.

Lynd, Robert Staughton, and Helen Merrell Lynd. *Middletown: a study in contemporary American culture*. London: Constable, 1929.

Maida, Carl A. and Sam Beck. Global Sustainability and Communities of Practice. Bergham Books, 2018.

TYPES OF PEER ASSESSMENTS IN GROUP PROJECTS

Author: MICHELE FLORENCIA VICTORIA

Affiliation: ROBERT GORDON UNIVERSITY, UK

INTRODUCTION

The P21 Framework for 21st Century Learning, which was developed by educators, education experts, and business leaders to define and illustrate the skills, knowledge, expertise, and support systems that students need, identifies collaboration as a key educational outcome as it prepares students for the real-world problem solving and enhance their prospects for employment.¹ Therefore, group assessments are becoming a commonplace in higher education, mainly to promote collaborative working environment and peer learning amongst students. In addition, group assessments are considered as an effective assessment strategy to manage large classes as it reduces the marking burden on academics.² Despite the benefits, students resent group work particularly when a common group mark is awarded when there is a varying level of inputs from the members of the group.^{3,4,5} Especially, non- engaging students could possibly attain good grades without contributing to the group work or with minimal contribution. This problem of "free riders" disadvantages and discourages engaging students.^{6,7}

There is a plethora of peer assessment methods used by academics to assess group works. However, there is a dearth of studies which explores why a particular method is preferred and the difference it makes on the final grades of students. Therefore, this paper explores different methods of peer assessments by reviewing recent literature and expands into comparing the final grades derived from two different methods of peer assessments adopted in the same module to study the end results. Finally, the correlation between the final individual grades and the peer marks given was unpacked which allows academics to make an informed decision.

LITERATURE REVIEW

Group Projects

The increasing use of group projects and team-based learning has become the norm in higher education with the pedagogical shift from teacher-centred learning approaches to student-centred learning approaches.⁸ Group projects are a catalyst to promote collaboration amongst students as the modern higher education strives to produce graduates with collaborative skills to improve their career prospects.⁹ In simple terms, collaboration can be defined as 'the act of working with another person or group of people to create or produce something.¹⁰ In the educational context, this can be translated into, working in teams to produce an output that meets the assessment requirements and demonstrates the achievement of the learning outcomes of a given module. Group projects are also proven to increase the productivity of academics by attending to students in groups rather than individually and through reduced marking burden.¹¹ Despite the perceived benefits of collaboration, literature reports

learners resisting group works and collaborative exercises due to the problem of free riders, those who do not contribute equally but receive the same grade as others.^{12,13,14} Scholars advocate that peer assessments can alleviate the problem of "free riders" and help reap the benefits of collaborative group projects.^{15,16,17}

Peer Assessments

Literature on peer assessments can be traced back to early 1990s. Latest developments in peer assessments are essentially a modification to the fundamental techniques proposed by Falchikov,¹⁸ Goldfinch and Raeside,¹⁹ Stanier,²⁰ and Topping.^{21,22} This suggests that these are seminal texts in the area and the methods proposed are still valid or in use in the same or different shape or form. Therefore, it is imperative that the historic literature and the development in the area is appraised. Topping²³ defines peer assessment as,

"an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status".

Accordingly, peer assessments can be used to assess the product of the group work or the process of the group work.^{24,25} Either way, peer assessments and group work can lead to student empowerment.²⁶ Students take ownership of their learning and become active participants in the learning process when they play the role of assessors. Peer assessments improve the quality of group assessments by positively influencing the attitudes of students and rewarding engaging students.²⁷ Stanier tested the attitudes of students engaging in a peer assessment integrated group work over the course of a multi-disciplinary module and noted that the attitudes of the students changed positively over the period of the module.²⁸ The study also reported that the students seemed to enjoy the group work while showing improved team effectiveness and a reduction of clashes.²⁹

A summary of the methods reported in the literature in the recent past (2009-2019) is presented in Table 1.

Computation Method	
Hybrid (Multiplier/Distribution)	
Multiplier	
Multiplier	
Multiplier	
Multiplier	
Distribution	

Table 1. Summary of the peer assessment methods reported in the literature

Literature in the past decade primarily reported of two methods and the third one is a combination of the two methods. This is an adaptation of the method reported in Conway et al.'s study.³⁶ Especially, addition and subtraction methods have become unpopular in the recent past. The reason for addition/subtraction method going out of fashion is could be attributable to the aim of the peer assessment. As discussed before, the two key aims of peer assessments are: (1) Assessing the group working/collaborative skills of the students (the process), or (2) Differentiating the final grade based on the individual's contribution to the final outcome (the product). Accordingly, addition/subtraction method is mainly used when the aim is to assess the collaborative skills of the student (or the process). Academics are moving away from assessing the process and moving towards assessing the product. Hence, varying forms of multiplier methods seem to be a preferable peer assessment method amongst academics. Therefore, distribution method and multiplier methods are compared.

Table 2 summarises the pros and cons of the two methods reported in the literature. Accordingly, both methods mainly aid the assessment of the final product. Nevertheless, the assessment of the process (or the collaborative skills of the student) can be factored in the PA by including collaboration as one of the assessment criteria. Problems of distribution method can be overcome by employing a carefully developed questionnaire or a PA form to guide the students in distributing the marks reasonably and objectively and providing a formula to distribute the marks. On the other hand, the multiplier methods are objective, however, they need to be straightforward, transparent, and interpretable. The hybrid method proposed by Carson and Glasor³⁷ aimed at overcoming the reported weaknesses to some extent by combining both methods. Yet, lack of a guide to distribute the marks needs to be addressed in Carson and Glasor's method.

Peer Assessment	Pros	Cons	Applicability
Methods			
Distribution Method	Straight-forward Simple and easy to understand by the students Students agree on the mark distribution as a group	Distribution is arbitrary/ no guide Difficulty in reaching consensus Complexity increases with larger groups Verification and validation can be difficult	Assess the product
Multiplier Method	Use of PA forms Students are aware of the marking criteria beforehand Independent assessment Objective computation	Can be complicated Some formulae are difficult to interpret Less transparent with complex computational methods	Assess the product

Table 2. Comparison of the existing methods of peer assessments in group projects

In summary, peer assessments are essentially a useful tool to minimise the effect of "free-riders" in group projects which are a catalyst to promote collaboration in the learning process. Of the various peer assessments methods practiced within the higher education setting, the functionality and impact of each method on the final grades vary. Therefore, it is important that academics thoroughly understand the pros and cons of the method being adopted and how it influences individual grades quantitatively. However, the recent literature suggests academics are more inclined towards product-based methods like multiplier and distribution methods compared to process-based methods like addition/deduction methods. Therefore, this paper uncovers this mystery by presenting an evaluation of the final grades derived from a process based and product-based peer assessment methods to study their impact on the overall spread of grades (standard deviation) and correlation between the peer mark and final mark to aid the selection process.

METHOD

The study involves primary data collection and analysis of two peer assessment methods to explore the impact of process based and product-based peer assessments on the final grades of students. Addition/deduction method of peer assessment is mainly used to assess the process of group working skills while multiplier method and distribution method are used to assess the product of group working

skills. Of the two product-based methods, multiplier method of peer assessment was used due to the availability of primary data that was obtained from a Quantity Surveying module. Student grades including peer mark and group marks of 27 students on this module was collected. In total, there were 8 groups of 3 to 4 students. Group mark was awarded by the tutor for the work submitted in groups and the peer mark was awarded by members of the group to one another. Peer marking process was guided through a pre-developed proforma and was conducted anonymously via an e-learning platform. The collected data was processed using addition method and multiplier method to derive the final marks. The formulae used to calculate individual marks for addition and multiplier methods are as follows:

Addition Method:

Individual Mark = Group Mark x 80% + Peer Mark x 20% (1) Multiplier Method:

Individual Mark = Group Mark x (Average Individual Peer Mark/Average Group Peer Mark) (2)

The marks were presented graphically (for example, G1S1 implies Student 1 of Group 1) and the standard deviation of the peer marks vs. final individual marks were analysed along with correlation coefficient to study data patterns. Correlation coefficient is a metric that measures the linear correlation between two variables, hence, helpful to study the outcome of the two peer assessment methods chosen.

Correlation coefficient can take range from -1.00 to +1.00. The sign of the correlation coefficient indicates the direction of the relationship (positive or negative) while the value indicates the strength of the relationship between two variables. Cohen suggest 0.1 represents a small effect, 0.3 represents a medium effect and 0.5 or more represents a large effect³⁸ while Evans argues values between 0 and 0.19 to be "very weak", 0.20 to 0.39 to be "weak", 0.40 to 0.59 to be "moderate", 0.60 to 0.79 to be "strong" and 0.80 to 1.0 to be "very strong". ³⁹ Even though these benchmarks are useful, Field⁴⁰ suggests that it is important to interpret the correlation in the context of the research.

FINDINGS

Data Analysis Addition Method

Individual marks derived from the addition method are presented in Figure 3. Group mark and peer marks were also plotted in the graph for ease of comparison. As illustrated in the graph, the final individual grades are always higher than the group grade when the peer mark is above the group grade and vice versa. However, the correlation between peer mark and individual mark is less than 0.1 (0.09). In addition, the standard deviation of the peer mark was 16 while the standard deviation of the individual mark was 11.



Figure 1. Outcomes of Addition Method

Multiplier Method

Similarly, individual marks derived from the multiplier method are presented in Figure 4. Contrary to the addition method, the final individual grades always mimic the pattern of peer marks. Final marks are sometimes lower than the group mark even though the pee mark is higher than the group mark. On the other hand, multiplier method depicts a better correlation (0.38, p=0.05) between peer mark and individual mark compared to addition method, yet the correlation is not very strong, and the standard of the individual mark was 18.



Figure 2. Outcomes of Multiplier Method

DISCUSSION

Primary data findings clearly present the difference in outcomes of the two peer assessment methods. When the process of collaborative skills is tested via addition method, the grades tends to be higher than the group grade unless the peer mark is lower than the group mark. This method in a way escalates final individual grades without a proper rationale. However, with multiplier method, final individual mark is derived in relation to the overall group's contribution. This implies if the individual's contribution was higher than the overall group's contribution then the final individua mark was higher than the group mark and vice versa. Assuming all members of the group contributed equally, the group mark will become the final individual mark for everyone in the group. Hence, the escalation of the final grades in multiplier method is justified by the fact that the students covering for disengaged students are awarded additional points for contribution beyond the requirement.

The impact of the two methods on the final outcomes is explained by the differing standard deviation and the coefficient of correlation. As in the addition method, the standard deviation of the individual marks is lower than the standard deviation of peer marks whereas in multiplier method the standard deviation of the individual marks is higher than the standard deviation of peer marks. This implies that 66 percent of the class has a mark between 55 and 77 with addition method as opposed to between 41 and 78 with multiplier method. Accordingly, addition method looks attractive based on the standard deviation yardstick.

Based on the correlation coefficient analysis, multiplier method shows a moderate correlation between peer mark and the final mark as per Cohen's yardstick⁴¹ although according to Evans's this is considered very low. ⁴² On the other hand, no correlation was found in the addition method (almost zero). This suggests, of the two methods, individual marks are positively correlated with peer marks in the multiplier method which can be explained by the fact the multiplier method uses a multiplication factor to calculate the final mark from peer mark, resulting in a certain level of correlation. Yet, the correlation was not very strong. Correlation coefficient is a factor that can be considered in choosing a peer assessment method although not compulsory. However, multiplier method should be chosen if the tutor wants final marks to be a distinct reflection of peer marks.

CONCLUSION

Use of peer assessments in group projects are becoming popular to address the problem of free riders and to engage students effectively in group projects. However, choosing an effective method amongst a pool of methods can be challenging. Therefore, this research attempted to shed some light in this regard by conducting a systematic review of the recent literature, followed by an evaluation of real-life data to demonstrate the impact of addition and multiplier peer assessment methods. Literature findings indicated that two methods are predominantly in practice over the last decade including distribution method and multiplier method, both intending to assess the final product. Addition/deduction method has now become unpopular due to this method geared towards process assessment as opposed to product assessment and academics preferring product-based peer assessments.

Distribution method is comparatively easy to understand than some of the multiplier methods. Lacking objectivity is one of the key shortfalls of distribution method. Contrarily, objectivity is a key strength of multiplier methods while the level of complexity makes this method difficult to interpret (by students) and hence, less desirable. Despite the advancement of multiplier functions, a simpler function is deemed effective in the eyes of students. Besides, both methods lead to a 'no free-rider' zone while improving team dynamics.

Evaluation of addition and multiplier methods reveal that the rigour of final individual marks can be ensured in multiplier method through meticulously developed equation. However, similar rigour is difficult to achieve with addition method. On the other hand, addition method seems to have a healthy spread of marks with a lower standard deviation as opposed to the multiplier method with a higher standard deviation for the analysed sample. In addition, multiplier method produces a better correlation compared to addition method. The choice, however, is not between addition or multiplier method but process-based assessment or product-based assessment.

Further, it is important to define the aim of the assessment (product or process) and communicate it clearly to students to improve the credibility of peer assessments. In addition, appropriate training to students as assessors is also crucial for the assessment process to be reliable and to reflect the reality. Therefore, the design of peer assessments and the training of students should be treated as equally important to achieve the goal of peer assessments, which is to improve the quality of group works by positively influencing the attitudes of students.

NOTES

¹"Framework for 21st Century learning," P21, accessed August 21 2020, http://static.battelleforkids.org/documents/p21/P21_framework_0816_2pgs.pdf.

²Robert Cannon and David Newble, *A handbook for teachers in universities and colleges*. (UK: Kogan Page Limited, 2000).

³Kathleen Carson and Rainer E. Glaser, "Chemistry is in the news: assessing intra- group peer review," *Assessment & Evaluation in Higher Education* 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.

⁴Naomi Elliott and Agnes Higgins, "Self and peer assessment – does it make a difference to student group work?," *Nurse Education in Practice* 5 (2005): 40-48, accessed August 20, 2020, doi:10.1016/j.nepr.2004.03.004. ⁵David Hall and Simon Buzwell, "The problem of free-riding in group projects: Looking beyond social loafing as reason for non- contribution," *Active Learning in Higher Education* 14 (2012): 37-49, accessed August 20, 2020, doi: 10.1177/1469787412467123.

⁶Kathleen Carson and Rainer E. Glaser, "Chemistry is in the news: assessing intra- group peer review," *Assessment & Evaluation in Higher Education* 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.

⁷Naomi Elliott and Agnes Higgins, "Self and peer assessment – does it make a difference to student group work?," *Nurse Education in Practice* 5 (2005): 40-48, accessed August 20, 2020, doi:10.1016/j.nepr.2004.03.004. 8Robert Cannon and David Newble, *A handbook for teachers in universities and colleges*. (UK: Kogan Page Limited, 2000).

⁹"Framework for 21st Century learning," P21, accessed August 21 2020, http://static.battelleforkids.org/documents/p21/P21_framework_0816_2pgs.pdf.

¹⁰"Oxford Learner's Dictionary English oxford living dictionaries," Oxford University Press Dictionary, accessed August 14, 2020, https://www.oxfordlearnersdictionaries.com/definition/english/collaboration?q=collaboration https://en.oxforddictionaries.com/definition/collaboration.

¹¹David Hall and Simon Buzwell, "The problem of free-riding in group projects: Looking beyond social loafing as reason for non- contribution," *Active Learning in Higher Education* 14 (2012): 37-49, accessed August 20, 2020, doi: 10.1177/1469787412467123.

¹²Kathleen Carson and Rainer E. Glaser, "Chemistry is in the news: assessing intra- group peer review," *Assessment & Evaluation in Higher Education* 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.

¹³Naomi Elliott and Agnes Higgins, "Self and peer assessment – does it make a difference to student group work?," *Nurse Education in Practice* 5 (2005): 40-48, accessed August 20, 2020, doi:10.1016/j.nepr.2004.03.004. ¹⁴David Hall and Simon Buzwell, "The problem of free-riding in group projects: Looking beyond social loafing as reason for non- contribution," *Active Learning in Higher Education* 14 (2012): 37-49, accessed August 20, 2020, doi: 10.1177/1469787412467123.

¹⁵Linda Stanier, "Peer assessment and group work as vehicles for student empowerment: A module evaluation," *Journal of Geography in Higher Education* 21 (1997): 95-98, accessed August 20, 2020, doi: 10.1080/03098269708725413.

¹⁶Keith Topping, "Peer assessment between students in colleges and universities," *Review of Educational Research* 68 (1998): 249-276, accessed August 20, 2020, doi: 10.3102/00346543068003249.

¹⁷Simon J. Williams, "An Approach for the Assessment and Allocation of Individual Grades for Group-Based, Collaborative Work by Combining Self- assessment, Group-Evaluation and Wiki Data: Results from an Action Research." in Assessment for Learning Within and Beyond the Classroom Taylor's 8th Teaching and Learning Conference 2015 Proceedings, ed Siew F. Tang and Loshinikarasi Logonnathan, (Singapore: Springer, 2020).

¹⁸Nancy Falchikov, "Group process analysis-Self and peer assessment of working together in a group," *Educational & Training Technology International* 30 (1993): 275-284, accessed August 20, 2020, doi:10.1080/0954730930300308.

¹⁹Judy Goldfinch and Robert Raeside, "Development of a peer assessment technique for obtaining individual marks on a group project," *Assessment and Evaluation in Higher Education* 15 (1990): 210-231 accessed August 20, 2020, doi: 10.1080/0260293900150304.

²⁰Linda Stanier, "Peer assessment and group work as vehicles for student empowerment: A module evaluation," *Journal of Geography in Higher Education* 21 (1997): 95-98, accessed August 20, 2020, doi: 10.1080/03098269708725413.

²¹Keith Topping, "Peer assessment between students in colleges and universities," *Review of Educational Research* 68 (1998): 249-276, accessed August 20, 2020, doi: 10.3102/00346543068003249.

22 Keith J. Topping, "Peer Assessment," *Theory into Practice* 48 (2009): 20-27, accessed August 20, 2020, doi: 10.1080/00405840802577569,

²³Keith Topping, "Peer assessment between students in colleges and universities," *Review of Educational Research* 68 (1998): 249-276, accessed August 20, 2020, doi: 10.3102/00346543068003249.

²⁴Kathleen Carson and Rainer E. Glaser, "Chemistry is in the news: assessing intra- group peer review," *Assessment & Evaluation in Higher Education* 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.

²⁵Debbi Weaver and Alexis Esposto, "Peer assessment as a method of improving student engagement," *Assessment & Evaluation in Higher Education* 37 (2012): 805- 816, accessed August 20, 2020, doi: 10.1080/02602938.2011.576309.

²⁶Linda Stanier, "Peer assessment and group work as vehicles for student empowerment: A module evaluation," *Journal of Geography in Higher Education* 21 (1997): 95-98, accessed August 20, 2020, doi: 10.1080/03098269708725413.

²⁷Keith Topping, "Peer assessment between students in colleges and universities," *Review of Educational Research* 68 (1998): 249-276, accessed August 20, 2020, doi: 10.3102/00346543068003249.

²⁸Linda Stanier, "Peer assessment and group work as vehicles for student empowerment: A module evaluation," *Journal of Geography in Higher Education* 21 (1997): 95-98, accessed August 20, 2020, doi: 10.1080/03098269708725413.

²⁹Linda Stanier, "Peer assessment and group work as vehicles for student empowerment: A module evaluation," *Journal of Geography in Higher Education* 21 (1997): 95-98, accessed August 20, 2020, doi: 10.1080/03098269708725413.

³⁰Kathleen Carson and Rainer E. Glaser, "Chemistry is in the news: assessing intra- group peer review," *Assessment & Evaluation in Higher Education* 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.

³¹Xiao-Hua Jin, "A comparative study of effectiveness of peer assessment of individuals' contributions to group projects in undergraduate construction management core units," *Assessment & Evaluation in Higher Education* 37 (2012): 577-589, accessed August 20, 2020, doi: 10.1080/02602938.2011.557147.

³²Debbi Weaver and Alexis Esposto, "Peer assessment as a method of improving student engagement," *Assessment & Evaluation in Higher Education* 37 (2012): 805- 816, accessed August 20, 2020, doi: 10.1080/02602938.2011.576309.

³³Kali P. Nepal, "An approach to assign individual marks from a team mark: the case of Australian grading system at universities," *Assessment & Evaluation in Higher Education* 37 (2012): 555-562, accessed January 20, 2021, doi: 10.1080/02602938.2011.555815.

³⁴Ciprian Spatar, Nigel Penna, Henry Mills, Vedrana Kutija and Martin Cooke, "A robust approach for mapping group marks to individual marks using peer assessment," *Assessment & Evaluation in Higher Education* 40 (2015): 371-389, accessed August 20, 2020, doi: 10.1080/02602938.2014.917270.

³⁵Anna Planas-Lladó, Lidia Feliu, Fransesc Castro, Rosa M. Fraguell, , Gerard Arbat, Joan Pujol, Juan Jose Suñol, and Pepus. Daunis-i-Estadella, "Using peer assessment to evaluate teamwork from a multidisciplinary perspective," *Assessment & Evaluation in Higher Education* 43 (2018): 14-30, accessed August 20, 2020, doi: 10.1080/02602938.2016.1274369.

³⁶Robert Conway, David Kember, Atara Sivan and May WU, "Peer assessment of an individual 's contribution to a group project," *Assessment & Evaluation in Higher Education* 18 (1993): 45-56, accessed August 20, 2020, doi.org/10.1080/0260293930180104.

³⁷Kathleen Carson and Rainer E. Glaser, "Chemistry is in the news: assessing intra- group peer review," *Assessment & Evaluation in Higher Education* 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.

³⁸Jacob Cohen, *Statistical power analysis for the behavioral sciences* (New York: Lawrence Erlbaum Associates, 1988).

39 James. D. Evans, *Straightforward statistics for the behavioral sciences* (Pacific Grove, CA: Brooks/Cole Publishing, 1996).

⁴⁰Andy P. Field, *Discovering statistics using IBM SPSS: and sex and drugs and rock 'n' roll* (London: SAGE, 2013).

⁴¹Jacob Cohen, *Statistical power analysis for the behavioral sciences* (New York: Lawrence Erlbaum Associates, 1988).

⁴²James. D. Evans, *Straightforward statistics for the behavioral sciences* (Pacific Grove, CA: Brooks/Cole Publishing, 1996).

⁴³Althea ArchMiller, John Fieberg, J.D. Walker and Noah Holm, "Group peer assessment for summative evaluation in a graduate-level statistics course for ecologists," *Assessment & Evaluation in Higher Education* 42 (2017):1208-1220, accessed August 20, 2020, doi:10.1080/02602938.2016.1243219.

BIBLIOGRAPHY

- ArchMiller, Althea., Fieberg, John., Walker, J.D. and Holm, Noah. "Group peer assessment for summative evaluation in a graduate-level statistics course for ecologists," *Assessment & Evaluation in Higher Education* 42 (2017):1208-1220, accessed August 20, 2020, doi:10.1080/02602938.2016.1243219.
- Cannon, Robert. and Newble, David, A handbook for teachers in universities and colleges. UK: Kogan Page Limited, 2000.
- Carson, Kathleen M. and Glaser, Rainer E. "Chemistry is in the news: assessing intra- group peer review." Assessment & Evaluation in Higher Education 35 (2009): 381- 402, accessed August 20, 2020, doi.org/10.1080/02602930902862826.
- Cohen, Jacob. *Statistical power analysis for the behavioral sciences*, New York: Lawrence Erlbaum Associates, 1988.
- Conway, Robert., Kember, David., Sivan, Atara. and WU, May. "Peer assessment of an individual 's contribution to a group project," *Assessment & Evaluation in Higher Education* 18 (1993): 45-56, accessed August 20, 2020, doi.org/10.1080/0260293930180104.
- Elliott, Naomi. and Higgins, Agnes. "Self and peer assessment does it make a difference to student group work?" *Nurse Education in Practice* 5 (2005): 40-48, accessed August 20, 2020, doi:10.1016/j.nepr.2004.03.004.
- Evans, James. D. Straightforward statistics for the behavioral sciences, Pacific Grove, CA: Brooks/Cole Publishing, 1996.
- Falchikov, Nancy. "Group process analysis-Self and peer assessment of working together in a group." *Educational & Training Technology International* 30 (1993): 275-284, accessed August 20, 2020, doi:10.1080/0954730930300308.
- Field, Andy P. Discovering statistics using IBM SPSS: and sex and drugs and rock 'n' roll. London: SAGE, 2013.
- Goldfinch, Judy. and Raeside, Robert. "Development of a peer assessment technique for obtaining individual marks on a group project." Assessment and Evaluation in Higher Education 15 (1990): 210-231 accessed August 20, 2020, doi: 10.1080/0260293900150304.
- Hall, David. and Buzwell, Simon. "The problem of free-riding in group projects: Looking beyond social loafing as reason for non- contribution." *Active Learning in Higher Education* 14 (2012): 37-49, accessed August 20, 2020, doi: 10.1177/1469787412467123.
- Jin, Xiao-Hua. "A comparative study of effectiveness of peer assessment of individuals' contributions to group projects in undergraduate construction management core units." *Assessment & Evaluation in Higher Education* 37(2012): 577-589, accessed August 20, 2020, doi: 10.1080/02602938.2011.557147.
- Nepal, Kali P. "An approach to assign individual marks from a team mark: the case of Australian grading system at universities." *Assessment & Evaluation in Higher Education* 37 (2012): 555-562, accessed January 20, 2021, doi: 10.1080/02602938.2011.555815
- Oxford University Press Dictionary. "Oxford Learner's Dictionary English oxford living dictionaries." Accessed August 14, 2020. https://www.oxfordlearnersdictionaries.com/definition/english/collaboration?q=collaboration https://en.oxforddictionaries.com/definition/collaboration.
- P21. "Framework for 21st Century learning." Accessed August 21 2020. http://static.battelleforkids.org/documents/p21/P21_framework_0816_2pgs.pdf.
- Planas-Lladó, Anna., Feliu, Lidia., Castro, Fransesc., Fraguell, Rosa M., Arbat, Gerard., Pujol, Joan, Suñol, Juan .J. and Daunis-i-Estadella, Pepus. "Using peer assessment to evaluate teamwork from a multidisciplinary

perspective." Assessment & Evaluation in Higher Education 43 (2018): 14-30, accessed August 20, 2020, doi: 10.1080/02602938.2016.1274369.

- Spatar, Ciprian., Penna, Nigel., Mills, Henry., Kutija, Vedrana. and Cooke, Martin. "A robust approach for mapping group marks to individual marks using peer assessment." Assessment & Evaluation in Higher Education 40 (2015): 371-389, accessed August 20, 2020, doi: 10.1080/02602938.2014.917270.
- Stanier, Linda. "Peer assessment and group work as vehicles for student empowerment: A module evaluation." *Journal of Geography in Higher Education* 21 (1997): 95-98, accessed August 20, 2020, doi: 10.1080/03098269708725413.
- Topping, Keith. "Peer assessment between students in colleges and universities." *Review of Educational Research*, 68 (1998):249-276, accessed August 20, 2020, doi: 10.3102/00346543068003249.
- Topping, Keith J. "Peer Assessment." *Theory into Practice*, 48 (2009): 20-27, accessed August 20, 2020, doi: 10.1080/00405840802577569,
- Weaver, Debbi. and Esposto, Alexis. "Peer assessment as a method of improving student engagement." Assessment & Evaluation in Higher Education 37 (2012): 805- 816, accessed August 20, 2020, doi: 10.1080/02602938.2011.576309.
- Williams, Simon J. "An Approach for the Assessment and Allocation of Individual Grades for Group-Based, Collaborative Work by Combining Self- assessment, Group-Evaluation and Wiki Data: Results from an Action Research." In: Assessment for Learning Within and Beyond the Classroom Taylor's 8th Teaching and Learning Conference 2015 Proceedings, edited by Siew F. Tang and Loshinikarasi Logonnathan, 361-372. Singapore: Springer, 2020.

BEYOND THE FRAME: COLLABORATING ON AN UNDERGRADUATE RESEARCH EXPERIENCE

Author: LINDSAY MAMCHUR, SUSAN CLOSE

Institution: UNIVERSITY OF MANITOBA, CANADA

INTRODUCTION

Originating from a project supported by the University of Manitoba's Undergraduate Research Award program, this study is based around a book-in-progress on the intersections of photography and design. The project has grown over the course of almost two years, supervised by Susan Close and assisted by Lindsay Mamchur and, for the first summer, her co-assistant Hanna Hendrickson-Rebizant.

It is known that supervised undergraduate research is a valuable educational practice for both the student, who, as author W. B. Johnson asserts, receives "knowledge, advice, counsel, challenge and support" from their mentor, and for the faculty supervisor, whose research is both enriched and made more productive by their student assistant.¹ Consistent with these claims, an alternative photographic research project positions participants in a context favourable to develop research skills, visual literacy, and independent agency for future studies. Specifically, this project became an opportunity for collaborative exchange between advisor and student. The argument will be structured around three factors of the procedure: foundational instruction in visual literacy; an open, anti-hierarchical approach; and, lastly, affordance for project growth.

Each factor will be described in its relevance to fostering cooperative exchange and will use examples of research activities that best demonstrate it. To provide evidence for how the process prioritized critical thinking and visual literacy, two blog entries and a research poster prepared by the assistant will be explored. Within this part of the discussion is an image reading that illustrates the method and shows the proficiency Mamchur has built over the course of the research project. In support of how the project used an anti-hierarchical approach that allowed new activities to evolve from the existing framework, the discussion highlights the research website with a focus on the image gallery and blog, a lecture presented by the project's two assistants in October 2019, the Instagram account, and, finally, the development of Close's creative website. Following, an argument is made for the value of the project's model of student-faculty collaboration, facilitated by these three main factors, as the means for enriching conventional research practices and for developing an undergraduate student as an independent researcher.

Background

The collaborative work began as a mentorship opportunity made possible through the University of Manitoba's Undergraduate Research Award. This competitive award is granted annually to undergraduate students looking to work as research assistants for advisors of their choosing. In May

2019, the project was founded around Close's book-in-progress on photography and the built environment. This summer academic term ended in August 2019, but the research and mentorship continued. In early October 2019, Mamchur and co-assistant Hendrickson-Rebizant presented the project in a faculty-sponsored *Food for Thought* lecture, a talk open to all members of their Faculty of Architecture.² Some weeks later, Mamchur participated in the university-wide research poster competition.³ From August 2019 to April 2020, Close and Mamchur continued to work together on a new project: Close's creative website.⁴ Through the design, curation, and presentation of Close's photography and personal achievements, a new collaboration emerged. In May 2020, *Photography and the Built Environment: the summer research project* began its second term, which differed greatly from its first. The COVID-19 pandemic required that the researchers conduct their work from home, communicate virtually, and reconfigure their activities using primarily digital resources. However, like the first summer of the project, the term ended in August but progressed beyond. The research continues today at a somewhat slower pace set by the pandemic.

VISUAL LITERACY

The first critical factor that supported the collaboration was foundational instruction in critical thinking and visual literacy. Close framed early activities around building these skills, which are prerequisites for conducting research and, in the context of an alternative photographic project, for reading images.

One such activity that demonstrates this was a writing assignment on visual literacy in the form of a blog entry. The entry, entitled "Being Critical: an Introduction to a Vocabulary of Visual Literacy," was an active exercise.⁵ Apart from one first-year course on the topic, Mamchur had little prior knowledge of visual literacy theory and so learned as she went. She approached the subject as if she was going to teach it to others: breaking down the concepts, formulating clear definitions with simple language, and structuring the material in a comprehensible way. This was a productive activity for developing her knowledge of visual literacy, basic research skills, and ability to clearly communicate new information.

Another activity, also a blog entry, that became an exercise in visual literacy took the form of an image analysis video.⁶ In the video, Mamchur examined two photographs: nineteenth-century documentarian Eugène Atget's *Tuileries – Jardin de Robespierre* and her own image *Parc de Sceaux*. She read each image individually, while considering formal, conceptual, and social parallels and distinctions. To do this, Mamchur employed a methodology outlined by Close in the Introduction of her book *Framing Identity: Social Practices of Photography in Canada (1880 – 1920)*. The process involves a close reading of the photograph followed by an inquiry into the context from which the photograph arose.⁷ In this method, there is particular interest for the photographer as the framer and for how contemporary context helps the image-reader interpret their ideas about what is included in or beyond the frame.⁸ The reading strategy is informed by the practice of cultural analysis, defined by theorist Mieke Bal as the contemporary study of an historical object using close reading and interdisciplinary theory.⁹

The final demonstration of this factor was an activity that built upon the previous image-reading video. Using the video's structure, Mamchur prepared a poster for the University of Manitoba's Undergraduate Research Award Poster Competition, an annual event at which undergraduate students from all faculties and schools come together to share the products of their research experiences.¹⁰ Her poster (Figure 1) for this year's competition advanced the side-by-side analysis of *Tuileries* and *Parc de Sceaux*. The poster's research questions included: what relationships exist between the two images

and why are these relationships significant? The following section is an excerpt from Mamchur's poster that highlights the comparative reading.



Figure 1. Atget and I: a Comparative Photographic Reading, poster.

From Atget and I: a Comparative Photographic Reading by Lindsay Mamchur

Looking first to *Parc de Sceaux*, we see my image (Figure 2) made on a study trip in September 2019. The statue depicted sits centrally in the composition reinforced by the half-circle seating and tree canopy. The treeline draws attention to the texture of the trees as well as to the sense of their movement and encroachment upon the foreground. The statue is headless. This is not immediately obvious and may be surprising when noticed. For this reason, the statue's headlessness lends a *punctum* or piercing quality.¹¹

In this photograph, I interpret a dynamic between the trees, as "nature," and the statue, as "civilization." The two components exist in conflict with one another. The mass of trees hulks behind the statue as a representation of a grand and imposing "nature", untameable by humans.

Another layer of my interpretation of this image recognizes the strangeness of the statue in the context of a formal landscape park. As a student of landscape architecture, I understand that park sculpture is meant to glorify something, usually a person or philosophy, that the proprietors value. It is common to see statuary that references classical mythology in seventeenth-century parks such as Sceaux. The statue, however, cannot be identified in its condition and is unlisted on the park's map of sculpture. What now does the anonymous figure represent?



Figure 2. Mamchur, Lindsay. Parc de Sceaux. 2019.



Figure 3. Atget, Eugène. Tuileries - Jardin de Robespierre. *c. 1911. Bibliothèque nationale de France, Paris.*

Turning to the second image (Figure 3), *Tuileries – Jardin de Robespierre* was made in 1911 by Eugène Atget. The statue depicted, a monument to Pomona, the Roman goddess of abundance, sits centrally in the composition reinforced by the half-circle terrace. The trees in the background provide a richly textured setting for the statue while also indicating Atget's distanced vantage point. A consequence of this is that the statue appears small and isolated in relation to the composition.

It is crucial to consider that Atget was a witness to a modernizing Paris. He saw firsthand the medieval city transform into Baron Haussmann's neoclassical vision. I argue this image reveals Atget's unease in unfamiliar urban space highlighted by a discordant relationship between the statue, which glorifies the classical era, and its representation, as small and insignificant.

I recognize my practice of photography as a creative, critical, and personal process of looking. In the case of *Parc de Sceaux*, my intention was to learn something as a landscape architecture student. What could my photograph reveal about the park's spatial character and function? In contrast, Atget conceived of his work rather differently. He believed he created visual records of space for use by artists, which he was not.¹² What *Tuileries* demonstrates, however, is the inevitable imprint a photographer leaves within their photograph. As I have argued, Atget's image imparts a personal struggle with change to his home and the subject of his life's work. Conversely, I photographed Parc de Sceaux as a tourist. My emotional response to the space was less invested. Interestingly, my experience of the French landscape had, previous to visiting the country, been informed by my study of Atget's work. His influence on my photograph is evident through formal analysis. While similar in visual structure, the two images differ in their reference to their distinct "making" contexts. The significance of this relationship is that while photographs should not be relied upon as indexical, they do arise from a particular time and place. In order to make plausible interpretations, a reader must analyze an image relative to the context in which it was made.

Parc de Sceaux addresses changing perceptions of a relationship between human and nature. Through the statue symbol, the image points to the loss of original meaning for historical sculpture in contemporary public space. This idea relates to my experience as a landscape student in the twenty-first century. I am frequently engaged in discussions about the evolving relations between "nature" and "culture", particularly how past notions such as the neoclassical picturesque contribute to present challenges in the discipline. *Tuileries* speaks more to the personal experience of the photographer in an evolving urban context. Through the statue symbol, the image expresses Atget's nostalgia for the familiarity of a Paris he had known but saw rapidly disappearing

Before arriving in Paris and before making *Parc de Sceaux*, I studied Eugène Atget in depth. This was in part why I photographed *Parc de Sceaux* the way I did: to remake what I had already seen. Ultimately, the image I produced is more than a rephotograph. It possesses its own unique meaning.

Outcome from Mamchur's Reading

In the poster's discussion, an argument was advanced that in their images a photographer leaves traces of themselves, their values and biases.¹³ It is only through a critical reading that these latencies can be revealed. In the conclusion, the student sought to explain the significance of an ability to interpret photographs, to synthesize relationships between seemingly distinct artefacts, and, in this way, to create new meanings informed by close reading and interdisciplinary theory.

This was a formative event in Mamchur's development as an independent researcher. With it, she began to recognize relationships between the work she produces and the work she studies and gain confidence as both a photographer and image-reader.

Combined, these activities advanced the assistant's understanding of visual literacy and encouraged the practice of reading images. In turn, this provided a better foundation from which she could collaborate with her supervisor and a greater appreciation, which they share, for the rich potential of photographic study.

FURTHER PROJECT OUTCOMES

One of this research project's foundational elements is that it was guided by a collaborative approach informed by feminist theory. As art historian Amy Tobin argues, collaboration is a common foundational element in feminist art practice that allows for individuals to work together to "build a bond of trust supportive enough to create something else."¹⁴ In this case, the collaboration allowed not only for the participants the opportunity to work together on a shared goal, but it provided for a
significant transmission of research knowledge and experience. The project's focus was to provide the two undergraduate mentees, Mamchur and Hendrickson-Rebizant, with an opportunity to gain agency through their collaborative research activities and, over time, allow them to develop into more independent researchers. As has been established earlier, this approach allowed for an alternative research experience informed by the methodology of cultural analysis that promotes visual thinking as outlined in Mieke Bal's writings.¹⁵ Following Bal's process, Close has argued that reading the image is the final act of a collaboration in which the photographer creates the image, and the viewer decodes it.¹⁶ In his book, *The Trade of the Teacher, Visual Thinking with Mieke Bal*, Jeroen Lutters provides a detailed exploration of Bal's form of analysis as a type of visual thinking. It provides insight into her reading or decoding of images as visual texts.

As Mamchur and Hendrickson-Rebizant became more comfortable with this type of analysis and the writing of short critical studies of references, they quickly settled into their research activities. Eventually, they took over Close's office in the Faculty of Architecture for the entire summer. Two significant parts of the mentorships, the website development and the Food for Thought presentation, demonstrate the research approach that followed. Close suggested that the students design a website to represent their summer research experience as a process-sharing platform. The students and their advisor facilitated its construction and content of the website by holding bi-weekly meetings to brainstorm. Still, the final execution of these ideas was primarily the students' creation. By the end of the summer, Mamchur and Hendrickson-Rebizant had successfully created *Photography and the Built Environment: the summer research project* and published the website (Figure 4).¹⁷ The posted content included the undergraduates' blog entries, a gallery of curated photographs, and research references reviews. It served as a visual resource to consider images and references for possible inclusion in the final manuscript.



PHOTOGRAPHY AND THE BUILT ENVIRONMENT:

Figure 4. Home page for Photography and the Built Environment: the summer research project, https://www.photographyandthebuiltenvironment.com/

The website's gallery section highlighted some of the images under consideration for inclusion in the final manuscript, such as the Irish photographers Anthony Haughey and Kenneth O'Halloran, whose work draws attention to the continued political significance of the border in the present day. Close had previously shortlisted a group of photographers for her book and asked the students to find related

publications to update the existing literature review. During the website construction, the research assistants learned to navigate more complex practical issues such as negotiating copyright with photographers, copyright managers and galleries for permissions to post images. The learning outcomes included increasing their ability to read photos and analyze references to write critical reviews.

At the end of the summer, Mamchur and Hendrickson-Rebizant initiated the idea to share the project and its website with the Faculty of Architecture. In order to do so, they organized and presented a Food for Thought talk to a packed audience of students and faculty (Figure 5).



Figure 5. Food for Thought blog entry on Photography and the Built Environment: the summer research project website, https://www.photographyandthebuiltenvironment.com/food-for-thought

This presentation provided the opportunity to reflect on and to distill the critical components of their research process. The website proved a useful visual tool that provided a dynamic and accessible portal into the research experience and later disseminated it to the broader community outside the Faculty. Mamchur continued to work as Close's research assistant that winter and complete additional work on the website, which she linked to a research-related Instagram account. These two student-managed social media sites helped to facilitate further growth for Mamchur as a self-reliant researcher. She wrote more extensive critical blog entries and made creative video clips illustrating her exploration of visual literacy, photography and the built environment. Over the last year, Mamchur and Close have also worked together to craft the final part of the mentorship: a conference paper with a plan to publish a co-written article. This multi-stepped process involved finding an appropriate conference, developing an abstract, and finally, the conference presentation and paper.

In addition, this year, as a separate but related project, Mamchur designed another photo-based website, susanclose.com, a thoughtfully-crafted online presence for Close's research and photographic practice.

During this mentorship, many lessons were learned, including photographic practice, history and theory, navigating photo archive databases, website design, and preparing presentations and conference papers. One of the most significant outcomes of this undergraduate experience was

increased visual literacy, which resulted in more advanced knowledge of reading or interpreting photographs. As Rebecca Solnit has written: "The stars we are given. The constellations we make. That is to say, stars exist in the cosmos, but constellations are the imaginary lines we draw between them, the readings we give the sky, the stories we tell."¹⁸ Solnit's argument underscores the need to understand the process of reading, interpreting and mapping research materials like photographs to produce more transparent outcomes.

CONCLUSION

In conclusion, this project allowed Mamchur and Hendrickson-Rebizant to transition from undergraduate research assistants to more seasoned researchers, which enabled a more egalitarian collaboration with Close. Further, it facilitated Mamchur's research journey through the opportunity to co-present at a significant international conference presentation in an environmental context. The definite last step in this mentorship was the development of this co-authored paper for publication. The resulting outcome is a voice for this research in the surrounding design communities. It is hoped that it also serves as a model and a catalyst for other undergraduate design students who wish to explore the significance of process in research and making.

NOTES

¹ W. B. Johnson, *On being a mentor* (New York: Routledge, 2016), 23.

² Lindsay Mamchur, "Food for Thought," Photography and the Built Environment: the summer research project, published October 8, 2020, https://www.photographyandthebuiltenvironment.com/food-for-thought.

³ Lindsay Mamchur, "Undergraduate Research Poster Competition," Photography and the Built Environment: the summer research project, published August 6, 2019,

https://www.photographyandthebuiltenvironment.com/poster-competition.

⁴ See https://www.susanclose.com/.

⁵ Lindsay Mamchur, "Being Critical: an Introduction to a Vocabulary of Visual Literacy," Photography and the Built Environment: the summer research project, published August 23, 2019,

https://www.photographyandthebuiltenvironment.com/being-critical.

⁶ Lindsay Mamchur, "Tuileries and Parc de Sceaux: a Comparative Reading," Photography and the Built Environment: the summer research project, published August 5, 2020,

https://www.photographyandthebuiltenvironment.com/comparative-video-reading.

⁷ Susan Close, *Framing Identity: Social Practices of Photography in Canada (1880-1920)* (Winnipeg: Arbeiter Ring Press, 2007), xi.

⁸ Close, *Framing Identity*, xi.

⁹ Close, Framing Identity, 52.

¹⁰ "2020 Undergraduate Research Poster Competition Entries," University of Manitoba, accessed January 20, 2021, https://umanitoba.ca/research/poster-entries.

¹¹ Roland Barthes, *Camera Lucida: Reflections on Photography*, trans. Richard Howard (New York: Hill and Wang, 1981), 26.

¹² Claire Raymond, "Eugène Atget's Sacred Spaces: Uncanny Capitalism," in *The Photographic Uncanny* (London: Palgrave Macmillan, 2019), 42.

¹³ Close, *Framing Identity*, xviii.

¹⁴ Amy Tobin, "I'll Show You Mine, If You Show Me Yours: Collaboration, Consciousness-Raising and Feminist-Influenced Art in the 1970s," *Tate Papers* 25 (Spring 2016), accessed January 20, 2020, https://www.tate.org.uk/research/publications/tate-papers/25/i-show-you-mine-if-you-show-me-yours.

¹⁵ See Mieke Bal, *Travelling Concepts in the Humanities: A Rough Guide* (Toronto: University of Toronto Press, 2002) for a detailed discussion of cultural analysis.

¹⁶ For a discussion of reading images, see Susan Close, *Framing Identity, Social Practices of Photography in Canada* (1880-1920) (Winnipeg: Arbeiter Ring Publishing, 2007), xvii.

¹⁷ See Photography and the built environment: the summer research project,

https://www.photographyandthebuiltenvironment.com/.

¹⁸ Rebecca Solnit, *Storming the Gates of Paradise: Landscapes for Politics* (Oakland: University of California Press, 2007), 165.

BIBLIOGRAPHY

Bal, Mieke. Travelling Concepts in the Humanities: A Rough Guide. Toronto: University of Toronto Press, 2002.

Barthes, Roland. *Camera Lucida: Reflections on Photography.* Translated by Richard Howard. New York: Hill and Wang, 1981.

Close, Susan. *Framing Identity, Social Practices of Photography in Canada* (1880-1920). Winnipeg: Arbeiter Ring Publishing, 2007.

Johnson, W. B. On being a mentor. New York: Routledge, 2016

Lutters, Jeroen. The Trade of the Teacher, Visual Thinking with Mieke Bal. Amsterdam: Valiz, 2018.

Mamchur, Lindsay. "Being Critical: an Introduction to a Vocabulary of Visual Literacy." Photography and the Built Environment: the summer research project. Published August 23, 2019.

https://www.photographyandthebuiltenvironment.com/being-critical.

Mamchur, Lindsay. "Food for Thought." Photography and the Built Environment: the summer research project. Published October 8, 2020. https://www.photographyandthebuiltenvironment.com/food-for-thought. Mamchur, Lindsay. "Tuileries and Parc de Sceaux: a Comparative Reading." Photography and the Built Environment: the summer research project. Published August 5, 2020.

https://www.photographyandthebuiltenvironment.com/comparative-video-reading.

Mamchur, Lindsay. "Undergraduate Research Poster Competition." Photography and the Built Environment: the summer research project. Published August 6, 2019.

https://www.photographyandthebuiltenvironment.com/poster-competition.

Photography and the Built Environment: the summer research project, accessed January 20, 2021.

https://www.photographyandthebuiltenvironment.com.

- Raymond, Claire. "Eugène Atget's Sacred Spaces: Uncanny Capitalism." *The Photographic Uncanny*, 41-71. London: Palgrave Macmillan, 2019.
- Solnit, Rebecca. Storming the Gates of Paradise: Landscapes for Politics. Oakland: University of California Press, 2007.
- Tobin, Amy. "I'll Show You Mine, If You Show Me Yours: Collaboration, Consciousness-Raising and Feminist-Influenced Art in the 1970s." *Tate Papers* 25 (Spring 2016). Accessed January 20, 2021. https://www.tate.org.uk/research/publications/tate-papers/25/i-show-you-mine-if-you-show-me-yours.
- University of Manitoba. "2020 Undergraduate Research Poster Competition Entries." Accessed January 20, 2021. https://umanitoba.ca/research/poster-entries.

ARCHITECTURE DESIGN STUDIO AS RESEARCH INCUBATOR: THRESHOLDS, EDGES, BOUNDARIES

Authors: ROSS T SMITH, CECILIA DE MARINIS

Institution: DEAKIN UNIVERSITY, AUSTRALIA

INTRODUCTION

This paper explores the conceptual and research approach, based in phenomenology, of a Master of Architecture urban design studio conceived and taught by the authors at the School of Architecture and Built Environment, Deakin University in Geelong, Australia.

The title and provocation of the studio brief was "On the Verge". This open-ended statement challenged the students to consider the broad context of 'threshold' and 'edge conditions' as both physical and psychological barriers, boundaries, and transformational positions determined by materiality, physicality, and perception as creative moves of analogy and metaphor. The concept of threshold was, therefore, offered to students as a research topic to investigate as well as a trigger for design exploration.

Together with a research topic to investigate, students were given a specific site for their design intervention. The site was the residue of a disused factory located on a cliff-edge facing the ocean in an industrial area of a semi-rural town in Australia. Complimentary to architecture the studio insisted on a definite consideration of the site landscape to be conceptualised and interpreted from a phenomenological method of observation. Because of this complexity and holism, many of the students' projects were determined by rigorous site analysis and ecological concerns which then have informed the constructed components of the architectural interventions as well as ecological systems and processes to enhance this wasteland site.

The pedagogical impetus was to use the studio as a research incubator and for the students to take complete responsibility for how they interpret, research, conceive, propose, and present their projects. This method is contained within the theory of constructivist teaching and learning in which the students take individual responsibility for their education. In turn, the students conceive, research, and determine their own brief as a response to the initial studio provocation in order to express their sensitivity about the existing site history, urban location, and environmental factors to determine their design strategies. This style of teaching is not a 'one size fits all' studio. Therefore, the concept, research, approach, and representation of each project is unique adding pedagogical excitement and challenge for the students and teachers.

The paper will present the design studio in terms of context, contents, methodology, and outcomes.

Examples of design interventions by students are presented in this paper to show the effectiveness of the teaching strategies as well as the relevance of the topics investigated in the design studio in relation to contemporary issues in the built environment.

The pedagogical values of the Architectural Design Studio

It is well-regarded that teaching and learning in architecture design studio is at the core of architectural pedagogy. It is a subjective and qualitative experience which is the most distinctive, fascinating, and challenging aspect of the course structure; it is unlike any other professional education.

The design knowledge, thinking and understanding generated in the design studio and the experience and knowledge that is transferred from practice has been essential to the field of architecture. According to Schön, the pedagogical value of the design studio lies in its capacity to open a window to the professional practice and process of architectural designing through experiential learning which is considered a unique mode of learning and teaching.¹

Additionally, Maitland says the design studio is not just a space but a specific way of thinking and learning.² Its intrinsic pedagogical value lies in its capacity of bringing students into a deep understanding of architectural practice. It is an immersive learning environment in a space where designers (as teachers and students) are required to make clear to one another "what it is they do when they design."³

The design studio is focused on open enquiry, creativity, learning-by-doing. The studio experience is an intensive self-explorative journey for students where design skills are developed and passed on, and where students develop as designers and reflect upon their skills and the skills of others. The process of learning within the studio is transformative in which the students discover their abilities as designers.⁴

Studio as research incubator

"On the Verge" was a Master of Architecture Design Studio situated in coastal town in regional Australia. The site was located in the coastal town of Geelong in regional Victoria, Australia. As an industrial, semi-rural town Geelong is rapidly changing its identity and image due to the deindustrialisation process. The site was the residue of the Powerhouse, a disused factory standing on a large piece of land, located on a cliff-edge facing the ocean, at the edge of the city. Students were given the choice to demolish it completely, partially, or to integrate it in their architectural interventions.

The studio proposed to students a research theme and a site: there was not a predictive brief, nor structured program. Students were asked to generate an architectural intervention, as a building or a series of built moments as concept approach by directing their ideas toward considerations of 'threshold'. The brief also expected that the overall design was an integration of an architectural intervention and the landscape. The aspects of land and sea of the site were a generator of ideas as the students had to perform detailed site analysis from a phenomenological point of view. Students investigated the site through long visits, observing, feeling, looking for clues, photographing, drawing, and mapping. Reading the site including ecological conditions of earth, fauna and flora, tangible and intangible materiality and ephemera, atmosphere and intuition, the natural and artificial, cultural and emotional aspects, history and memory of place. The topic was selected for its ambiguity, openness and intrinsic uncertainty.

The threshold is at the same time a dynamic space, concept, and realm where boundaries and limits are blurred, undefined, and unstable. It is a space of negotiation, of dialogue between different territories, where elements of both territories are traceable, in an ever-changing and dynamic coexistence. According to Herzberger, the threshold provides the key to the transition and connection between areas with divergent territorial claims.⁵ The threshold is an intermediate, non-specialised space and therefore more flexible in its interpretation, which configures and shapes the passage from one

codified space to another. It is a space where connection and separation coexist thereby allowing for multiple and changing identities.

The threshold is at the same time potentially a danger and an opportunity.⁶ It embeds the risk of going beyond the known and the possibility to discover the unknown.⁷ It is a rich and fruitful *terrain vague* offering a multiplicity of experiences of the expected and unexpected. The *terrain vague* was referred to as "estrangement" by architect Ignasi de Sola-Morales. These interstitial spaces become fertile ground for artists who, he adds, "seek refuge in the margins of the city precisely when the city offers them an abusive identity, a crushing homogeneity, a freedom under control."⁸

Furthermore, 'threshold' is a multi-scale concept: it can define a transition from the urban to the urban, and urban from the rural, from the coast to the city, from the building to the street, from the entrance to the door, from the living room to the bedroom, from the bed to the window, from the bathtub to the toilet, from the ground to the sky, from beneath to above. Intermediate / transitional / interstitial space was to be designed with thought and specific purpose, and at different scales: from the urban to the architectural, focusing especially on interiority, being essential to how we experience space, form, light/shadow, and atmosphere as human beings.

THE TEACHING METHODOLOGY

The teaching style of our architecture design studios is based on the theory of phenomenology, constructivist pedagogy, and experiential learning. Expanded from this is the essential purpose of conceptual or abstract thinking, and considerable levels of research into ideas, the human body and sensory perception as the core of architecture, precedents, interdisciplinary approaches, the integration of the landscape with architectural interventions, ecological considerations, and the exploration of creative inspirations. We strongly encourage risk-taking, experimentation, play and fun; and for the students to question – What if? Therefore, every studio project is unique adding pedagogical excitement and challenge for the students and teachers.

A transformative approach gains success for teachers, who can see their students grow and evolve. According to Pallasmaa: "The duty of education is to cultivate and support the human abilities to imagination and empathy...The main object of artistic education is not the principles of making art, but the personality of the students and their image of themselves and the world".⁹

The 'disruptive' teacher has to be open-minded and receptive to being a student at all times; and to maintain a certain degree of naiveté. The teacher's knowledge must be interwoven with that of the students' and with progress, layer upon layer, develop a dense learning experience for both parties. The teacher must be both weaver and woven to propagate information and to ensure strong contact points of knowledge transfer; teaching and learning is chiasmic.

Phenomenology

Phenomenology seeks the truth of reality and as French philosopher Maurice Merleau-Ponty states: "We must not … wonder whether we perceive a world truly, we must instead say: the world is what we perceive."¹⁰ In this aspect we maintain in ourselves an openness to the potential of revelation in order to retain the magic and thrill of life. Phenomenology describes our direct contact with the objective and non-objective world; that which is material, immaterial and ephemeral. The phenomenological tradition asks us for close observation to establish comprehension of the objective and pragmatic with the poetic and philosophical in "vividness, accuracy, richness, and elegance", according to behavioural geographer David Seamon.¹¹

Therefore, learning to 'see' rather than just 'look', 'feel' and not just 'make contact', enhances our awareness of the subtlety of phenomenal moments that infuse our daily experience, adding to our

appreciation of a life of art and architecture. Developing a deeper perception informs our understanding of the way we can design spaces of haptic richness and psychological depth. Gaston Bachelard says: "In times of great discoveries, a poetic image can be the seed of a world, the seed of a universe imagined out of a poet's reverie."¹² Life experience may be *poiesis*, that is, transformative by "the bringing into existence something that was not already there," says Alberto Pérez-Gómez.¹³ It is through artistic and poetic experiences and a sense of beauty that we are able to raise above the pedestrian to allow ourselves to breathe deeply the richness of being-in-life. It is this richness which we must carry into our creative explorations and endeavours.

Constructivism

How can theories of phenomenology, which apply to sensory perception, and the body and mind, when integrated with the conceptual research and experiential learning act as a pedagogical framework for teaching Design Studio in architecture?

A current theory in educational research is Constructivism which student-centred and processoriented.¹⁴ It relinquishes the domination of the university institution and encourages students to take responsibility for their own learning by establishing a supportive and self-generating studio environment. Experiential learning reasserts the physicality of the teaching and learning location as a way of integrating body and mind. Developing and encouraging a Studio which demands phenomenological and conceptual research, and experimentation and risk-taking, empowers students to consider the impact and influence theory can have on practice. It gives students a depth of knowledge which they can make decisions with and 'permission' to develop new and untested ways of being-in-architecture.

A design studio that is a dynamic, student-led environment that supports individualism, experimentation, and innovation is more likely to be successful when students assume personal responsibility for their education. Whereas, the teacher-dominated studio of prescriptive exercises and check-list requirements diminishes the students' willingness to take personal control of their project. Constructivist learning is a synthesis of thinking, research, making, and reflective practice. To be self-directed, creative, experiential, and innovative is the expectation of students in a Constructivist learning environment.

Experiential Learning

Experiential learning is the process of being informed by an experience. It puts your body in direct contact with the material world so your senses interact with materials, objects, other people, and sensory experiences in a physical, three-dimensional environment. Educational theorist David A. Kolb says that learning invokes the "integrated functioning of the total organism".¹⁵ We *are* experiences. Elizabeth Ellsworth, Professor of Media Studies at The New School in New York, makes a strong claim for sensational pedagogies as "possible experiences of thinking", which "address us as bodies whose movements and sensations are crucial to our understandings"¹⁶ It is by thinking, knowing, and acting that we become experiential learners. Experiential learning is one of pause and evaluation of the activities you have undertaken, their meaning, the success or failure of these actions, the result of the outcome, and how you could have done this differently to achieve a more satisfactory result.

The team led by Finnish design researcher Ilpo Koskinen comment on the abstracted process of design thinking: "Designers trained in the arts are capable of capturing fleeting moments and structures that others find ephemeral, imaginative, and unstable for serious research. They are also trained in reframing ideas rather than solving known problems. Above all, they are trained to imagine problems

and opportunities to see whether something is necessary or not."¹⁷ The processes of active experimentation and reflective observation combined with abstract and conceptual thought and research reinforce the mode of experiential learning.

Project 1: Aband-Art. Elliott Creed.

Aband-Art is an artist residency and studios that expresses a renewed identity and evokes a sense of mystery, curiosity and discovery of the abandoned Powerhouse. It offers artists to live, work and play on the site by bringing projects to life and sharing them with the community. This project blends with its surrounding architectural and industrial heritage to define a new inhabitation, purpose and identity of the site. The exhibition gallery and walkways are shared with the public and the residing artists who rent apartments and workspaces in the renovated Powerhouse. Wide boardwalks link, traverse and descend/ascend towards the water's edge, creating journeys between the thresholds of land, cliff and sea. The walkways lead the wanderer to six various points of impression that further enable the site's identity. This free-flowing type of architectural intervention reflects the natural beauty of the site and connects the individual to the land, sea, and sky. (*Images from final project.*)



Figure 1





Project 2: The Powerhouse. Joe Loughnan.

The Powerhouse is designed to facilitate the machine not the human. It is monolithic, robust, harsh, heavy, cold, dark, and slightly intimidating. It echoes, creeks, and drips – there is a tension in the air. Yet, it is also exciting, fascinating, and beautiful. What if the inhuman scale and darkness were used to enhance the theatre of experience by cloaking and strategically expressing parts of its history and function? To illuminate and obscure, to intrigue and enchant. What if the connections between interior and exterior were unassuming yet potent in their staging and revelation? The Powerhouse stands as a beautiful monument to structure and history, presence and memory, electricity and fluidity. Kurt Vonnegut, in *Player Piano*, wrote: "I want to stay as close to the edge as I can without going over. Out on the edge you see all kinds of things you can't see from the center. Big undreamed-of things – the people on the edge see them first." (*Images from final project.*)



Figure 3



Figure 4

Project 3: After Architecture. Harrison Lang.

Time and Decay underpin the conceptual approach to this project and was informed by site analysis of the industrial landscape. Research of installation artists led to an exploration in ephemerality and transience in architecture. The regenerative abilities of ecology were deployed to stabilise the landscape and provide it with a local composition. Architecture is often seen as a legacy; yet the concept developed as 'anti-architecture'. The temporal power of nature to withstand and endure is everlasting relative to architecture. A dialogue between ecology and architecture was developed as a canvas upon which Nature would act. This provided different experiences for the user based on transience of the time of day, the weather, years in the future, entropy, and atmospheric conditions.

This intervention became a place of thinking, of spiritual acceptance, a place where individuals may come and reflect upon their relationship to nature, and how their actions impact the environment and landscape; now and in the future. (*Images from final project.*)



Figure 5



Figure 6

NOTES

¹ Donald Schön, *The Design Studio. Exploration of its Traditions and Potential.* (London: RIBA Publications Limited, 1985).

² Barry M. Maitland, "Problem-based Learning for an Architecture Degree," cited in *The Challenge of problem-based Learning*, ed. David Boud. (London: Kogan Page, 1991).

³ Schön, The Design Studio, 32.

⁴ Cecilia De Marinis, *Design Research Training. The contribution of the practice-based doctoral training on professional practice and pedagogical approaches to Studio Teaching*, 2018, http://dap-r.info/outcomes/dap-r-research-impact-on-industry-and-pedagogy

⁵ Hermann Hertzberger, *Buildings and Projects*. (Den Haag: Arnulf Luchinger, 1987).

⁶ Franco La Cecla, *Perdersi. L'uomo senza ambiente*. (Bari: Laterza, 2011 [1988]).

⁷ Zygmunt Bauman, *City of Fears, City of Hopes*. (London: Goldsmiths College, University of London, New Cross, 2003).

⁸ Ignasi de Sola-Morales, cited in Cynthia Davidson, Anyplace. (Cambridge, Mass: MIT Press, 1995).

⁹ Juhani Pallasmaa, "Lived Space," *Sensuous Minimalism.* (China: China Architecture and Building Press, 2002), 188.

¹⁰ Maurice Merleau-Ponty. *The Merleau-Ponty Reader.* (Evanston: Northwestern University Press, 2007).
63.

¹¹ David Seamon. "Phenomenology, Place, Environment, and Architecture." In *Environmental and Architectural Phenomenology Newsletter*. (Manhattan: Kansas State University, Architecture Dept, Fall 2007).

¹² Gaston Bachelard, *The Poetics of Reverie: Childhood, Language, and the Cosmos.* (Boston: Beacon Press, 1971 [1960]).

¹³ Alberto Pérez-Gómez, *Built Upon Love: Architectural Longing after Ethics and Aesthetics*. (Cambridge, Mass: M.I.T. Press, 2006).

¹⁴ John Biggs and Catherine Tang, *Teaching for Quality Learning at University*. (Maidenhead, UK: Open University Press, McGraw Hill, 2011).

¹⁵ David A. Kolb, *Experiential Learning: Experience as the Source of Learning and Development*. (New Jersey: Prentice Hall, 1984).

¹⁶ Elizabeth Ellsworth, "The Materiality of Pedagogy." *Places of Learning: Media, Architecture, Pedagogy.* (UK: Routledge Falmer, 2005), 15-36.

¹⁷ Ilpo Koskinen, et al., *Design Research through Practice: From the Lab, Field, and Showrooom.* (USA: Morgan Kaufman, Elsevier, 2011), 8.

BIBLIOGRAPHY

Bachelard, Gaston. *The Poetics of Reverie: Childhood, Language, and the Cosmos.* Translated by Daniel Russell. Boston: Beacon Press, 1971 [1960].

Bauman, Zygmunt. *City of Fears, City of Hopes.* London: Goldsmiths College, University of London, New Cross, 2003.

Biggs, John and Catherine Tang. *Teaching for Quality Learning at University*. Maidenhead, UK: Open University Press, McGraw Hill, 2011.

Boud, David and Grahame Feletti, eds. The Challenge of problem-based Learning. London: Kogan Page, 1991.

Davidson, Cynthia. Anyplace, Center 14: On Landscape Urbanism. Cambridge, Mass: MIT Press, 1995.

De Marinis, Cecilia. Design Research Training. The contribution of the practice-based doctoral training on professional practice and pedagogical approaches to Studio Teaching. 2018. Accessed January 12, 2021. http://dap-r.info/outcomes/dap-r-research-impact-on-industry-and-pedagogy.

Ellsworth, Elizabeth. "The Materiality of Pedagogy." In *Places of Learning: Media, Architecture, Pedagogy.* UK: Routledge Falmer, 2005.

Hertzberger, Hermann. Buildings and Projects. Den Haag: Arnulf Luchinger, 1987.

Kolb, David A. *Experiential Learning: Experience as the Source of Learning and Development*. New Jersey: Prentice Hall, 1984.

Koskinen, Ilpo and John Zimmerman, Thomas Burder, Johan Redström, Stephan Wensveen. Design Research through Practice: From the Lab, Field, and Showrooom. USA: Morgan Kaufman, Elsevier, 2011.

La Cecla, Franco. Perdersi. L'uomo senza ambiente. Bari: Laterza, 2011 [1988].

- Merleau-Ponty, Maurice. *The Merleau-Ponty Reader*. Edited by Ted Toadvine and Leonard Lawlor. Evanston: Northwestern University Press, 2007.
- Pallasmaa, Juhani. *Sensuous Minimalism.* Edited by Fang Hai. China: China Architecture and Building Press, 2002.
- Pérez-Gómez, Alberto. Built Upon Love: Architectural Longing after Ethics and Aesthetics. Cambridge, Mass: M.I.T. Press, 2006.
- Schön, Donald. *The Design Studio. Exploration of its Traditions and Potential*. London: RIBA Publications Limited, 1985.
- Seamon, David. *Environmental and Architectural Phenomenology Newsletter*. Manhattan: Kansas State University, Architecture Dept, Fall 2007.

THE THIRD TEACHER- THE INVOLVEMENT OF CHILDREN IN THE DESIGN PROCESS AND ASSESSING THEIR DEVELOPMENT

Author: EDA CAN, GÖKSENİN İNALHAN

Institution: ISTANBUL TECHNICAL UNIVERSITY, TURKEY

INTRODUCTION

Child participation is one of the core principles of the United Nations Convention on the Rights of the Child (UNCRC), which asserts that children and young people have the right to freely express their views. This study discusses the involvement of children in the design process in school environments. Despite the increasing numbers of children's spaces, there are few studies that describe the involvement of the children in these environments' design and planning. It is explained in the education literature that environment promotes relationships, communication, collaboration, and exploration through play as the third teacher. In the design process itself there is a focus on designing for children, rather than designing with children.¹ However, it is crucial that understanding children's knowledge, values, experience and use of place would help us improve planning and design of those children's spaces. Furthermore, this study wants to see the linkages between social and emotional development of children and their participation. Within this study a critical question is asked as "How does the involvement of the children in the design process effect the social and emotional development of the children?", "Could we call the process of children and environment interaction as the third teacher?". The study suggests an empirical research that offers new ways of thinking about children's participation and learning and social-emotional development. It will concentrate on the participatory design experiences and discussions on how to create better inclusive child-centered design and interactive experiences for children.

In the literature on one hand, social and emotional development is known to determine that the children's self-expression, control of their emotions, peace and harmony with each other and their physical environment. Children who have a voice and authority about their own problems at school, in accordance with their development level, they will actively own their own learning processes and school. Also as an extension (continuation) of this, they are going to stake a claim on social problems in adulthood. In this respect, participatory approaches in childhood are important in terms of individuals playing a critical role in gaining awareness of democratic citizenship.

On the other hand the environment is to be designed in accordance with human needs and behavior. The physical environment affects humans' physical, cognitive, social-emotional development and shapes their behavior.² The user also changes and shapes the place in which he or she interacts as an active element of the physical environment. The interaction between the environment and the user

takes place in two directions.³ Respect for the right of the children to express them in education is essential for the realization of the right to education. Educational environments should be provided to ensure the active participation of children. The right to participate can be defined as expressing opinions in any part of the process or in all areas which has relation to a person's own life or the society he/she lives in. Children's right to participate is related to their involvement in matters that concern them.⁴ Children spend most of their time in schools. In this context, child participation is considered to be important in design as well as education.

Therefore, this study is concerned with addressing the relationship between educational pedagogyspace design and related with child participation. It is important in terms of examining the effect of place on social-emotional development by a designer. It attempts to establish the connection between the physical built environment (school) and children participation. It explores the link between participation to design and the social-emotional development of the child. The next part provides an overview of the literature on children rights and participation and the theoretical framework on children's development and physical environment as a third teacher. Following the literature review and the theoretical framework, the methodology of the study will be explained. As this study is a part of ongoing PhD thesis, the preliminary conclusions will be drawn.

LITERATURE REVIEW:

Children's right and participation

This part of the study addresses the issue of child participation in design with a rights-based approach. In this context, the rights on the UNCRC definition of the child's right to participate (Article 12) and other related articles have been examined. Child participation is one of the core principles of the UNCRC, which is associated with other articles in the contract with regard to the hearing and inclusion of children's voices. Therefore, these items are also related to Article 12 (Article 5, 9, 12, 13, 14, 15, 16, 17, 29).⁵

"Article 5: parental provision of direction and guidance in accordance with respect for children's evolving capacity;

Article 9: non-separation of children from families without the right to make their views known;

Article 12: the right to be listened to and taken seriously;

Article 13: the right to freedom of expression;

Article 14: the right to freedom of con-science, thought and religion;

Article 15: the right to freedom of association;

Article 16: the right to privacy;

Article 17: the right to information;

Article 29: the right to education that pro- motes respect for human rights and democracy."

In order to expand the concept of participation outlined in Article 12, the UN Committee on the Rights of the Child in its General Comments 12 defined child participation as an 'ongoing process, which includes information-sharing and dialogue between children and adults based on mutual respect, and in which children can learn how their views and those of adults are taken into account and shape the outcome of such processes.' This definition embraces the notion of child participation as a process but also as an outcome, which has three pivotal components:⁶ (1) impact in decision-making; (2) mutual respect between children and adults; and (3) joint learning process.

Current child participation literature offers several models of participation such as the Hart's Ladder of Participation, Treseder's Degrees of Participation, Shier's Pathways to Participation, Lansdown's Model of Participation.⁶ After reviewing the various provisions of UNCRC, it was made examinations in line with children's experiences of participating in decision-making processes.⁷

In the light of these studies, Lundy (2007) proposed, that there is a new way to bring Article 12 into practice in the context of human rights and its association with the law. In Lundy's Model of Participation, the key components of Article 12 and its' connections to the involvement of children in decision-making processes is conceptualized.⁷

In this model, 'space' refers to the fact that children must be given the opportunity to express a view. 'Voice' means that children must be facilitated to express their views. 'Audience' reflects the obligation that the view must be listened to. 'Influence' means that these views must be acted upon, as appropriate.⁷

For the purpose of this research paper, the Lundy model will be used as an appropriate guide to understanding child participation based on the definitions provided by the CRC and UN Committee on the Rights of the Child.

Despite all these views, children's places are shaped based on the values of adults and children's views are mostly ignored.⁸ However, it is possible to say that the child has the right to speak on the space design. Using this model will help to determine how spaces have been created for children, what mechanisms are in place to ensure that their voices are validated, how the strategic audience has been selected, and how and when their views have been taken into account in decision-making processes.

THEORETICAL FRAMEWORK:

Children's development

Cognitive and Social-emotional development is the change over time in children's ability to react to and interact with their social environment. It differs according to each age group of children. Cognitive development includes the following stages. The age range in which these stages occur may differ for each child. However, the order to follow each other is always the same:⁹

• Sensorimotor stage (0-2 years): The child interacts with the outside world with his activities with sensory organs and objects.

• Pre-operational stage (2-6 years): It starts when the child starts talking. The child's learning and adaptation to the environment takes place through imitation. Symbolic (imaginary) play, drawing, mental imagination and speaking language develop.

• Concrete operational stage (7-12 years): A big step towards the isolation of thought takes place at this stage.

• Formal operational stage (12 years-adult): It is the stage in which the ability to trade on assumptions is developed, except for the operations before your eyes.

Psychosocially development is defined as eight stages. Five of them have included childhood era:¹⁰

• Infancy stage (first year of life): This stage represents the periods when the child experiences trust (attachment).

• Toddler stage (second year of life): It is a period when the child can develop more independent relations with her or his environment thanks to language (self-expression skills) and physical development.

• Preschooler stage (3-5 years): In this period; children increasingly learn to move freely around the environment and therefore establish a place for them to achieve their goals in a wider and limitless manner.

• Elementary school stage (6-12): During this period, there is a great increase in the child's sense of task sharing, discipline and the ability to do something.

• Adolescence (12-18 years): Adolescence refers to a clear and conscious phase between childhood and adulthood. Adolescents often think about how to connect the ideal examples in daily

life with the skills and roles they had in previous periods, so that the young person can feel that he is ready to live as an adult.

- Young adulthood
- Middle adulthood
- Older age

The early years of life are a time of rapid growth and development,¹¹ and the positive experiences a child has early in life set the foundation for lifelong learning, behaviour, health, and well-being.¹²

Social and emotional learning has been defined as "the process through which children acquire the knowledge, attitudes and skills to recognise and manage their emotions, set and achieve positive goals, demonstrate caring and concern for others, establish and maintain positive relationships, make responsible decisions and handle interpersonal situations effectively."¹³

The importance of learning environments(schools) focusing on the development of social and emotional skills in children is now widely accepted.^{14, 15, 16 and 17} In this study, case study is going to be done with children in the 4-5 years old age group who is linguistically able to express itself and also the environmental discoveries of the children started during this period.^{9 and 10} Despite having these features, they are involved the processes least. Therefore, it is considered important to hear the voice of this age.

The environment as the third teacher

Makin defines the term environment in early education settings as "an aggregate of conditions and influences on learning, including both the physical environment (layout, range of resources, access, and use) and the psycho-social environment (interactions between staff and children, among peers, and between the setting and its wider context of homes and communities)".¹⁸

The principle of the environment as the third teacher comes from the educators in Reggio Emilia, Italy. It reflects the idea that the environment acts as a participant in the educational experience taking place within that environment. It involves rendering the environment a living space that actively participates in the educative process. The work of Bronfenbrenner stresses the importance of considering the environment as more than just an inanimate object, but rather one of bi-directionality, where the child impacts the environment and in turn is impacted by the environment.¹⁹ The environment is so entwined in a child's development that it is presumed that "the metamorphosis of childhood can be understood as a dynamic dance between children and their environments".^{20 and 21}

Strong-Wilson and Ellis explain that "childhood is often the first place where we begin to see and use the environment imaginatively [and where] we can begin to notice how our surroundings can take on a life of their own that contributes to children's learning" (p. 40). By seeing the environment as a teacher, you recognize that your surroundings take on a life of their own that contribute to children's learning and development.²²

Children thrive in indoor and outdoor spaces that invite them to investigate, imagine, think, create, solve problems, and make meaning from their experiences – especially when the spaces contain interesting and complex open-ended materials that children can use in many ways. In addition, when the schedule allows for long periods of uninterrupted play, with few transitions, children are calmer and more engaged. When the environment supports children's growing autonomy and independence, challenging behaviors are reduced and educators can focus more fully on observing, interacting, and extending children's learning and development in meaningful ways.¹²

"In order to act as an educator for the child, the environment has to be flexible: it must undergo frequent modification by the children and the teachers in order to remain up-to-date and responsive to

their needs to be protagonists in constructing their knowledge."²³ However, we have limited knowledge on how the environment enables and stimulates children's senses and effect on socio-emotional development through children participation.

METHODOLOGY

In the light of the above discussion, the purpose of this research study is to explore the concept of the environment as a third teacher and how students in a school inspired by "Reggio Emilia" viewed their classroom and its ability to help them learn. In this study, an alternative school is chosen named "Mese Palamudu (Acorn School)" in Turkey as a case study. These alternative schools in Turkey known as democratic schools which attach great importance to hearing children's voices (participation). The child is considered the real owner of the school and children's rights are prioritized in this educational setting.

Methodological approach is discussed to participatory from the perspective of environmental psychology. Within the scope of the study, both quantitative and qualitative research methods will be used in data collection and analysis. The children who are taken part in this study are 4-5 ages year old. The number of children to participate in the study was determined by taking into account the number of a class in the school which is in Istanbul, Turkey. Based on a class, 15-20 children, their parents, and their teachers are participants.

At the beginning of this study, verbal and visual data about the physical environment of the school were collected. Has the relationship between education curriculum and physical environment been attempted? This was questioned in the first interviews. In addition, semi-structured interviews will be held with children, their parents and their teachers. The purpose of the interviews is to understand how much the venue allows children to participate. Similarly, the same questions about children's participation in the home and school spaces is asked to their parents and their teachers. The aim of interviews with three different type of participation is to increase the reliability of the study, and to reveal the difference or similarity in adult and child perspective. After this part other questions of case study will be tried to explain with different tools:

First research question is (a) how is the effect of design participation on the social and emotional development of children?

Data collection for this question, "Social-Emotional Assessment / Evaluation Measure-Preschool (SEAMTM)" (which is developed by Squires et. al, 2014) scale questions are asked children's parents at beginning and the end of the semester to understand effect of the school environment. SEAMTM scale is developed in ABD to measure social-emotional development of children and to identify in the risk group.²⁴ The master thesis had carried out scale of SEAMTM reliability and validity study in Turkey.²⁵ This study shows that "SEAMTM has Turkish language equivalence and is a reliable and valid scale." SEAMTM scale is used by child developments professionals.

In this interdisciplinary study, this scale is used in association with the field of design. Thus, the relationship between space, child participation and social-emotional development will be tried to be revealed. The SEAMTM scale consists of 41 questions. The questions are grouped under 10 titles to show 10 basic development steps. According to scale pre-school age child:²⁴

- 1. participates in healthy interactions
- 2. expresses a range of emotions
- 3. regulates social-emotional responses
- 4. shows empathy for others
- 5. shares and engages with others
- 6. demonstrates independence

- 7. displays a positive self-image
- 8. regulates attention and activity level
- 9. cooperates with daily routines and requests
- 10. shows a range of adaptive skills

Secondly (b) how does child participation in the design of the educational place affect the child's behavior?

For this questions observation is the most important tool. And also there are a few observation papers which are prepared before to check the behaviors. According to behavioral maps, these subjects will be tried to be detailed; activity types, place needs related to them, behavior patterns, which space is used actively, which area is preferred for which activity, gender-related behavioral differences, participation type, and degrees of participation. Behavior maps continue to be developed. In this study, description of SEAM-TM scale details is emphasized.

For the ethical concerns of this study, the "ethics committee" of the university was consulted after all steps to be used in the study were approved by the child clinic psychologist. Detailed information about interview forms, SEAM and behavioral maps were presented orally and in writing, and approval was obtained from the ethics committee. The study described in this article honored children's voice. It entails documenting matters that directly affect children. The study also explores children's views about their learning environment in order to develop a deeper understanding of children's perspectives to ascertain whether they viewed their environment as a third teacher. After the evaluation of these results of the case study, it is expected that it is possible to design and create new learning environments that take consideration of children participation.

CONCLUSION

A wide understanding of participation has emerged as a result of not meeting the needs of children completely by adults, leaving adults deprived of their needs. At the same time, it started as a defense process with the dream that it should be present in its children in design and planning stages. Today, the participation of the child's participation has become more acceptable and widespread. Although not all circles are planned with their thoughts or by directly involving them, many communities carry out their design and planning with an understanding that includes children in the environments used by children. Child involvement has been a slow revolution, involving many stages or with distinct areas.²⁶ It is very important to have this in children's practices to talk about democratic participation. After this is done, it will be possible to see successful participant examples organized by children. It is always a process that primarily starts the empowerment in the family and the impact of the family is an important parameter in child participation⁵. Acting according to the views of children and young people has positive outcomes. There are studies showing that child / youth participation promotes service development, increased citizen relations and social participation of children and young people, and also supports stronger personal development.²⁷

Observations prove that adult individuals act intuitively when creating a place for children. Designing without paying attention to children's environmental is pushed architects and designers to produce alternative standard criteria. As an alternative to the adult environment, Clark advocates that a child-orientated architecture should emerge through the eyes of the designers and more children.³

This study emphasizes that engaging learning environments are essential to children's cognitive, physical, social, and emotional development. Designing for future, school environment that is functioning successfully as a third teacher will be responsive to the children's interests, provide opportunities for children to make their thinking visible and then foster further learning and engagement which will contribute to children's development.

NOTES

¹ Susan J. Wake, "Children's Gardens: Answering the Call of the Child?." *Built environment* 33.4 (2007): 441-453. ² Roger G. Barker, *Ecological Psychology* (Strandford: Stanford University Press, 1968).

³ Jeffrey R. Edwards , Robert D. Caplan and R. Van Harrison, "Person-environment fit theory: Theories of organizational stress" (1998): 28, 67.

⁴ Laura Lundy and Lesley McEvoy, "Children's rights and research processes: Assisting children to (in) formed views." *Childhood* 19 (2012): 129-144.

⁵ Gerison Lansdown, "Promoting children's participation in democratic decision-making" (2001): No. innins01/9.

⁶ Patricio Cuevas-Parra, Mario Stephano, and Yan Zhu, "Unpacking gender equality approach to children and young People's participation." (2016), *World Vision.*

⁷ Laura Lundy, "Voice' is not enough: conceptualising Article 12 of the United Nations Convention on the Rights of the Child." *British educational research journal* 33 (2007): 6: 927-942.

⁸ Roger A Hart, Children's participation: from tokenism to citizenship (Essay for UNICEF, 1992), No. inness92/6.

⁹ Bärbel Inhelder, Chipman H. Harold and Charles Zwingmann, edith *Piaget and his school: a reader in developmental psychology* (Springer, 1976).

¹⁰ Erik H. Erikson, *Identity and Life cycle*, (New York: W. W. Norton & Company, 1994).

¹¹ Ayla Arseven, "The Reggio Emilia approach and the curriculum development process." *International Journal of Academic Research*, (2014): 6(1), 166–171. doi: 10.7813/2075-4124.2014/6-1/B.23

¹² Ontario Ministry of Education. "How Does Learning Happen? Ontario's Pedagogy for the Early Years." (2014). http://www.edu.gov.on.ca/childcare/HowLearningHappens.pdf [retrieved 28.01.2021]

¹³ Weissberg J. Payton et. al., "The positive impact of social and emotional learning for kindergarten to eighthgrade students: Findings from three scientific reviews. Technical Report" *Chicago,IL: Collaborative for Academic, Social, and Emotional Learning (NJ1)* (2008)

¹⁴ Susanne. A. Denham and Chavaughn Brown, ""Plays nice with others": Social-emotional learning and academic success." *Early Education & Development,* (2010): 21.5: 652–680.

¹⁵ Val Gillies, "Social and emotional pedagogies: Critiquing the new orthodoxy of emotion in classroom behaviour management." *British Journal of Sociology of Education*, (2011): 32,185–202.

¹⁶ Mark T. Greenberg et al., "Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning." *American Psychologist*, (2003): 58, 466–474.

¹⁷ Lisa K. Maguire, Ulrike Niens, Mark McCann and Paul Connolly, "Emotional development among early schoolage children: gender differences in the role of problem behaviours." *Educational Psychology*, (2016): 36:8, 1408-1428.

¹⁸ Laurie Makin, "Creating positive literacy learning environments in early childhood." In N. Hall, J. Larson, & J. Marsh (Eds.), *Handbook of early childhood literacy* (2003): 327-337.

¹⁹ Urie Bronfenbrenner, *The ecology of human development: Experiments by nature and design*. (Harvard university press, 1979).

²⁰ Jane Bertrand, "Early Learning for Every Child Today: A framework for Ontario early childhood settings." *Toronto: Ministry of Children and Youth Services*, (2007).

http://cfcollaborative.ca/wp-content/uploads/ELECT-Jan-2007.pdf [retrieved 29.01.2021]

²¹ Kelsey Robson, "Review of the literature on the Reggio Emilia approach to education with a focus on the principle of the environment as the third teacher." *The International Journal of Holistic Early Learning and Development,* 4, (2017): 35-44.

²² Teresa Strong-Wilson and Julia Ellis "Children and place: Reggio Emilia's environment as third teacher." *Theory Into Practice*, 46(1), (2027): 40-47.

²³ Edwards, Carolyn P., Lella Gandini, and George E. Forman, eds. *The hundred languages of children: The Reggio Emilia approach--advanced reflections*. (Greenwood Publishing Group, 1998).

²⁴ Jane Squires, Diana Bricker, Misti Waddell, Kristin Funk, Jantina Clifford and Robert Hoselton. *Social Emotional Assessment/Evaluation Measure (SEAM): Research edition,* (Baltimore: Paul H. Brookes Publishing Co., Inc, 2014)

²⁵ Hande A. Çiftçi and Gülden U. Balat, "Social-Emotional Assessment/Evaluation Measure (SEAM): Turkish Adaptation Study for Children 48-66 Months." *Inonu University Journal of the Faculty of Education (INUJFE)* (2018): 19(3).

²⁶ Mark Francis and Ray Lorenzo, "Seven realms of children's participation." *Journal of environmental psychology* 22 (2002): 157-169.

²⁷ Lanyon Kirby P., Kathleen C. Cronin and Ruth Sinclair, *Building a culture of participation. Involving children and young people in policy, service planning, delivery and evaluation*, (Nottingham: Department for Education and Skills Publications, 2003).

BIBLIOGRAPHY

- Arseven, Ayla. "The Reggio Emilia approach and the curriculum development process." *International Journal of Academic Research*, (2014): 6(1), 166–171.
- Barker, Roger G.. Ecological Psychology. Stanford: Stanford University Press, 1968.
- Bertrand, Jane. "Early Learning for Every Child Today: A framework for Ontario early childhood settings.", *Toronto: Ministry of Children and Youth Services,* 2007.
- Bronfenbrenner, Urie. The ecology of human development: Experiments by nature and design. Harvard university press, 1979.
- Çiftçi A., Hande and Balat U., Gülden. "Social-Emotional Assessment/Evaluation Measure (SEAM): Turkish Adaptation Study for Children 48-66 Months." *Inonu University Journal of the Faculty of Education (INUJFE)* (2018): 74-87.
- Cuevas-Parra ,Patricio, Stephano, Mario, and Zhu, Yan. "Unpacking gender equality approach to children and young People's participation." (2016), *World Vision.*
- Denham, Susanne. A. and Brown, Chavaughn. ""Plays nice with others": Social-emotional learning and academic success." *Early Education & Development,* (2010): 21.5: 652–680.
- Edwards, Carolyn P., Lella Gandini, and George E. Forman, eds. *The hundred languages of children: The Reggio Emilia approach--advanced reflections*. Greenwood Publishing Group, 1998.
- Edwards, Jeffrey R., Caplan, Robert D., and Van Harrison, R. "Person-environment fit theory: Theories of organizational stress" (1998).
- Erikson, Erik H., Identity and Life cycle, New York: W. W. Norton & Company, 1994.
- Francis, Mark and Lorenzo, Ray. "Seven realms of children's participation." *Journal of environmental psychology* 22, 1 (2002).
- Gillies, Val. "Social and emotional pedagogies: Critiquing the new orthodoxy of emotion in classroom behaviour management." *British Journal of Sociology of Education*, (2011): 32,185–202.
- Greenberg, Mark T., et al. "Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning." *American Psychologist*, (2003): 58, 466–474.
- Hart, Roger A. Children's participation: from tokenism to citizenship. Essay for UNICEF, 1992.
- Inhelder, Bärbel, Harold H., Chipman and Zwingmann, Charles. Edith *Piaget and his school: a reader in developmental psychology*. Springer, 1976.
- Kirby, Perpetua, Lanyon, Claire, Cronin, Kathleen and Sinclair, Ruth. *Building a culture of participation. Involving children and young people in policy, service planning, delivery and evaluation.* Nottingham: Department for Education and Skills Publications, 2003.
- Lansdown, Gerison. "Promoting children's participation in democratic decision-making" (2001).
- Lundy, Laura. "Voice' is not enough: conceptualising Article 12 of the United Nations Convention on the Rights of the Child." *British educational research journal* 33 (2007), 927-942.
- Lundy, Laura and McEvoy, Lesley. "Children's rights and research processes: Assisting children to (in) formed views." *Childhood* 19 (2012), 129-144.
- Maguire, Lisa K., Niens, Ulrike, McCann, Mark and Connolly, Paul. "Emotional development among early schoolage children: gender differences in the role of problem behaviours." *Educational Psychology*, (2016): 36:8, 1408-1428.
- Makin, Laurie. "Creating positive literacy learning environments in early childhood." In N. Hall, J. Larson, & J. Marsh (Eds.), *Handbook of early childhood literacy* (2003): 327-337.
- Ontario Ministry of Education. "How Does Learning Happen? Ontario's Pedagogy for the Early Years.", 2014. Retrieved http://www.edu.gov.on.ca/childcare/HowLearningHappens.pdf [date 28.01.2021]

- Payton, J., Weissberg, et al., "The positive impact of social and emotional learning for kindergarten to eighthgrade students: Findings from three scientific reviews. Technical Report" *Chicago,IL: Collaborative for Academic, Social, and Emotional Learning (NJ1),* 2008.
- Robson, Kelsey. "Review of the literature on the Reggio Emilia approach to education with a focus on the principle of the environment as the third teacher." *The International Journal of Holistic Early Learning and Development*, 4, (2017), 35-44.
- Squires, Jane, Bricker, Diana, Waddell, Misti, Funk, Kristin, and Clifford, Jantina. Social Emotional Assessment/Evaluation Measure (SEAM): *Research edition,* Baltimore: Paul H. Brookes Publishing Co., Inc, 2014.
- Strong-Wilson, Teresa., and Ellis, Julia. "Children and place: Reggio Emilia's environment as third teacher." *Theory Into Practice*, 46(1), (2007): 40-47.

Wake, Susan J. "Children's Gardens: Answering the Call of the Child?." Built environment 33.4 (2007): 441-453.

PERCEPTUAL QUALITIES OF CONCRETE: A CHANGING PARADIGM?

Author: TARA HARB, TATJANA LEBLANC

Institution: UNIVERSITÉ DE MONTRÉAL, CANADA

INTRODUCTION

Concrete is one of the most used materials of the century with an estimated 30 billion tons consumed each year ¹. The material has continuously been the subject of interest of architects, urban planners, and designers due to its availability, ease of use, and cost efficiency ². Today, concrete is known as a versatile medium that is adaptable to a wide range of applications. Despite its popularity as a building material, it has a significant impact on our environment. Concrete's life cycle and rapid weathering seem to affect its reputation. This paper presents some of the research investigating the changing perceptual qualities of concrete artifacts. We look into the dichotomy between the technological and environmental considerations and concrete's evolving aesthetics by relying on a product semantic framework ^{3, 4, 5}.

Material perception

Perception is the active cognitive process of perceiving sensorial stimuli from one's surroundings and then analyzing and organizing the information meaningfully ⁶. It is a highly context-sensitive activity influenced by culture, the contextual environment, lived experiences, and memories or associations, among other things ⁷. Based on recent research, the brain processes the information received according to different levels: some subconscious and others more contemplated and reflective ^{8, 9}. Product experiences – including material experiences – are thus based on the perception and reference framework of each individual user, whether it is consciously analyzed or not ^{10, 11}.

Many scholars agree that materials can have a positive or negative influence on the way users experience artifacts. The physical properties of an artifact (shape, material, color, textures, odors, sounds) can generate emotional reactions such as attraction, pleasure, and even repulsion ¹². Given the complexity of perceptions, it was important to firstly investigate concrete's evolution through time to better understand its perception today.

CONCRETE'S EVOLUTION

Many tend to differentiate between early concrete-like compounds – referred to as *crude concretes* – and today's concrete mixes – referred to as *modern concrete*.

Various types of concrete-like compounds have been discovered, developed, and exploited by ancient civilizations. They can be classified into *natural compounds* which come from spontaneous geological reactions such as natural pozzolans, and *manufactured compounds* that were created by mixing

components such as mud and straw or through transformation by fire, leading to materials such as calcined volcanic stone ^{13, 14}.

According to literature, the first traces of cement compounds were found in different regions of the world, notably in the Middle East and parts of Europe. Historians mention early uses of crude concrete mixes around 3000 B.C. to build the Pyramids in Egypt ¹⁵ or to hold bamboo together for the Great Wall of China ¹⁶. However, no ancient culture exploited its advantages as much as the Romans ¹⁷. In fact, they developed a material remarkably resembling today's *modern concrete* ¹⁸. They were also the first to use trade guilds to pass on their material know-how and techniques. They built architectural marvels that withstood the test of time such as the Colosseum and the Pantheon. Yet, their concrete knowledge was lost with the fall of their empire and no significant developments were documented between 476 A.D. and the 15th century ^{19, 20}.

Discovered in 1414, roman architect Vitruvius's *Ten Books on Architecture (De Architectura)* were the earliest manuscripts documenting concrete techniques ²¹.

During the following centuries, little progress was made. Though the industrial revolution led to population growth and urban development, pushing the construction industry to experiment with material technologies. And thus, the renewed interest in concrete drove the emergence of more performant compounds that experts refer to as *modern concretes*.

Modern concretes are divided into two main categories: **non-structural** mixes made with a binder paste (water and cementitious compound) and fillers (aggregates of different grades), or **structural concretes** with added reinforcement for applications requiring high performances. Concrete is thus composed of a handful of simple ingredients. In fact, French engineer and pioneer of reinforced concrete, François Hennebique, said that "reinforced concrete was the art of doing large things with small means"²².

Although concrete technologies evolved greatly during the industrial revolution in the early 1800s, the invention of Portland Cement marked an important milestone in the material's history. It opened the doors for its standardization worldwide and created a great demand in North America and in Europe.

By the end of the 19th century, concrete finally became an accepted architectural material: techniques such as ready-mixed, cast-in-place, and precast allowed for an optimized efficiency on the construction site, revolutionizing the construction industry. The experimentation with admixtures, agents, and aggregates created different grades of performance concretes for various applications. Structures could be given thin hyperbolic shapes and unprecedented cantilevers, and sophisticated techniques such as coloring and stamping offered a variety of surface finishes.

Concrete and its impact on the environment

In all concrete recipes, the cementitious compound – the most common being Portland cement – plays an important role by reacting with the ingredients, allowing the mix to cure. However, Portland cement is highly polluting, considering the energy required for its extraction and manufacturing. Despite the efforts to optimize these processes, recent studies show that the production of Portland cement is still responsible for about 7% of the planet's CO2 emissions $^{23, 24}$.

Furthermore, many post-war and post-industrial revolution structures had to be demolished, producing about 40% of the world's concrete debris ²⁵.

Nonetheless, despite its ecological impact, concrete remains in high demand as a building material due to its technical and economic advantages.

As populations are growing and cities densifying, concrete is becoming the medium of choice for the expansion of the urban world ^{26, 27}. Its inevitability increases global environmental concerns. The consequences on climate change are forcing society to reassess its practices and invest in more

sustainable solutions. Ever since, optimized approaches have emerged by scrutinizing concrete's lifecycle and applications. This progressively leads to more responsible design intentions, including recycling debris, perfecting recipes, etc. ^{28, 29, 30}.

PERCEPTION OF CONCRETE

Today, it is no secret that concrete is one of the most controversial materials 31 . Its quality perception – and by consequence, its reputation – is torn between its aesthetic limitations and practicality. Considering its technoeconomic advantages, it is difficult to currently imagine a material able to compete with concrete

In addition, the expansion of the construction industry has had a considerable effect on people's relationship with the material. Its quality perception will depend on the user's reference framework. These are context-sensitive and include concrete artifacts experiences paired with other factors and markings. Some will associate the material with industrialization, urban development, war and destruction, others with environmental pollution, and global warming; whereas others may see inherent beauty in its imperfections. The connotative significance will consequently vary from one generation to another, from one individual to another.

Our study shows that concrete artifacts are subject to different and even contradicting appreciations, depending on how the users relate to those artefacts.

For example, the value perception of those who invest in it (governments, municipalities, promoters, developers, etc.) can be denoted and pragmatic compared to those who create with the material, and keep prescribing it (designers, architects, urban planners, etc.). The experiences of working with and manipulating concrete (builders, construction workers, entrepreneurs, etc.), or maintaining and preserving the artifacts and infrastructures (city workers, conservators, etc.) may affect quality perception differently from the users cited above. Finally, there are those who directly experience and interact with concrete artefacts daily (locals and visitors of all ages, with different cultural backgrounds and varied physical and cognitive abilities). They can testify to how concrete elements affect everyday life, how they complement the surroundings, and how they survive the passage of time, use, and abuse. Additionally, our research allowed us to compile testimonies from observers and experts that studied the material and its uses through time such as historians and scholars.

Quality perception

An appreciable amount of data about the material has been collected studying scientific articles, manuscripts, books, magazines, and blog entries with regards to concrete applications from their early beginnings until now, examining recipes, production techniques, popular uses, and trends.

We learned that concrete structures and artefacts can be perceived as *rich, sensuous*, and *versatile*, while referring to the material's plasticity and the structural or aesthetic possibilities it offers. Architect and theorist Gottfried Semper describes concrete as a "particularly rich medium" stressing that "it lent itself to so many different surface treatments while at the same time being a structural material" ³². Adrian Forty, architectural historian, mentioned that "[architects] exploited concrete's sensuous and tactile properties, and its capacity to suggest that buildings were 'real', the outcome of an actual process of construction" ³³. Ernest Ransome, one of the first architects using reinforced concrete, saw it as being "the concern of skilled craftsmen, and capable of displaying an inherent beauty" ³⁴.

Many appreciate this material for its *solidity, strength,* and *resistance* in withstanding the test of time and natural disasters. The material can offer a *sense of security* and *protection*, particularly in post-war scenarios, as it has been called "a medium of defense" by English architect Charles Reilly ³⁵.

However, the research also shows that concrete can be perceived as *cold, dark, monolithic* and *oppressive* for its *omnipresence* and *association with the fast expansion of the urban world*. In fact, the Royal Institute of British Architects observes more pragmatically that "the natural grey of Portland cement is cold and depressing, and time and weather, [...] make untreated concrete more and more dirty, dark and untidy" ³⁶. In addition, the material can be seen to have the capacity to *resist nature's manifestation* with its weight and composition. Concrete can be a *powerful man-made tool obliterating nature*, which adds to its *destructive* reputation. Expressions such as *concrete jungle* describing megacities, and "*to concrete over*" referring to the exponentially growing building activities have fueled this opposition between what is considered natural, and man-made ³⁷. Forty describes concrete as "an artificial product, plundered from nature, it resists nature and produces environments from which nature is excluded, that are 'denatured'" ³⁸, whereas geographer and urbanist Matthew Gandy sees it as the "creation of a new kind of nature through the agency of concrete: "*urban nature*" ³⁹.

Concrete can also be the *source of frustration* due to its *unpredictably*, as it is *difficult, if not impossible to control* on a construction site. We can find English architectural critic and writer Reyner Banham commenting on the recently constructed Marchionni Institute saying that "one of the early icons of the heavy concrete style has weathered very badly, and now that the exposed concrete is stained and streaked, to the visitor, it seems very harsh" ⁴⁰. Forty observed that "whatever concrete strives to do, it almost invariably manages, at the same time, to achieve the opposite" ⁴¹.

Aging material

The passage of time tends to significantly affect concrete's aesthetic decline. Rapid deterioration and vandalism seem to contribute to its bad reputation. As they cure, concrete surfaces naturally - yet unpredictably - expose what many consider *imperfections*. However, concrete is always bound to develop superficial stains and cracks as air bubbles and aggregates rise randomly and uncontrollably to its surface. In addition, exposure to harsh climate and inappropriate maintenance leads to premature deterioration. These *imperfect* surfaces thus become the *perfect* canvas for acts of vandalism since they are less intimidating than the ones perfectly finished (Images 1, 2 & 3).



Figures 1, 2 & 3. Ageing concrete, T. Harb, 2019

A dramatic example is architect Kisho Kurokawa's Nakagin Capsule Hotel, built in 1972 with precast lightweight concrete panels. At the time, the seemingly *perfect* light-colored concrete finish was striking from afar (Image 4) ⁴². Today, the ageing concrete surfaces have deteriorated the building's value perception (Image 5) ⁴³.

The tower has since been the subject of controversy due to its high maintenance costs. Advocates fighting to preserve this architectural heritage are being confronted with investors who perceive it as an *eyesore* and call for its demolition.



Figure 4. Nakagin Capsule Hotel by Kisho Kurokawa in 1972 (Images from ArchEyes by Noritka Minami)



Figure 5. Nakagin Capsule Hotel by Kisho Kurokawa in 2019 (Image from Flickr by Sharat Ganapati)

The quest for perfection

Ageing concrete infrastructures and artifacts have always been subjected to harsh critics from those with high expectations, ulterior motives or opposing views. In recent years, Western cultures have become known for their obsession with perfection and unforgiving standards when it comes to natural wear and tear ⁴⁴⁴⁵. Beauty is often associated with being *perfect*, *new* or "a sense of being flawless, while appearances have become more important than essence and substance" ⁴⁶. The quest for the *impeccable* leads to the premature discard of perfectly functional products showing signs of wear. It explains in part why concrete elements tend to lose their user's appreciation and get easily dismissed. In fact, design professor and researcher Johnathan Chapman insists that "products whose key value lies in the degree of newness are vulnerable to the glare of decay"; and, by designing perfection we are creating an "unstable and vulnerable" subject-object relationship ⁴⁷. This distorted quality perception leads to unsustainable lifestyles, thus harming modern society and its ecosystems.

And yet, not all materials face the same scrutiny. For example, stones, metals, wood and even leather tend to gain value as patina forms on their surfaces. Signs of deterioration are valued for the story they tell. These variants in material perception beg the question: could such a posture be applicable to concrete artifacts, and what would it take to achieve it?

Designing for imperfection

In Eastern cultures, transience and aesthetic imperfections are considered *unique*. To many, defaults add value and meaning to an artifact. Through practices such as *Kintsugi*, imperfections are celebrated as part of the artifact's life journey ⁴⁸⁴⁹. Chips or cracks in pottery are highlighted instead of concealed by mixing precious powdered metals in the repair process. This perspective gains traction with those seeking to extend the lifespan of a product. This approach has inspired some who try to adapt the technique to their respective field of practice: the *Kintsugi Court* by Victor Solomon being an example (Image 6) ⁵⁰.



Figure 6. Kintsugi Court by Victor Solomon, Los Angeles, 2020 (image from Dezeen)

Eastern worldviews such as Wabi Sabi embrace transience and find beauty in the signs of the inevitable passage of time ⁵¹. We can even find Le Corbusier famously insisting to leave the imperfections on the concrete of his Marseilles Unité d'Habitation untouched saying that "the defects shout out at one from all parts of the structure [...] but these are magnificent to look at, they are interesting to observe, and to those who have a little imagination they add a certain richness" ⁵².

In fact, Dutch art historian and design critic Renny Ramakers explains the rising interest in imperfection observed today in industrial design practices as a response to the redundantly perfect aesthetics of mass production. Some designers go to the extent of artificially introducing imperfections in products to counter uniformity ⁵³. These motives are questionable and may be perceived as a deceptive practice. It does not reflect the genuine philosophies and worldviews of those who seek sustainable lifestyles and honest and authentic design by embracing natural anomalies.

A SHIFTING PARADIGM

And thus, our research has revealed a notable shift in paradigm with regards to quality perception of concrete. A paradigm is "what members of a scientific community share" ⁵⁴. Consequently, it includes emerging discoveries - constructive or destructive - that may cause or contribute to change ⁵⁵. Such findings can be the result-of or preconditioned-by a crisis of some sort. In the context of our research,

unsustainable lifestyles and mass urbanization start affecting all societies, the environment and people's quality of life. The emerging challenges require new policies with the goal to alter practices and mindsets.

Changing perception through design

The research shows that design can influence user perceptions and trigger emotional responses towards a product or a material ⁵⁶. Therefore, design can impact our view of concrete's natural deterioration through innovative, surprising, resilient, and sustainable solutions and practices.

In the recent years, designers and engineers started to experiment with optimized concrete technologies in multiple fields. New techniques allow designers to explore a more poetic side of the material beyond its traditional structural applications.

For example, Zaha Hadid Architects collaborated with ETH Zurich to create a double-curved thin shell pavilion with the use of a 3D-knitted fabric formwork ⁵⁷. In addition, 3D-printing concrete for various applications has proven to be an excellent way to optimize construction time and to minimize waste as can be seen in the houses created by Arup and CLS Architetti ⁵⁸. The 3D-printed columns by ETH Zurich even included an optimized fast-setting concrete recipe (Image 7) ⁵⁹.



Figure 7. Concrete Choreography by ETH Zurich (image from Dezeen)

In addition, the *Naturalis Biodiversity Center* was built with marble aggregate concrete panels. The rubber molds were designed by Neutelings Riedijk Architects in collaboration with fashion designer Iris Van Herpen to produce surprising shapes and textures, rarely seen with this type of medium (Image 8) ⁶⁰. Not to mention in-situ concrete that was given textured surfaces by using natural formworks reminiscent of bamboo as can be seen in the *House for Trees* by VTN Architects ⁶¹.



Figure 8. Naturalis Biodiversity Center Leiden by Neutelings Riedijk Architects and Iris Van Herpen (images from ArchDaily)

Furthermore, recent trends have been celebrating the *béton brut* or exposed concrete, offering a rather authentic appearance. Untreated concrete finishes can be increasingly found in interior design projects such as the *Brutalist Silence* offices by Annabell Kutucu ⁶², *A Forest House* by Aquilies Jarrin ⁶³, the *Casa H3* board-marked concrete by Luciano Kruk ⁶⁴, and the *Casa Mq2* by BP Architectura ⁶⁵.

Additionally, introducing digital manufacturing gives concrete screens and façades a whole new dimension. Antistatics Architectrue, for example, have created the *MAOHAUS* Ultra-High-Performance (UHPC) concrete screen with CNC mold fabrication (Image 9) ⁶⁶ and the *Wenzhou OUriver Crustal Boxes Restaurant* façade using UHPC dynamic block elements which were produced with simple two-part casting molds ⁶⁷.



Figure 9. MAOHAUS concrete screen by Antistatics Architecture (image from Antistatics Architecture and Design)

Moreover, experimentation with admixtures, aggregates and other ingredients have led to more performant concrete mixes and novel applications. Although it is still the material of choice for dramatic structures typically seen in engineering projects, concrete is now being used in more subtle ways in product design. With lightweight pigmented concrete mixes, the material lends itself to product designs as can be seen in the concrete furniture line *cimento* by Parisotto and Formenton ⁶⁸⁶⁹ or the *Petra sink* by Merendi and Cencato ⁷⁰.

Other innovative techniques even use flexible concrete cloths. Designers such as Florian Schmid have been pushing fabric forming techniques with *Stitching Concrete*, as the poetically folded concrete cloth seat using Concrete Canvas demonstrates (Image 10)⁷¹.



Figure 10. Stitching Concrete by Florian Schmid (Images from Dezeen)

And finally, colossal concrete structures have since been erected, showing how the material has imposed itself as appropriate for places of spirituality. Temples, mosques, and churches around the world have been recently built from concrete: for example, the stepped concrete temple by Toru Kashihara Architects ⁷², the mosque by Candalepas Associates ⁷³ or the chapel by Cavagnero ⁷⁴. In fact, concrete has become the chosen material for commemoration, found in post-war memorials such as the notorious *Holocaust Memorial* in Berlin by Eisenman and Happold ⁷⁵ or the more recent *Memorial for the victims of Covid19 in Uruguay* by Platero ⁷⁶.

Sustainable solutions

In parallel, scholars and engineers have been searching for innovative ways to reduce concrete's ecological footprint ⁷⁷. For example, demolished concrete can be recycled onsite and used as coarse aggregate in new mixes. This approach helps reduce costs by reusing what was considered a wastematerial all while saving time and reducing carbon emissions from the production of new aggregates ⁷⁸. As studies show, others replace parts of the highly pollutant Portland cement with recycled or repurposed products such as fly ash or micronized glass ⁷⁹. The Ultra-High-Performance Glass Concrete (UHPGC) for example, uses micronized glass powder to create an ecological high-performance mix, giving concrete improved physical properties that help reduce heat island effects ⁸⁰. Other recipes use Titanium-Dioxide, an additive that can purify air pollutants as was measured with the *smog-cleaning* concrete panels by Italcimenti ⁸¹.

Furthermore, concrete has been progressively introduced in a more unconventional manner to replace, for example, the typical use of plastics in electrical switches and sockets ⁸². These and many more applications showcase that recent developments in material sciences have helped concrete recipes and finishing techniques become more aesthetically and ecologically responsible.

CONCLUSION

It has become obvious that technological progress in the field of material sciences and manufacturing techniques has affected the way people perceive and engage with the material world. Concrete has established itself as a defining component of modernity, having had positive and negative effects on the urban landscape. Its omnipresence throughout centuries has had its share in creating the problems that urban centers are facing. Charged with historic and cultural significance, concrete was often associated with the experiences and events of cultures throughout history, thus explaining certain connotations that some people associate it with. Our research shows how these emotional responses can consequently vary.

Innovative designs and new attitudes towards the material have had an influence on its relevance and appreciation.

By comparing its perceptual features using a semantic framework we were able to document a dualism which highlights a changing paradigm. It shows that a better understanding of today's qualities perception of materials can help experts, designers, and architects to more purposefully orient their efforts and support this change.

It is obvious that innovative design approaches and scientific progress have a role to play in encouraging a shift in paradigm that promotes more sustainable practices. In this regard, designers need to consciously address issues such as the natural aging process of materials by adopting worldviews that responsibly embrace "imperfections".

NOTES

¹ Paulo, Monteiro J. M., Sabbie A. Miller, and Arpad Horvath. "Towards Sustainable Concrete." *Nature Materials* 16, no. 7 (July 2017): 698–99.

² Christian, Meyer, "Concrete as a Green Building Material." *Construction Materials Mindess Symposium*, (2005), 10.

³ Pieter, Desmet, and Paul Hekkert. "Framework of Product Experience." *International Journal of Dsign* 1, no. 1 (2007).

⁴ Klaus, Krippendorff, "The Semantic Turn: A New Foundation for Design". CRC Press, (2005).

⁵ Charles, E., Osgood, George J. Suci, and Percy Tannenbaum. "*The Measurement of Meaning*". 1st Edition. Urbana-Champaign: University of Illinois Press, (1967).

⁶ Claude, Bonnet, "Processus cognitifs de la perception. Perception et agnosies". De Boeck Supérieur, (1995).

⁷ Michela C., Tacca, "Commonalities between Perception and Cognition." *Frontiers in Psychology* 2 (2011): 358.

⁸ Donald, Norman, "Emotional Design: Why We Love or Hate Everyday Things". 1 edition. Basic Books, (2005).

⁹ Andrew, Ortony, Gerald L. Clore, and Allan Collins. "*The Cognitive Structure of Emotions*. Cambridge University Press", (1990).

¹⁰ Elvin, Karana, Owain Pedgley, and Valentina Rognoli, eds. "*Materials Experience: Fundamentals of Materials and Design*". 1 edition. Amsterdam: Butterworth-Heinemann, (2013).

¹¹ Hendrik N. J., Schifferstein, and Marc P. H. D. Cleiren. "Capturing Product Experiences: A Split-Modality Approach." *Acta Psychologica* 118, no. 3 (March 2005): 293–318.

¹² Elvin, Karana, Owain Pedgley, and Valentina Rognoli, eds. "*Materials Experience: Fundamentals of Materials and Design*". 1 edition. Amsterdam: Butterworth-Heinemann, (2013).

¹³ Norbert J., Delatte, "Lessons from Roman Cement and Concrete." *Journal of Professional Issues in Engineering Education and Practice* 127, no. 3 (July 1, 2001): 109–15.

¹⁴ Bridget, Cherry, and Nikolaus Pevsner, "London 3: North West". Yale University Press, (2002).

¹⁵ Donald H., Campbell, and RobertT L. Folk, "Ancient Egyptian Pyramids--Concrete or Rock." *Concrete International* 13, no. 8 (August 1, 1991): 28, 30–39.

¹⁶ Zongjin, Li, "Advanced Concrete Technology". John Wiley & Sons, (2011).

¹⁷ Norbert J., Delatte, "Lessons from Roman Cement and Concrete." *Journal of Professional Issues in Engineering Education and Practice* 127, no. 3 (July 1, 2001): 109–15.

¹⁸ Norbert J., Delatte, "Lessons from Roman Cement and Concrete." *Journal of Professional Issues in Engineering Education and Practice* 127, no. 3 (July 1, 2001): 109–15.

¹⁹ Adrian, Forty, "Concrete and Culture: A Material History". Reaktion Books, (2013).

²⁰ Peter, Collins, "Concrete: The Vision of a New Architecture." Montreal, Que.: McGill-Queen's University Press, (2004).

²¹ Vitruvius. "Ten Books on Architecture (De Architectura)." Harvard University, (1914).

²² Gwenaël Delhumeau, and Institut français d'architecture. "*Le Béton en représentation: la mémoire photographique de l'entreprise Hennebique, 1890-1930*". Paris: F. Hazan. Institut français d'architecture., (1993).

²³ Paulo J. M. Monteiro, Sabbie A. Miller, and Arpad Horvath, "Towards Sustainable Concrete." *Nature Materials* 16, no. 7 (July 2017): 698–99.

²⁴ Christian, Meyer, "Concrete as a Green Building Material." *Construction Materials Mindess Symposium*, (2005), 10.

²⁵ World Buisness Council for Sustainable Development (WBCSD). "Cement Sustainability Initiative 2019," (2019). https://www.wbcsd.org/CSI.

²⁶ Roser, Max, Hannah Ritchie, and Esteban Ortiz-Ospina. "World Population Growth." *Our World in Data*, (May 9, 2013).

²⁷ Christine, Haaland, and Cecil Konijnendijk van den Bosch. "Challenges and Strategies for Urban Green-Space Planning in Cities Undergoing Densification: A Review." *Urban Forestry & Urban Greening* 14, no. 4 (January 1, 2015): 760–71.

²⁸ Christian, Meyer, "Concrete as a Green Building Material." *Construction Materials Mindess Symposium*, (2005), 10.

²⁹ Kumar P., Mehta, "Greening of the Concrete Industry for Sustainable Development." *Concrete International*, Tuthill Commemorative Lecture at the Fall 2001 ACI Convention, Dallas, Tex, (2002), 6.

³⁰ Durability of Concrete: Proceedings, Fifth International Conference, Barcelona, Spain, 2000. American Concrete Institute, (2000).

³¹ Peter, Collins, "Concrete: The Vision of a New Architecture." Montreal, Que.: McGill-Queen's University Press, (2004).

³² Adrian, Forty, "Concrete and Culture: A Material History. Reaktion Books, (2013).

³³ Adrian, Forty, "Concrete and Culture: A Material History. Reaktion Books, (2013).

³⁴ Peter, Collins, "Concrete: The Vision of a New Architecture." Montreal, Que.: McGill-Queen's University Press, (2004).

³⁵ Adrian, Forty, "Concrete and Culture: A Material History. Reaktion Books, (2013).

³⁶ Ministry of Works. *The Architectural Use of Building Materials*. His Majesty's Stationery Office, (1946).

³⁷ Cyrille, Simonnet, "*Le beton, histoire d'un materiau*". First edition edition. Marseille: Editions Parenthèses, (2005).

³⁸ Adrian, Forty, "Concrete and Culture: A Material History. Reaktion Books, (2013).

³⁹ Matthew, Gandy, "Concrete and Clay: Reworking Nature in New York City". MIT Press, (2003).

⁴⁰ Reyner, Banham, "The New Brutalism: Ethic or Aesthetic?" First Edition. Architectural Press, (1966).

⁴¹ Adrian, Forty, "Concrete and Culture: A Material History. Reaktion Books, (2013).

⁴² "Nakagin Capsule Tower in Tokyo / Kisho Kurokawa,", ArchEyes., March 3, 2016, accessed November 11 2020, https://archeyes.com/nakagin-capsule-tower-kisho-kurokawa/.

⁴³ "AD Classics: Nakagin Capsule Tower / Kisho Kurokawa", ArchDaily, Accessed November 23, 2020. https://www.archdaily.com/110745/ad-classics-nakagin-capsule-tower-kisho-kurokawa.

⁴⁴ Elvin, Karana, Owain Pedgley, and Valentina Rognoli, eds. "*Materials Experience: Fundamentals of Materials and Design*". 1 edition. Amsterdam: Butterworth-Heinemann, (2013).

⁴⁵ Michael F., Ashby and Kara Johnson, "*Materials and Design: The Art and Science of Material Selection in Product Design*". 3 edition. Oxford: Butterworth-Heinemann, (2014).

⁴⁶ Elvin, Karana, Owain Pedgley, and Valentina Rognoli, eds. "*Materials Experience: Fundamentals of Materials and Design*". 1 edition. Amsterdam: Butterworth-Heinemann, (2013).

⁴⁷ Jonathan, Chapman, "*Emotionally Durable Design: Objects, Experiences and Empathy*". 2 edition. London; New York, NY: Routledge, P.131, (2015).

⁴⁸ Guy, Keulemans, "The Geo-Cultural Conditions of Kintsugi." *The Journal of Modern Craft* 9, no. 1 (January 2, 2016): 15–34.

⁴⁹ Helen, Chittock, "*Pattern as Patina: Iron Age 'Kintsugi' from East Yorkshire. Images in the Making*". Manchester University Press, 2020.

⁵⁰ "Victor Solomon Mends LA Basketball Court Using Japanese Art of Kintsugi.", Dezeen, Accessed November 24, 2020, https://www.dezeen.com/2020/08/18/victor-solomon-kintsugi-court-basketball/

⁵¹ Andrew, Juniper, "Wabi Sabi: The Japanese Art of Impermanence". Tuttle Pub., (2003).

⁵² Willy, Boesiger, "Le Corbusier - Oeuvre Complète: Volume 5: 1946-1952 ». 12. Aufl. edition. Basel: Birkhäuser Basel, (1995).

⁵³ Renny, Ramakers, "Less + More: Droog Design in Context". 010 Publishers, (2002).

⁵⁴ Thomas S., Kuhn, "*The Structure of Scientific Revolutions: 50th Anniversary Edition*". University of Chicago Press, P.64, (2012).

⁵⁵ Thomas S., Kuhn, "*The Structure of Scientific Revolutions: 50th Anniversary Edition*". University of Chicago Press, P.64, (2012).

⁵⁶ Donald, Norman, "Emotional Design: Why We Love or Hate Everyday Things". 1 edition. Basic Books, (2005).

⁵⁷ "Zaha Hadid Architects and ETH Zurich Debut Concrete Pavilion with 3D-Knitted Formwork,", Dezzen, accessed November 22, 2020, https://www.dezeen.com/2018/11/02/zaha-hadid-architects-eth-zurich-3d-knitted-concrete-formwork-knitcrete-knitcandela/.

⁵⁸ "Arup and CLS Architetti's 3D-Printed House Was Built in a Week,", Dezeen, accessed November 22, 2020, https://www.dezeen.com/2018/11/19/video-mini-living-3d-printing-cls-architetti-arup-movie/.

⁵⁹ "Students' 3D-Printed Concrete Choreography Pillars Provide a Stage for Dancers,", Dezeen, accessed November 29, 2020, https://www.dezeen.com/2019/07/24/3d-printed-concrete-choreography-pillars-design/.

⁶⁰ "Naturalis Biodiversity Center Leiden / Neutelings Riedijk Architecten,", ArchDaily, accessed November 22, 2020, https://www.archdaily.com/924031/naturalis-biodiversity-center-leiden-neutelings-riedijk-architecten.

⁶¹ "House for Trees / VTN Architects", ArchDaily, accessed December 1, 2020, https://www.archdaily.com/518304/house-for-trees-vo-trong-nghia-architects.

⁶² "Berlin's Brutalist Silence Co-Working Space Has Barely Anything Inside,", Dezeen, accessed December 1, 2020, https://www.dezeen.com/2020/02/04/brutalist-silence-co-working-office-interiors/.

⁶³ "Quito Apartment A Forest House Has a Mini Indoor Pool," Dezeen, accessed December 1, 2020, https://www.dezeen.com/2020/05/02/a-forest-house-aquiles-jarrin-quito-apartment-renovation/.

⁶⁴ "Luciano Kruk Adds Board-Marked Concrete Holiday Home to Seaside Resort near Buenos Aires,", Dezeen, accessed November 29, 2020, https://www.dezeen.com/2016/08/10/casa-h3-luciano-kruk-buenos-aires-holiday-home-board-marked-concrete/.

⁶⁵ "Concrete Screen Shades Patio at Casa Mq2 by BP Arquitectura,", Dezeen, accessed November 29, 2020, https://www.dezeen.com/2019/01/20/casa-mq2-bp-arquitectura-concrete-cordoba-argentina/.

⁶⁶ "THE MAOHAUS' 16 BanQiao Hutong Facade.", antistatics architecture design, accessed November 4, 2020. https://www.antistatics.net/.

⁶⁷ "Wenzhou Ou-River Crystal Boxes Restaurant / AntiStatics Architecture", ArchDaily, Accessed November 4, 2020. https://www.archdaily.com/945168/wenzhou-ou-river-cystal-boxes-restaurant-antistatics-architecture.

⁶⁸ "GIUDECCA | Square Table Giudecca Collection By Cimento Design PARISOTTO + FORMENTON ARCHITETTI.", Archiproducts, accessed August 10, 2020,

https://www.archiproducts.com/en/products/cimento/square-cimento-table-giudecca-square-table_415258.

⁶⁹ "Cimento® Bench LIDO By Cimento Design PARISOTTO + FORMENTON ARCHITETTI.", Archiproducts, Accessed August 10, 2020. https://www.archiproducts.com/en/products/cimento/cimento-bench-lido_411545.

⁷⁰ "Petra Bathroom Collection Is Made from Stain-Resistant Concrete,", Dezeen, accezssed November 22, 2020, https://www.dezeen.com/2019/09/07/petra-bathroom-furniture-collection-stain-resistant-concrete-marco-merendidiego-vencato-gypsum/.

⁷¹ "Stitching Concrete by Florian Schmid", Dezeen, Accessed September 17, 2020. https://www.dezeen.com/2011/08/09/stitching-concrete-by-florian-schmid/.

⁷² "Toru Kashihara Architects Design Stepped Concrete Temple in Tokyo," Dezeen , accessed December 2, 2020 https://www.dezeen.com/2019/04/24/shoraku-ji-toru-kashihara-architects-buddhist-temple-tokyo/.

⁷³ "Candalepas Associates Completes Concrete Punchbowl Mosque in Sydney.", Dezeen, Accessed January 26, 2021. https://www.dezeen.com/2019/06/26/punchbowl-mosque-candalepas-associates-sydney-australia/.

⁷⁴ "Mark Cavagnero Creates Concrete Chapel for Saint Mary's in California,", Dezeen, accessed December 31 2020, https://www.dezeen.com/2018/11/20/mark-cavagnero-associates-concrete-chapel-saint-marys-california/.

⁷⁵ "Peter Eisenman: Designing Berlin's Holocaust Memorial,", ArchDaily, accessed September 29, 2020, https://www.archdaily.com/938511/peter-eisenman-designing-berlins-holocaust-memorial.

⁷⁶ "Gómez Platero Designs World's First Large-Scale Memorial to the Victims of the Pandemic in Uruguay.", World Architecture Community, Accessed December 7, 2020. https://worldarchitecture.org/architecture-news/efmmf/gmez-platero-designs-world-s-first-largescale-memorial-to-the-victims-of-the-pandemic-in-uruguay.html.

⁷⁷ Chrisitan, Meyer, "Concrete as a Green Building Material." *Construction Materials Mindess Symposium*, (2005), 10.

⁷⁸ Kumar P., Mehta, "Greening of the Concrete Industry for Sustainable Development." *Concrete International*, Tuthill Commemorative Lecture at the Fall 2001 ACI Convention, Dallas, Tex, (2002), 6.

⁷⁹ Arezki, Tagnit-Hamou, Nancy Soliman, Ahmed Omran, Mohammed Mousa, Nicolas Gauvreau, and MFrancine Provencher. "Novel Ultra-High-Performance Glass Concrete." *Concrete International* 39 (March 1, 2015): 53–59.

⁸⁰ Arezki, Tagnit-Hamou, Zidol Ablam, Soliman Nancy, Deschamps Joris, and Omran Ahmed. "Ground Glass Pozzolan in Conventional, High, and Ultra-High Performance Concrete." *MATEC Web of Conferences*, (2018), 7.
⁸¹ English, Trevor. "Smog-Eating Concrete." smog-eating concrete, February 15, (2016).

http://smogeatingconcrete.weebly.com/.

⁸¹ "Sekhina Designs Minimal Light Switches and Sockets from Concrete,", Dezeen, accessed November 24, 2020. https://www.dezeen.com/2020/07/07/sekhina-concrete-light-switches-plug-sockets-design/.

BIBLIOGRAPHY

AD Classics: Nakagin Capsule Tower / Kisho Kurokawa | ArchDaily. Accessed November 23, 2020. https://www.archdaily.com/110745/ad-classics-nakagin-capsule-tower-kisho-kurokawa.
- Antistatics architecture design. "'THE MAOHAUS' 16 BanQiao Hutong Facade." Accessed November 4, 2020. https://www.antistatics.net/.
- ArchDaily. "House for Trees / VTN Architects," May 7, 2019. https://www.archdaily.com/518304/house-for-treesvo-trong-nghia-architects.
- ArchDaily. "Naturalis Biodiversity Center Leiden / Neutelings Riedijk Architecten," August 30, 2019. https://www.archdaily.com/924031/naturalis-biodiversity-center-leiden-neutelings-riedijk-architecten.

ArchDaily. "Peter Eisenman: Designing Berlin's Holocaust Memorial," April 29, 2020. https://www.archdaily.com/938511/peter-eisenman-designing-berlins-holocaust-memorial.

- ArchEyes. "Nakagin Capsule Tower in Tokyo / Kisho Kurokawa," March 3, 2016. https://archeyes.com/nakagincapsule-tower-kisho-kurokawa/.
- Archiproducts. "Cimento® Bench LIDO By Cimento Design PARISOTTO + FORMENTON ARCHITETTI." Accessed August 10, 2020. https://www.archiproducts.com/en/products/cimento/cimento-bench-lido_411545.

Archiproducts. "GIUDECCA | Square Table Giudecca Collection By Cimento Design PARISOTTO + FORMENTON ARCHITETTI." Accessed August 10, 2020.

https://www.archiproducts.com/en/products/cimento/square-cimento-table-giudecca-square-table_415258.

Arezki, Tagnit-Hamou, Zidol Ablam, Soliman Nancy, Deschamps Joris, and Omran Ahmed. "Ground Glass Pozzolan in Conventional, High, and Ultra-High Performance Concrete." *MATEC Web of Conferences*, 2018, 7.

Ashby, Michael F., and Kara Johnson. *Materials and Design: The Art and Science of Material Selection in Product Design.* 3 edition. Oxford: Butterworth-Heinemann, 2014.

Banham, Reyner. The New Brutalism: Ethic or Aesthetic? First Edition. Architectural Press, 1966.

- Boesiger, Willy, ed. Le Corbusier Oeuvre Complète: Volume 5: 1946-1952. 12. Aufl. edition. Basel: Birkhäuser Basel, 1995.
- Bonnet, Claude. *Processus cognitifs de la perception. Perception et agnosies*. De Boeck Supérieur, 1995. https://www.cairn.info/perception-et-agnosies--9782804119652-page-31.htm.
- Campbell, Donald H., and RobertT L. Folk. "Ancient Egyptian Pyramids--Concrete or Rock." *Concrete International* 13, no. 8 (August 1, 1991): 28, 30–39.
- Chapman, Jonathan. *Emotionally Durable Design: Objects, Experiences and Empathy.* 2 edition. London; New York, NY: Routledge, P.131, 2015.
- Cherry, Bridget, and Nikolaus Pevsner. London 3: North West. Yale University Press, 2002.
- Chittock, Helen. *Pattern as Patina: Iron Age 'Kintsugi' from East Yorkshire. Images in the Making.* Manchester University Press, 2020. https://www.manchesterhive.com/view/9781526142856/9781526142856.00020.xml.
- Collins, Peter. "Concrete: The Vision of a New Architecture." Montreal, Que.: McGill-Queen's University Press, 2004. https://trove.nla.gov.au/work/7382210.
- Collins, Peter. "Concrete: The Vision of a New Architecture." Montreal, Que.: McGill-Queen's University Press, 2004. https://trove.nla.gov.au/work/7382210.
- Collins, Peter. "Concrete: The Vision of a New Architecture." Montreal, Que.: McGill-Queen's University Press, 2004. https://trove.nla.gov.au/work/7382210.
- Delatte, Norbert J. "Lessons from Roman Cement and Concrete." *Journal of Professional Issues in Engineering Education and Practice* 127, no. 3 (July 1, 2001): 109–15. https://doi.org/10.1061/(ASCE)1052-3928(2001)127:3(109).
- Delatte, Norbert J. "Lessons from Roman Cement and Concrete." *Journal of Professional Issues in Engineering Education and Practice* 127, no. 3 (July 1, 2001): 109–15. https://doi.org/10.1061/(ASCE)1052-3928(2001)127:3(109).
- Delhumeau, Gwenaël and Institut français d'architecture. *Le Béton en représentation: la mémoire photographique de l'entreprise Hennebique, 1890-1930.* Paris, Paris: F. Hazan. Institut français d'architecture., 1993.
- Desmet, Pieter, and Paul Hekkert. "Framework of Product Experience." *International Journal of Dsign* 1, no. 1 (2007). http://www.ijdesign.org/index.php/IJDesign/article/view/66/15.
- Dezeen. "Arup and CLS Architetti's 3D-Printed House Was Built in a Week," November 19, 2018. https://www.dezeen.com/2018/11/19/video-mini-living-3d-printing-cls-architetti-arup-movie/.
- Dezeen. "Berlin's Brutalist Silence Co-Working Space Has Barely Anything Inside," February 4, 2020. https://www.dezeen.com/2020/02/04/brutalist-silence-co-working-office-interiors/.
- Dezeen. "Candalepas Associates Completes Concrete Punchbowl Mosque in Sydney." Accessed January 26, 2021. https://www.dezeen.com/2019/06/26/punchbowl-mosque-candalepas-associates-sydney-australia/.

Dezeen. "Concrete Screen Shades Patio at Casa Mq2 by BP Arquitectura," January 20, 2019. https://www.dezeen.com/2019/01/20/casa-mq2-bp-arquitectura-concrete-cordoba-argentina/.

- Dezeen. "Luciano Kruk Adds Board-Marked Concrete Holiday Home to Seaside Resort near Buenos Aires," August 10, 2016. https://www.dezeen.com/2016/08/10/casa-h3-luciano-kruk-buenos-aires-holiday-home-board-marked-concrete/.
- Dezeen. "Mark Cavagnero Creates Concrete Chapel for Saint Mary's in California," November 20, 2018. https://www.dezeen.com/2018/11/20/mark-cavagnero-associates-concrete-chapel-saint-marys-california/.
- Dezeen. "Petra Bathroom Collection Is Made from Stain-Resistant Concrete," September 7, 2019. https://www.dezeen.com/2019/09/07/petra-bathroom-furniture-collection-stain-resistant-concrete-marcomerendi-diego-vencato-gypsum/.
- Dezeen. "Quito Apartment A Forest House Has a Mini Indoor Pool," May 2, 2020. https://www.dezeen.com/2020/05/02/a-forest-house-aquiles-jarrin-quito-apartment-renovation/.
- Dezeen, Stitching Concrete by Florian Schmid. Accessed September 17, 2020. https://www.dezeen.com/2011/08/09/stitching-concrete-by-florian-schmid/.
- Dezeen. "Students' 3D-Printed Concrete Choreography Pillars Provide a Stage for Dancers," July 24, 2019. https://www.dezeen.com/2019/07/24/3d-printed-concrete-choreography-pillars-design/.
- Dezeen. "Toru Kashihara Architects Design Stepped Concrete Temple in Tokyo," April 24, 2019. https://www.dezeen.com/2019/04/24/shoraku-ji-toru-kashihara-architects-buddhist-temple-tokyo/.
- Dezeen. "Zaha Hadid Architects and ETH Zurich Debut Concrete Pavilion with 3D-Knitted Formwork," November 2, 2018. https://www.dezeen.com/2018/11/02/zaha-hadid-architects-eth-zurich-3d-knitted-concrete-formworkknitcrete-knitcandela/.
- Dezeen. "Sekhina Designs Minimal Light Switches and Sockets from Concrete," July 7, 2020. https://www.dezeen.com/2020/07/07/sekhina-concrete-light-switches-plug-sockets-design/.
- Durability of Concrete: Proceedings, Fifth International Conference, Barcelona, Spain, 2000. American Concrete Institute, 2000.
- English, Trevor. "Smog-Eating Concrete." smog-eating concrete, February 15, 2016.
 - http://smogeatingconcrete.weebly.com/.
- Forty, Adrian. Concrete and Culture: A Material History. Reaktion Books, 2013.
- Gandy, Matthew. Concrete and Clay: Reworking Nature in New York City. MIT Press, 2003.
- Haaland, Christine, and Cecil Konijnendijk van den Bosch. "Challenges and Strategies for Urban Green-Space Planning in Cities Undergoing Densification: A Review." *Urban Forestry & Urban Greening* 14, no. 4 (January 1, 2015): 760–71. https://doi.org/10.1016/j.ufug.2015.07.009.
- Juniper, Andrew. Wabi Sabi: The Japanese Art of Impermanence. Tuttle Pub., 2003.
- Karana, Elvin, Owain Pedgley, and Valentina Rognoli, eds. *Materials Experience: Fundamentals of Materials and Design*. 1 edition. Amsterdam: Butterworth-Heinemann, 2013.
- Keulemans, Guy. "The Geo-Cultural Conditions of Kintsugi." *The Journal of Modern Craft* 9, no. 1 (January 2, 2016): 15–34. https://doi.org/10.1080/17496772.2016.1183946.
- Krippendorff, Klaus. The Semantic Turn: A New Foundation for Design. CRC Press, 2005.
- Kuhn, Thomas S. *The Structure of Scientific Revolutions: 50th Anniversary Edition*. University of Chicago Press, P.64, 2012.
- Li, Zongjin. Advanced Concrete Technology. John Wiley & Sons, 2011.
- Mehta, P Kumar. "Greening of the Concrete Industry for Sustainable Development." *Concrete International*, Tuthill Commemorative Lecture at the Fall 2001 ACI Convention, Dallas, Tex, 2002, 6.
- Mehta, P Kumar. "Greening of the Concrete Industry for Sustainable Development." *Concrete International*, Tuthill Commemorative Lecture at the Fall 2001 ACI Convention, Dallas, Tex, 2002, 6.
- Meyer, C. "Concrete as a Green Building Material." Construction Materials Mindess Symposium, 2005, 10.
- Ministry of Works. The Architectural Use of Building Materials. His Majesty's Stationery Office, 1946. Monteiro, Paulo J. M., Sabbie A. Miller, and Arpad Horvath. "Towards Sustainable Concrete." Nature Materials 16, no. 7 (July 2017): 698–99. https://doi.org/10.1038/nmat4930.
- Norman, Donald. *Emotional Design: Why We Love or Hate Everyday Things*. 1 edition. Basic Books, 2005. https://www.amazon.ca/Emotional-Design-Love-Everyday-Things/dp/0465051367.
- Ortony, Andrew, Gerald L. Clore, and Allan Collins. *The Cognitive Structure of Emotions*. Cambridge University Press, 1990.
- Osgood, Charles E., George J. Suci, and Percy Tannenbaum. *The Measurement of Meaning*. 1st Edition. Urbana-Champaign: University of Illinois Press, 1967.

Ramakers, Renny. Less + More: Droog Design in Context. 010 Publishers, 2002.

- Roser, Max, Hannah Ritchie, and Esteban Ortiz-Ospina. "World Population Growth." *Our World in Data*, May 9, 2013. https://ourworldindata.org/world-population-growth.
- Schifferstein, Hendrik N. J., and Marc P. H. D. Cleiren. "Capturing Product Experiences: A Split-Modality Approach." *Acta Psychologica* 118, no. 3 (March 2005): 293–318.
 - https://doi.org/10.1016/j.actpsy.2004.10.009.

Simonnet, Cyrille. Le beton, histoire d'un materiau. First edition edition. Marseille: Editions Parenthèses, 2005.

- Tacca, Michela C. "Commonalities between Perception and Cognition." *Frontiers in Psychology* 2 (2011): 358. https://doi.org/10.3389/fpsyg.2011.00358.
- Tagnit-Hamou, A., Nancy Soliman, Ahmed Omran, Mohammed Mousa, Nicolas Gauvreau, and MFrancine Provencher. "Novel Ultra-High-Performance Glass Concrete." *Concrete International* 39 (March 1, 2015): 53– 59.
- Victor Solomon Mends LA Basketball Court Using Japanese Art of Kintsugi. Accessed November 24, 2020. https://www.dezeen.com/2020/08/18/victor-solomon-kintsugi-court-basketball/.
- Vitruvius. "Ten Books on Architecture (De Architectura)." Harvard University, 1914. https://www.gutenberg.org/files/20239/20239-h/20239-h.htm.
- Wenzhou Ou-River Crystal Boxes Restaurant / AntiStatics Architecture | ArchDaily. Accessed November 4, 2020. https://www.archdaily.com/945168/wenzhou-ou-river-cystal-boxes-restaurant-antistatics-architecture.
- World Architecture Community. "Gómez Platero Designs World's First Large-Scale Memorial to the Victims of the Pandemic in Uruguay." Accessed December 7, 2020. https://worldarchitecture.org/architecture-news/efmmf/gmez-platero-designs-world-s-first-largescale-memorial-to-the-victims-of-the-pandemic-in-uruguay.html.
- World Buisness Council for Sustainable Development (WBCSD). "Cement Sustainability Initiative 2019," 2019. https://www.wbcsd.org/CSI.

TEACHING ONLINE: THE PARADIGM OF HIGHER EDUCATION IN DESIGN IN TIMES OF PANDEMIC

Authors: ANDRÉ CASTEIÃO, SUSANA BARRETO

Affiliation: UNIVERSITY OF PORTO, PORTUGAL

INTRODUCTION

Due to the pandemic generated by SarsCov-2 in early 2020, we were forced to migrate to fully digital education, where education experts began to discuss whether online environments are suitable spaces for teaching and learning. This article focused on analyzing the behavior of teachers and students during online classes to identify the pedagogical methods used. Three Design teaching institutions in Portugal were analyzed, a local scenario, which can be applied in a broader context, since it is a local-global phenomenon.

The contemporary European educational paradigm presents itself as a construction derived from the association between currents of thought in Western culture, with emphasis on the Scientific Revolution (16th and 17th centuries), the Enlightenment and the Industrial Revolution, however, technological evolution has updating of teaching methods is required. The results of this investigation point to possible solutions that will serve for the development of a teaching method of Design in Portugal, which considers the hybrid means of teaching and learning.

Design is one of the very few professions that was established first as teaching and then through practice. The initiation of design in the world and its propagation until today, has more to do with politics and economics, than with art, or the craving for perfect forms, according to Renaissance ideals. The more traditional definitions of the word already demonstrate this possible political and economic aspect. This illustrates well the role of design in a society. There is not only the intention to work the object so that it becomes more beautiful. Its importance in the economy is magnificent, since the development process of the countries is strongly linked to the industrial evolution in them.

Therefore, if design was simply art, or the search for form, development and the search for capital would not be part of this context, thus, since the beginning of the design, a link with the economy is seen, which makes it present in state policies. State policies interfere in parallel with education and economic development. In a priori education, as it is understood that this is at the service of industry, so universities have a fundamental role in preparing students for the new challenges they must face.

The European higher education system has undergone a profound transformation since the second half of the 20th century and has experienced, especially in recent decades, a dramatic acceleration. Educational policy is no longer restricted to national borders, as shown by the Bologna Process.¹ What has been called the Bologna Process is the production of a "public policy from a meta-state to a university meta-field", constituting a "supranational educational policy, common to the member states

of the European Union and others associated countries, with a view to building a European space for higher education"². Even with this political effort to improve education, we still find some factors responsible for the causes of current educational problems, ^{3;4} they are:

• a compartmentalized and fixed grid of knowledge where there is little connection between knowledge.

• low valuation of subjects in the teaching-learning process and the overvaluation of teaching to the detriment of a concern with student learning.

• excessive and distorted valuation of the evaluation process.

From this reflection, it is possible to infer that, in opposition to the "solid" pedagogical experiences and content, the current social demands demand a new attitude from the teacher and the establishment of a new relationship between knowledge and knowledge, since it is up to him, primarily, the conduct of this process. In effect, these requirements imply new learning, the development of new skills, changes in conceptions, that is, the construction of a new meaning in teaching, imbued with the ethical and political dimensions.⁵

STRATEGIC EDUCATION VS PRACTICAL EDUCATION

The European Commission strategically recognizes the need to develop a different EU approach to innovation. It recognizes the need to understand the changing nature of barriers and constraints to achieve successful innovation, for example, the need to help companies overcome barriers to the pursuit of innovation, sharing knowledge and bringing good ideas to the market.

Therefore, design is recognized as a fundamental factor for innovation; as a European competitive advantage; and as a form of innovation that builds on Europe's strengths, its heritage, diversity, authenticity and creative potential to adapt to global markets. Despite this, the role of design in innovation policies is fragmented across Europe. In recent years, there has been a growing recognition by policy makers as to the potential of design and an essential innovation factor to add value to Europe's competitiveness. The European Commission has demonstrated its commitment to design, stating: "There is a political agreement in Europe to guarantee competitiveness, prosperity and wellbeing, all forms of innovation need to be supported".⁶

The importance of design as a key discipline and activity to bring ideas to the market, was recognized as an emblematic initiative of the Europe 2020 Strategy for Growth. In addition to this agreement, there is also a favorable scenario for the promotion of Design: "Never before has there been an opportunity so clear as now, for the European Commission, Member States and regions to take bold actions to allow a new level of awareness about the importance of design as a driver of user-centered innovation across Europe".⁷

We believe that all these efforts are valid for the development of public policies that benefit from design to assist the development of countries and increase their competitiveness, but these objectives interfere or should interfere in the teaching of design in a more pragmatic way.

Digital technologies advance with great speed, which does not happen with educational methods, so, naturally, a gap is formed between teaching and market demands. Design as a discipline takes advantage of creativity and interdisciplinarity, being able to interact in any area of knowledge, this requires that the teaching of design evolves to qualify students in overcoming the current challenges of Design.

We face a world in which we must help design solutions to the problems of complex socio-technical systems in a threatened planetary environment. The challenges that arise are qualified in a) performance challenges; b) systemic challenges, c) contextual challenges. These three challenges encompass all areas of design.⁸

To advance in the most advanced processes of teaching, reflection, cognitive integration, generalization, and re-elaboration of new practices, Active Learning Methodologies (PBL) are starting points.

Theorists have long emphasized the importance of overcoming banking, traditional education and focusing on student learning, involving it, motivating it and dialoguing with it.⁹

The problem-based learning methodology, (also known as PBL) at its most fundamental level, is a method characterized by the use of real-world problems to encourage students to develop critical thinking and problem-solving skills. problems and acquire knowledge about the essential concepts of the area in question.¹⁰ Putting the student in touch with the professional reality since the first year; the overcoming of theoretical requirements in order to practice; the acquisition of knowledge in a not necessarily logical and sequential manner; the construction of networked, non-linear knowledge; and students' responsibility for their professional development and ethical behavior towards colleagues, teachers and society is fundamental.¹¹

This is one of the characteristics that make PBL interesting for higher education institutions: the possibility of reaching broader educational objectives, that is, not only the acquisition of knowledge by students, but the development of skills and attitudes that will be given to them. useful in your future professional life.

MIGRATION FROM CONVENTIONAL EDUCATION TO DIGITAL

Due to the pandemic generated by Covid-19, we live in a new era for higher education in Design. We were forced to migrate to a mostly digital education and what is being revealed is that most Universities have been teaching inappropriately, or rather, outdated, teacher-dependent, with little student involvement and creativity.¹²

The problem is not online, but the method, there is a lack of autonomy in the training of each student, there is a deficiency in the domain of problem solving and also in the paternalistic management of the student. During this period, there was forced disclosure of problems that always existed, the extreme disparity in access to digital. It reinforced the need to have a public policy that streamlines the digital infrastructure, the training of teachers in digital skills and that individual and family access to the Internet is considered a fundamental right of the 21st century as possession of water and energy.¹³ Digital is not a panacea, but a fundamental component of modern life, which affects all dimensions of our existence, remote work, online shopping, insertion in networks and communities of interest, in short, it is a priority to emphasize and experience the human fundamental values.



Figure 1. Traditional class. Before the pandemic period. (Source: Authors, March 12, 2019)



Figure 2. New type of classes. Zoom section. (Source: Authors, January 15, 2021)

METHODOLOGY

The methodology used in this article was adapted so that the behavioral observation of teachers in remote and face-to-face mode was possible. This observation aimed to analyze behavior, teaching methods, material support resources for the class, interaction with students and mastery of content. In addition to establishing the roadmap for online observation, it was necessary to determine the sampling, the research periods, the universities and the method.

Sample

To investigate the teachers, we decided on a qualitative method, triangulated with interviews, biographical narratives and behavioral observation. Seven professors were selected for this investigation, despite being a relatively low number, given the number of professors in design in

Portugal, this sample is valid because it is a qualitative investigation applied to specialists in teaching design.

Research Period

The first phase of data collection took place between September and November 2020, the period that precedes the evaluations, it was important to choose this period because in evaluation periods students are focused on tests and productivity and participation in classes decrease.

In the 2nd phase, interviews with students will take place from February 2021 onwards, after evaluations.

Universities

At first, the selected universities are located in the city of Porto, in Portugal, as they are partners of ID + (Institute for Research in Design, Media and Culture). They are public and private universities, and in this article, they will be identified with the letter U and the respective number.

METHOD

Through videoconferencing software, it is possible to obtain a holistic understanding of the needs of the participants, observe the environment and the impacts on their studies and finally establish the type of investigation and the steps to follow.¹⁴

During the observation we developed a script to standardize the observation even in different contexts, in this case the three universities and their respective professors and students.

Step 1 - Needs

Our first step was to understand the needs of our investigation. The objective was to assess the usability and user experience in a remote teaching context.

Step 2 - Constraints

This step includes observing the limitations generated by the bandwidth of the internet, the software and the ability to make the classes operational, generating dynamics and interaction.

Step 3 – Digital tools

Understanding the wide range of digital tools available was instrumental in adapting traditional methods of investigation, such as daily studies, in-depth interviews and usability sessions. Videoconferencing and social media platforms, for example.

Step 4 – Types of data collect

We put together different types of data sets (visual, written, audio). This really helped us to get to know our participants on a deeper level, because each set of data provided a window into a different dimension of their lives and behaviors. In order to gather richer perceptions and dense descriptions, we conducted post-observation interviews with each teacher.

Although online field research does not replace traditional field research, this form of research should encourage designers to continue researching, and not cross it off the list until we can start traveling again. Online field research can provide a deeper and more complete understanding of the audience.¹⁴

Cases	Needs	Constraints	Digital Tools	Types of data	Type of class
	Teachers'	Failures	Equipment	Passive	
	procedures			observation	
	Traditional class	no	Portable	Classroom	Presential
			computer		class
U 1	Projective		Multimedia	Presential class	
	exercise		projector		
	23 students			Direct interaction	
	4 Hours				
	Online class	yes	Portable	At home	At home
			computer		
	Projective			Videoconference	
U 2	exercise			class	
	15 students			Indirect interaction	
	4 hours				
	Hybrid class	no	Portable	At home	At home and
	Lecture and		computer	Videoconference	presential
	discussion			class	class
U 3	26 students		Multimedia	Indirect interaction	
			projector		
	3 hours				

Table 1. Overview of collected data (Source: Authors)

DESCRIPTION OF OBSERVATIONS

University 1 - Face-to-face observation

Face-to-face observation in the classroom sought to understand the method used by the teacher, the dynamics of the class and the interaction of students. The discipline taught was the graphic design project, with weekly meetings of 4 hours. According to the discipline planning, students should develop a graphic design project according to the briefing presented by the teacher, using specific project software. The dynamics of the class was based on individual attention of the students as the needs happened. The teacher had a computer and a multimedia projector that helped to expose concepts, examples and other references. In that session, there was no need or dependence on the internet signal, each student had his own laptop. The teacher assesses students constantly, considering the process more important than the result.

University 2 - Remote observation - online class

Observation and data collection at this university were only possible via videoconference, due to the restrictions generated by the pandemic, but the objective remained with the necessary adaptations. The

class in question is a practical project discipline, with weekly meetings of 4 hours. Following the same method mentioned above, students should develop projects according to the briefing proposed by the teacher, the difference is that in this context everyone is working and interacting remotely. According to the teacher's report: "interaction in this type of class is fundamental, and the remote way harms students, but on the other hand, student performance increases because they are in a "safe" environment, (their own homes) and the socialization factor is minimized". The operation of the class depends directly on the bandwidth and stabilization of the internet signal.

University 3 - Remote observation - classroom / online

With the changes in the containment rules, some universities have chosen to offer students the possibility to attend classes in person or remotely. Unlike the other classes analyzed, this discipline is theoretical with meetings of 3 hours per week. The method used by the teacher to explain the content was that of projection for students who were present and sharing the computer screen for students who participated remotely. This option meant that the teacher was obliged to switch the focus, time talking with the face-to-face students, time with the online students. It was noticed that after a short time of class the students who were online turned off the cameras. The interaction between the on-site students and the teacher flowed normally, whereas with the students who attended the online class, the interaction only occurred in the interval, when the on-site students were not present.



Figure 3. Zoom section, all students turned-off their cameras. (Fonte: Authors)

ANALYSIS OF RESULTS

When analyzing the 3 universities and their teachers, we realized that the teaching methods are still based on the paradigms built over time, with expository classes and project classes where the transmission of knowledge is hampered by the lack of interaction with students. The urgency generated by the confinement did not contribute to the preparation and adaptation of classes, there was only a migration from classroom to online. There is a certain reproduction of teaching methods where teachers teach in the same way as they learned, there was no specific qualification for online teaching, with more effective pedagogies and methods, it was observed that in no class did active learning methods be applied. The teachers, having a lot of teaching experience, migrated to the videoconferencing platforms and continued to transmit their knowledge, only now remotely. During

the classes we noticed a much greater effort on the part of the teachers and the students so that everything worked correctly, and the class flowed in the best possible way. The dependence on the stability of the internet signal is a relevant factor that directly affects the day to day of classes. When the signal fluctuates or does not work, the class is immediately interrupted or closed, generating frustration for both, teachers and students. Despite the difficulties presented, the commitment and effort of students and teachers must be exalted so that the planned programs are fulfilled, and the academic calendar is not compromised.

CONCLUSION

The conclusions of this review point to evidence that we can learn in different ways, in all spaces and at different times. It is imperative to share and analyze how to integrate all environments, teaching and learning strategies optimally in each learning phase and according to the individual needs of each student. We need to act quickly to redesign flexible, quality and low-cost educational projects with faster and more agile results. It is now urgent to share and analyze how to integrate all environments, teaching and learning strategies optimally in each stage of learning and according to the needs of each one. We have to review the curriculum in this period, with greater teaching autonomy and intense exchange of experiences. All content needs to be relevant, linked to life, worked in close relationship with creative and entrepreneurial activities. It is increasingly evident that we can learn in multiple ways, in all spaces and at different times. This moment of change can prove to be a turning point in several aspects of design education, like a post-bologna reform.

NOTES

^{1.} Derrick De Kerckhove, *Connected Intelligence*: The Arrival of the Web Society. (Toronto: Somerville House, 1997).

^{2.} Licínio C. Lima and Mário Luiz Neves de Azevedo and Afrânio Mendes Catani, O processo de Bolonha, a avaliação da educação superior e algumas considerações sobre a Universidade Nova. (Campinas: Avaliação: Revista da Avaliação da Educação Superior, 2008) vol.13, nº.1, p. 7-36. ISSN 1414-4077.

^{3.} Maria Cândida Moraes, Paradigma Educacional Emergente (Campinas: Papirus, 1997).

^{4.} Edgar Morin, and Eliane Lisboa. Introdução ao pensamento complexo. (Porto Alegre: Sulina, 2007) vol.3.

^{5.} Janete Bassalobre, *Ética, Responsabilidade Social e Formação de Educadores* (Belo Horizonte: Educação em Revista, 2013) 311-317

⁶ Venanzio Arquilla, Stefano Maffei, Marzia Mortati, and Beatrice Villari. *Design in European Policy*. (Milano, 2014).

^{7.} Michael Thomson and Tapio Koskinem, *Design for Growth & Prosperity: Report and recommendations of the European Design Leadership Board.* (Finland: Unigrafia, 2012)

^{8.} Ken Friedman, Chatterjee Global Lecture. Design Education Today: Challenges, Opportunities, Failures. (Cincinnati, Ohio: College of Design, Architecture, Art and Planning, the University of Cincinnati. 2019)

^{9.} John Dewey, *Democracia e Educação*. (Porto: Didáctica Editora. 2007)

^{10.} Luis Roberto C. Ribeiro, Edmundo Escrivão Filho and MGN Mizukami, *Uma experiência com a PBL no ensino de engenharia sob a ótica dos alunos*. (São Paulo: COBENGE, 2003)

^{11.} Marcos Masetto and Maria Célia Abreu, O Professor Universitário Em Aula. (São Paulo: MG Editores Associados, 1990).

^{12.} Howard S. Barrows, *The Essentials of Problem-Based Learning*. (*Journal of Dental Education* 62, no. 9, 1998) 630-33.

^{13.} José Manuel Moran and José Armando Valente. *Educação a Distância.* (Porto Alegre: Summus Editorial, 2015).

^{14.} Sheila Pontis, Making sense of field research: a practical guide for information designers. (Routledge, 2018).

BIBLIOGRAPHY

Barrows, Howard S. "The Essentials of Problem-Based Learning." *Journal of Dental Education* 62, no. 9 (1998): 630-33.

Bassalobre, Janete Netto. "Ética, Responsabilidade Social E Formação De Educadores." *Educação em Revista* 29, no. 1 (2013): 311-17.

Buchanan, Richard. "Design Research and the New Learning." Design issues 17, no. 4 (2001): 3-23.

Davis, Meredith. Teaching Design: A Guide to Curriculum and Pedagogy for College Design Faculty and Teachers Who Use Design in Their Classrooms. Simon and Schuster, 2017.

de Kerckhove, Derrick. "Connected Intelligence, the Arrival of The." Web Society (1997).

Friedman, Ken. "Design Curriculum Challenges for Today's University." Paper presented at the International Conference from CLTAD, 2002.

——. "Design Education Today-Challenges, Opportunities, Failures." *Chatterjee Global Lecture Series. Ullman School of Design* (2019).

. "Models of Design: Envisioning a Future Design Education." Visible language 46, no. 1/2 (2012): 132.

Hickman, Larry A, and Giuseppe Spadafora. John Dewey's Educational Philosophy in International Perspective: A New Democracy for the Twenty-First Century. SIU Press, 2009.

Masetto, Marcos Tarciso. Competência Pedagógica Do Professor Universitário. Summus editorial, 2012.

Moraes, Maria Cândida. Paradigma Educacional Emergente (O). Papirus editora, 1997.

Moran, José Manuel. "A Integração Das Tecnologias Na Educação." Salto para o Futuro 204 (2005).

Moran, José Manuel, and José Armando Valente. Educação a Distância. Summus Editorial, 2015.

Pontis, Sheila. Making Sense of Field Research: A Practical Guide for Information Designers. Routledge, 2018.

Redström, Johan. "Certain Uncertainties and the Design of Design Education." She Ji: The Journal of Design, *Economics, and Innovation* 6, no. 1 (2020): 83-100.

Ribeiro, Luis Roberto C, Edmundo Escrivão Filho, and MGN Mizukami. "Uma Experiência Com a Pbl No Ensino De Engenharia Sob a Ótica Dos Alunos." *São Paulo: COBENGE* (2003).

WERNER SELIGMANN AND THE SYRACUSE SCHOOL OF ARCHITECTURE (1976-1990). A PEDAGOGICAL LEGACY

Authors: CATERINA FRISONE, MARK SHAPIRO

Institution: OXFORD BROOKES UNIVERSITY, UK

INTRODUCTION

This paper is about the contribution of an Architect and Dean and his exceptional academic methodology in conveying the art of teaching and learning architecture, in forging the minds and lives of generations of students and faculty, as well as establishing a reference for the development of future architecture programmes. Dean of the Syracuse University School of Architecture between 1976 and 1990, Werner Seligmann focused his pedagogy on the belief that "architecture can be taught" increasing its visibility and centrality in the international educational network. Born in the footsteps of the innovative teaching methodology conceived at University of Texas in Austin (1951-1958), the academic curriculum founded by Seligmann, the account of his tenure at Syracuse and the impact all this had on students and faculty have yet to be told. This paper explores Seligmann's pedagogy centred on teaching the role of historical precedent, the architect's responsibility to the urban realm, the art of space-making. By strengthening the school's "Identity", "Team" and "Curriculum" and "raising the bar", Seligmann worked to increase the student's self-esteem and ambition. Today, his legacy is embodied by successful practitioners and deans still acting upon his principles. Further investigation will achieve an important historical document of a period at the Syracuse University School of Architecture.

The Texas Rangers at University of Texas in Austin (1951-1958)¹

Named after the legend inadvertently propagated by Alan Chimacoff and Tom Schumacher through their song 'The Texas Rangers' at Cornell in the early 1960s², this pedagogic event that occurred very briefly recounts one of the most significant chapters in the history of post-war American architecture, revealing how an unprecedented curriculum that challenged the teaching systems of the time, contained the germs for a postmodern revolution in architecture pedagogy and practice. Between 1951 and 1958 a group of young architects (later named 'Texas Rangers') taught at the University of Texas in Austin under the deanship of Harwell Hamilton Harris (1951-55) chairing the newly independent school of architecture. Among them, Bernhard Hoesli - who had worked for Le Corbusier - and Colin Rowe formed the core of the faculty that Harris intended to reform the school curriculum. They were joined by John Hedjuk who trained under Gropius at Harvard, Robert Slutzky and Lee Hirsche both trained with Joseph Albers at Yale. The new pedagogy was premised on the belief that modern architecture is not merely a negative rationalism and that "only through the present can we understand the past"³; it also expressed the need for a theory course and a freehand drawing course linked to the

design studio. Through the cube and nine square grid exercises the new design method discouraged the sculpting of the building's mass in favour of the visualisation and organisation of architectural space. Written by Rowe and Hoesli but announced by Harris in May 1954, "this little memo (...) had almost the effect of a demolition of the Berlin Wall"⁴. After facing strong oppositions from an entrenched senior faculty Harris resigned in 1955 and, subsequently, in the summer '56 the young faculty were not reappointed. Hoesli remained and was joined by Werner Seligmann, Lee Hodgden and John Shaw who were in turn fired in 1958.

Who was Werner Seligmann⁵

Born in Germany and a concentration camp survivor, Werner Seligmann arrived in the United States in 1949. With only an architectural background as an apprentice, he studied at Cornell University School of Architecture between 1950 and 1955. After attending graduate school in Braunschweig in 1959 and reuniting with Hoesli at ETH Zurich in 1959-1961, Seligmann taught alongside some of his Texan colleagues at Cornell from 1961 to 1974. Following two years at Harvard, Seligmann was appointed dean at Syracuse in 1976 where his tenure lasted until 1990. Throughout this time, he maintained an architectural practice and produced significant work in public housing for the New York Urban Development Corporation such as the one at Elm Street, Ithaca⁶. Because of this work he was associated with the New York Fives⁷. Among the many commissions, noteworthy are the Olean Fire station⁸, the Center Ithaca⁹ and Beth Davis Synagogue¹⁰. As stated by Kristen Shaffer¹¹, there are two letters written in 1979 by Jerzy Sołtan (a Polish architect who worked with Le Corbusier and taught at Harvard from 1959 to 1979), asking Seligmann for slides of his own work. "Because your work represents to me the best line in the world today". Yet, he was not interested in the manufacture or reflection of a personal style, believing firmly in the transcendent power of architecture"¹² Seligmann wrote about Le Corbusier¹³, Frank Lloyd Wright¹⁴ and Mario Campi¹⁵. His work received many design awards and was exhibited in the United States and abroad.

Syracuse University, School of Architecture in 1976

Established in 1873, the Architecture department started within the College of Fine Arts. In 1917, it moved into Slocum Hall (1917), a Beaux Arts building located at the centre of the campus map¹⁶. In 1976, it was the fourth oldest architecture programme in the country, offering students many programmes and joint degrees reducing the focus on architectural design. Basic design, required only in second and third year, included study of colours and proportions of geometry and forms with a continuation in social, economic, political and formal aspects of environmental design. "In 1976, when Werner became Dean of the School of Architecture at Syracuse University, the best that could be said of the school was that it was a journeyman's training centre, solid in the intent of its programmes but intellectually and academically unremarkable"¹⁷. With Seligmann's arrival, the school gained a sense of purpose and a value system that linked progressive modernist ideals with an understanding of history and its uses in the design process¹⁸.

THE NEW PEDAGOCIC STRATEGY (1976-1990)

From the very beginning, Seligmann focused his pedagogy on the belief that "architecture can be taught" and built the School strengthening its 'Identity', 'Team' and 'Curriculum'. Differently from many deans, he was not merely an administrator but an active teacher in the core design curriculum. "At Syracuse, where he transformed the school into an academy characterised by passion, rigour and thoroughness, Werner was an active dean. (...) And he demanded extraordinary performance from both his students and faculty"¹⁹.

Identity

For Seligmann, the environment of the students and the faculty, i.e. the studio, the exhibition space, the library, the classroom were critical elements of the School's pedagogy and identity, to the point that he made changes to the building to reflect all of this. Seeing the classroom as a laboratory to monitor how space affects learning and the core of the whole school as a manifesto of active, dynamic and evolving knowledge, Seligmann was adamant in enhancing the entire academic community with visiting critics studios, lectures, exhibitions, competitions, publications and travel. The lecture series acted as an outstanding feature of education that constituted the bridge between architectural education and practice and ultimately "put this school on the map"²⁰. With the establishment of the Florence programme for the 4th year students and a thesis done at a professional level for the 5th year students, he completed his academic strategy to empower faculty and students, giving them identity and measure through the exposure with other schools and academic realities. "The work produced at this level should be of a quality which ultimately will give the identity of the school. This can only be accomplished by placing the best and most challenging critics and teachers at this level. Schools of architecture, probably more than most schools, depend on the general atmosphere to induce high quality work. The school must be stimulating to both the Faculty and the students"²¹.

Team

In his 1976 speech addressed to the faculty at a retreat at Minnowbrook, Seligmann remarked on the economic slowdown and the increasing disbelief in the premises and tenants of modern architecture as a result of the great dissatisfaction with its physical results²². He had a clear vision of the school's pedagogy which was to serve as an antechamber to the profession. Because he was intent on creating a stable and lasting pedagogical approach, Seligmann clearly stated that he would not follow the current clichés and fashions sought by other schools. Convinced that design was underestimated, he increased the number of required design courses from two to ten²³ and the number of history faculty from one to three full-time positions²⁴. As a lecturer, he taught the '101 - Introduction to Architecture' course and in Design, he coordinated First Year Design Studio which for many former students constituted the foundations of their preparation. Seligmann entered many national and international competitions among the schools of Architecture in the Northeast of the USA²⁵.

Curriculum

The new curriculum of the school was very clear: one sole five years B.Arch programme to which, later in 1982 a three and a half years M.Arch programme was added; they both had design all the way through and thesis in the last year. In the undergraduate programme, the first three years or 'Core Years' included all the history, technology and structure courses, so the students were set to enjoy the fourth year which acted as a "production refuelling year²⁶. Within the upper level studios, the two semesters of the fourth year were one in a visiting critic studio and the other in the travelling abroad programme in Florence, while the ones of the fifth year were devoted to "thesis prep" and "thesis". "At the core level, I understand teaching to be distinctly different from 'critting'. It implies a sequential process of learning, a collective effort of a like-minded faculty with a shared, agreed upon structure of subjects, issues and objectives. At the basis of the teaching lies the assumption that architecture is a formal construct and that it operates through its own particular logic. It is this architectural logic which would constitute the intellectual framework for the core, which means that the success of the core model depends on a parallel teaching of history and theory. By theory,

however, I mean perhaps something else than is commonly understood - a theoretical discourse appropriate to the student's stage in design, such as the properties of architectural space, of *parti*, the formal logic and the appropriate arrangement of a plan, etc. - not exactly hot, current topics"²⁷.

DESIGN PRINCIPLES

The design principles set by Werner Seligmann at Syracuse were the same ones he adopted in his practice at his office and can be extrapolated from the Keynote Address he gave at the A.I.A. in1985. The first one regards "the analysis of the historical precedent" to extrapolate the principles which guided successful examples in history. The second emphasises the "responsibility of the architect towards the urban realm" correlated to the care and the passion an architect should have for his building and the surrounding environment and the last one concerns "the art of space-making" also in relation to the perception and experience of space.

Role of the historical precedent

As stated by Kristen Shaffer²⁸ during the presentation at the 2014 Symposium on Werner Seligmann²⁹, the study of the architectural past plays an essential role within the teaching of architecture. Started in Texas, developed in Switzerland, reiterated in Syracuse, in the words of Alex Caragonne "for students of architecture the study of modern architecture as a useful precedent and source of ideas might then provide them the necessary intellectual foundation for their own personal voyages of exploration and discovery"³⁰. In Switzerland, Hoesli and Seligmann understood that in order to make modern architecture teachable, it was necessary to recognise it as a style as Nowicki had already stated in 1951³¹. Thus, they began a careful examination of the best examples of modern architecture, with students and faculty carrying out a broad and detailed analysis of exemplary modern buildings. What they quickly discovered was that the buildings of Le Corbusier and Wright lent themselves to the investigation as they could identify fundamental principles. Dissected in search of themes and the principles that are repeated, architectural solutions have no longer been considered singular unique acts in history, but questions of form that belong to all architecture, thus making the study of historical examples relevant. Convinced that study of the historical past was relevant and, as such, analysis was fundamental, once arrived at Syracuse, Seligmann saw the historical precedent as a design tool. "Analysis projects became an important tool for teaching about the spatial and formal interrelationships often bypassing systems, i.e. columns and closures and circulation"³² (Fig.1).



Figure 1. Werner Seligmann's analytical sketches of buildings by Le Corbusier

Architect's responsibility towards the urban realm

In the Keynote Address given at the A.I.A. in1985, Werner Seligmann stated the new trends of the time (decomposition or deconstruction) "places architecture into the world of the rock culture. A most unfortunate consumer mentality is invading the field (...) in order to get quickly in on the act and sell it. The rock culture phenomenon is based on the premise of "instant discovery" and "instant fame" and, besides, it does not require much work. It requires only talent and discovery by the media. History, fortunately (...) makes us realise that good architecture cannot be that easy"³³. According to Seligmann, the true architect cares about the building and also the context, putting them in a mutual dialogue and in a constant relationship: by learning from the context, the building acts as a new historical layer while it informs and improves it. The Florence programme in which travelling and drawing were the real tools to absorb the knowledge of the past and analysis was the means to extract the architectural principles was the way by which the students better understood the sense of responsibility towards the urban realm.

Art of Space-making

Through the three non-parallel planes and the open cube exercises, the first-year students were led towards the search for space. The first exercise involved the construction of three rectangular planes in cardboard, each a maximum of 5 square inches with a minimum size of 1 inch, that formed different relationships. Far from volumetric forms, the aim of the design problem was to discover ideas that governed the spatial composition, arranging the planes hierarchically and finding the harmony of the parts yet to be perceived as a "whole". The second exercise concerned the design of an open 3 inches side cube defined by five perforated planes whose openings had to balance the opening produced by the missing sixth side. The goal was to understand the fundamental principles of space-making and generate organisational ideas that went beyond the simple definition of cubic space. By inserting the three non-parallel planes into it, the goal became to establish a hierarchy of well-defined spaces within it. In this way, in addition to the spatial definition, the students understood the articulation that would then be applied to the projects of the following years, moving on to design an isolated building and then an urban block in the first year, to gradually tackle increasingly complex and close to reality projects.

Student's Involvement, the fourth component

Still through Seligmann's Keynote Address, we understand the last components of his strategy. If we look back at history the best architectures were built by the architects in their old age. This is because architecture requires "undisturbed creative" time. "Design time is the most important ingredient". Besides, in order to produce a good piece of design, somebody must be passionately involved with everything that has to do with that building, until the very end. For the true architect, the process never lets one go. "Without that kind of passion and involvement with architecture, good design does not happen". Also, drawing is a wonderful inspirational moment where thoughts and ideas in our mind find their way through our hand to the tip of the pencil on the paper. "Good architects draw". If talent is not there, it can be substituted by an informed, inquisitive, critical mind. "This search for quality in architecture, this attitude about design, shapes the atmosphere of the office as a study, as a laboratory". And last, there is pride. "When was the last time that we prided ourselves on the eloquence of a plan of exquisite proportions, sublime composition and beautiful qualities of space? If we can answer some of these questions, we will perhaps get close to the whole issue of design"³⁴.

CONCLUSION

Contemporary architecture and, by extension, architecture education is facing many challenges. Some are sustainability in the face of the environmental crisis, the integration of parametric modelling both in terms of form and constructive performance, the call to inclusion and diversity in the profession, social relevance, continuous criticism of studio culture. Additionally, many schools around the world are experiencing a lack of confidence in their mission and methods not unlike that seen in the late 1960s and early 1970s with a dilution of the centrality of design. But perhaps within the Academy, today, there should be an urgency to regain possession of what is essentially architectural. Dean Werner Seligmann and his pedagogy at Syracuse University's School of Architecture constitutes an exemplary model of architectural education that we believe is still valid today because of its greatest impact on the transmission of knowledge. In a letter to Arizona Architect, written from Zurich in 1959, Hoesli and Seligmann wrote "It must be remembered that the function of a school of architecture is not primarily the production of young architects and the professional preparation of practitioners, but it is the preserving and augmenting of the entire body of architectural knowledge and to pass it on"³⁵. According to Seligmann, the educator's role was to promote the discipline, through analysis, the study of history and the act of teaching as a means of exploration. This approach to teaching challenged the architecture and pedagogy of the time. With the same audacity, today this challenge is still possible. "It was a wonderful legacy to inherit eight years ago and while the agenda changes as it must, the conviction in the belief in what a school must be in order to be a school, does not. But when all is said and done, it is the fact that he made for me and countless others the belief that being a teacher of architecture was the highest calling and among the most noble of pursuits that is his greatest legacy"³⁶.

NOTES

¹ Alexander Caragonne, *The Texas Rangers. Notes from an Architectural Underground* (Cambridge [MA] and London: The MIT Press, 1995).

² Colin Rowe and Alexander Caragonne (ed), *As I was saying* – *Volume one: Texas, Pre-Texas, Cambridge* (Cambridge [MA] and London: The MIT Press, 1996), 39.

^{3 3} Colin Rowe and Alexander Caragonne (ed), *As I was saying – Volume one: Texas, Pre-Texas, Cambridge* (Cambridge [MA] and London: The MIT Press, 1996), 47.

⁴ Colin Rowe and Alexander Caragonne (ed), *As I was saying* – *Volume one: Texas, Pre-Texas, Cambridge* (Cambridge [MA] and London: The MIT Press, 1996), 43-53.

⁵ "Werner Seligmann's genealogy," Hohenems Geneaologie, accessed February 6, 2021, http://www.hohenemsgenealogie.at/gen/getperson.php?personID=I9921&tree=Hohenems.

⁶ John Morris Dixon, "Places to live" (editorial) and "Scattered site hill town," *Progressive Architecture*, 5 (1973): 63-71, accessed February 6, 2021,

https://richardboscharchitect.com/projects/Werner_Seligmann_projects_files/Elm%20Street.pdf.

⁷ "The New York Fives," Wikipedia, accessed February 6, 2021,

https://en.wikipedia.org/wiki/The_New_York_Five.

⁸ Werner Seligmann, "A fitting image? Central Fire Station Olean," *Progressive Architecture* 7 (1980): 66-69, accessed on February 6, 2021,

https://richardboscharchitect.com/projects/Werner_Seligmann_projects_files/Olean%20fire%20station.pdf.

⁹ Mack Travis, "Center Ithaca (1980-1994): A Financial Failure", in *Shaping a City*, ed. Mack Travis (Ithaca and London: Cornell University Press, 2018), 28-32.

¹⁰ Thomas Fisher, "Werner Seligmann's Inspired Beth David Synagogue", *Architect* August (2013), accessed February 6, 2021, https://www.architectmagazine.com/design/buildings/werner-seligmanns-inspired-beth-david-synagogue_o.

¹¹ Kristen Shaffer, *Seligmann after Texas. History in the Education of the Architect,* accessed February 6, 2021, https://www.youtube.com/watch?v=V-Gc4NE-

ImM&ab_channel=SyracuseArchitecture%28SyracuseUniversitySchoolofArchitecture%29.

¹² James Garrison, "Remembering Werner Seligmann," *Oculus*, 61, 8, 1999: 19.

¹³ Werner Seligmann, "Le Corbusier as Architectural Engineer," *Architectural Record*, October 1987: 142-151.

¹⁴ Werner Seligmann, "Evolution of the Prairie House," in *Frank Lloyd Wright. A primer on Architectural Principles*, ed. Robert McCarter (Princeton, NJ: Princeton Architectural Press, 1996), 57-98.

¹⁵ Werner Seligmann, "Campi Pessina Piazzoli (Critique)," *Progressive Architecture* 7 (1982): 70–71.

¹⁶ Denise Owen Harrigan, "Architecture at 125. Built for Success," *Surface* (1998):1, accessed January 7, 2021, https://surface.syr.edu/cgi/viewcontent.cgi?article=1615&context=sumagazine .

¹⁷ Alan Chimacoff, "Whoever heard of a Texas Ranger with a German accent? in Memorial Service for Werner Seligmann: Distiguished Professor of Architecture," *Surface* 149 (1998): 9-12, accessed February 6, 2021, https://surface.syr.edu/arc/149.

¹⁸ Bruce Abbey, "Introduction for the awarding of the Topaz medallion to Werner Seligmann". Delivered at the ACSA convention, Cleveland Ohio, (1998), accessed January 7, 2021

http://soa.syr.edu/faculty/bcoleman/seligmann/topaz/ws.topaz.abbey.html

¹⁹ James Garrison, "Remembering Werner Seligmann," *Oculus*, 61, 8, 1999: 19.

²⁰ Randall Korman, in Denise Owen Harrigan, "Architecture at 125. Built for Success," *Surface* (1998):3, accessed January 7, 2021, https://surface.syr.edu/cgi/viewcontent.cgi?article=1615&context=sumagazine .

²¹ Werner Seligmann, "Opening speech addressed to the School of Architecture faculty at Minnowbrook, NY" (1976)

²² Kristen Shaffer, *Seligmann after Texas. History in the Education of the Architect,* accessed February 6, 2021, https://www.youtube.com/watch?v=V-Gc4NE-

 $ImM\&ab_channel=SyracuseArchitecture\%28SyracuseUniversitySchool of Architecture\%29.$

²³ Denise Owen Harrigan, "Architecture at 125. Built for Success," Surface (1998):3, accessed January 7, 2021, https://surface.syr.edu/cgi/viewcontent.cgi?article=1615&context=sumagazine.

²⁴ Kristen Shaffer, Seligmann after Texas. History in the Education of the Architect. In Bruce Coleman, Seligmann Symposium: Part 1/3 "The Pedagogy of Werner Seligmann," accessed February 6, 2021,

https://www.youtube.com/watch?v=V-Gc4NE-

ImM&ab_channel=SyracuseArchitecture%28SyracuseUniversitySchoolofArchitecture%29.

²⁵ Gianni Pettena, "On the Conceptual Origins. Interview with Werner Seligmann." In *Architectural Teaching USA*, eds. Joel Bostick and Gianni Pettena (Florence: La Casa Uscher, 1985), 19.

²⁶ Arthur McDonald, *Syracuse University, School of Architecture 1974 vs.1982.* In Bruce Coleman, *Seligmann Symposium: Part 1/3 "The Pedagogy of Werner Seligmann,"* accessed February 6, 2021, https://www.youtube.com/watch?v=V-Gc4NE-

 $ImM\&ab_channel=SyracuseArchitecture\%28SyracuseUniversitySchool of Architecture\%29.$

²⁷ Werner Seligmann, "Speech in acceptance of the Topaz Medallion", delivered at the ACSA convention, Cleveland, Ohio, accessed February 6, 2021, http://www.arch.mcgill.ca/prof/sijpkes/abc-structures-2005/Lectures-2005/ws.topaz.speech.html.

²⁸ Kristen Shaffer, *Seligmann after Texas. History in the Education of the Architect,* accessed February 6, 2021, https://www.youtube.com/watch?v=V-Gc4NE-

 $ImM\&ab_channel=SyracuseArchitecture\%28SyracuseUniversitySchool of Architecture\%29.$

²⁹ Bruce Coleman, *Seligmann Symposium: Part 1/3 "The Pedagogy of Werner Seligmann"*. School of Architecture Lectures Series. 52, accessed February 6, 2021, https://surface.syr.edu/architecture_lectures/52.

³⁰ Alexander Caragonne, *The Texas Rangers. Notes from an Architectural Underground* (Cambridge [MA], London: The MIT Press, 1995), 136-137.

³¹ Matthew Nowicki, "On Exactitude and Flexibility". Student Publication of NC State College of Design, 1951: 11-19, accessed February 6, 2021, https://academics.design.ncsu.edu/student-publication/wpcontent/uploads/2012/07/TSP_v01_1951.pdf

³² Kristen Shaffer, *Seligmann after Texas. History in the Education of the Architect,* accessed February 6, 2021, https://www.youtube.com/watch?v=V-Gc4NE-

 $Im M\&ab_channel=SyracuseArchitecture\%28 SyracuseUniversitySchool of Architecture\%29.$

³³ Werner Seligmann, "The Role of Design in the Profitable Architectural Office". Keynote Address, The A.I.A. Press, 1985.

³⁴ Werner Seligmann, "The Role of Design in the Profitable Architectural Office". Keynote Address, The A.I.A. Press, 1985.

³⁵ Kristen Shaffer, Seligmann after Texas. History in the Education of the Architect, accessed February 5, 2021. https://www.youtube.com/watch?v=V-Gc4NE-

ImM&ab_channel=SyracuseArchitecture%28SyracuseUniversitySchoolofArchitecture%29.

³⁶ Bruce Abbey, "Introduction for the awarding of the Topaz medallion to Werner Seligmann". Delivered at the ACSA convention, Cleveland Ohio, (1998), accessed January 7, 2021 http://soa.syr.edu/faculty/bcoleman/seligmann/topaz/ws.topaz.abbey.html

BIBLIOGRAPHY

Caragonne, Alexander. *The Texas Rangers. Notes from an Architectural Underground.* Cambridge [MA] and London: The MIT Press, 1995.

Chimacoff, Alan. "Whoever heard of a Texas Ranger with a German accent?" In "Memorial Service for Werner Seligmann: Distiguished Professor of Architecture." *Surface* 149 (1998): 9-12.

Fisher, Thomas. "Werner Seligmann's Inspired Beth David Synagogue." *Architect* August (2013). Accessed February 6, 2021. https://www.architectmagazine.com/design/buildings/werner-seligmanns-inspired-beth-david-synagogue_o

Garrison, James. "Remembering Werner Seligmann." Oculus 61 (1999): 19.

Morris Dixon, John. "Places to live" (editorial) and "Scattered site hill town." *Progressive Architecture* 5 (1973): 63-71.

Owen Harrigan, Denise. "Built for Success." Surface (1998): 3.

Nowicki, Matthew. "On Exactitude and Flexibility." *Student Publication of NC State College of Design* (1951): 11-19.

Rowe, Colin, and Alexander Caragonne (ed). As I was saying – Volume one: Texas, Pre-Texas, Cambridge. Cambridge [MA] and London: The MIT Press, 1996. Seligmann, Werner. "A fitting image? Central Fire Station Olean." *Progressive Architecture*, 7 (1980): 66-69. Seligmann, Werner. "Campi Pessina Piazzoli (Critique)." *Progressive Architecture*, 7 (1982): 70–71.

Seligmann, Werner. "Le Corbusier as Architectural Engineer." *Architectural Record*, October (1987): 142-151. Seligmann, Werner. "Evolution of the Prairie House." In *Frank Lloyd Wright. A primer on Architectural Principles*, edited by Robert McCarter, 57-98. Princeton, NJ: Princeton Architectural Press, 1996.

Seligmann, Werner. "Speech in acceptance of the Topaz Medallion, delivered at the ACSA convention, Cleveland, Ohio". Accessed February 6, 2021. http://www.arch.mcgill.ca/prof/sijpkes/abc-structures-2005/Lectures-2005/ws.topaz.speech.html.

Travis, Mack. "Center Ithaca (1980-1994): A Financial Failure." In *Shaping a City,* edited by Mack Travis, 28-32. Ithaca and London: Cornell University Press, 2018.

FROM FLATS TO POLICIES: BREAKING THE BOUNDARIES BETWEEN DISCIPLINES - A JOINT 'STUDIO' FOR ARCHITECTURE AND PLANNING STUDENTS

Authors: MANUELA MADEDDU, JOHANNA MUSZBEK

Institution: UNIVERSITY OF LIVERPOOL, UK

INTRODUCTION

Urban problems have become more complex over the past century and now encompass challenges including global climate change and pan-national housing crises. These are 'wicked problems'¹ that have neither an agreed definition nor a single solution. Whilst it is generally agreed that no single profession can tackle these problems alone, which will instead require cross-disciplinary and collaborative responses, the built environment professions remain stubbornly separate, guided by 'silo mentalities'. The format of higher education has helped perpetuate the divide between disciplines, and built environment education providers now have a responsibility to raise awareness of the vital contributions made by other disciplines to tackling complex problems and global challenges.

This paper details the results of a joint design studio for architecture and planning students that ran for two years at the University of Liverpool in London and which attempted to build an 'interdisciplinary bridge' between these disciplines. The aim of the studio was to develop a collaborative pedagogy that, whilst maintaining disciplinary boundaries, sought greater understanding of the processes, methods and ultimately the limits of these respective fields as a way of adequately framing and communicating their design solutions in response to current built environment challenges.

The role of Higher Education

In the Anglo-American university tradition, planning and architectural education have long been separated². There are twenty-seven planning schools in the UK and the Republic of Ireland which provide courses professionally accredited by the Royal Town Planning Institute (RTPI)³. Eleven of those twenty-seven sit in the same faculty as a school of architecture; four offer a shared programme (e.g. BA Architecture and Planning), and only one of those programmes has joint RTPI and RIBA (Royal Institute of British Architects) accreditation.

This separation between architecture and planning (within higher education first, and then within the profession) has incubated very different design cultures. Whilst in planning schools, design is more context / place and policy dependent, aimed at remedying socio-economic challenges, and it is often identified with problem-solving and used to visualize planning requirements; in architecture schools, design is usually seen as an individually-oriented experimental activity that privileges creative expression and artistic originality over evidence-based inquiry. Both approaches have long been

criticized: the former, for its tendency to generate 'space-less' responses (due to its architectural illiteracy) and for its reliance on pre-conceived solutions, with little vision⁴; and the latter for the advancement of 'place-less' visions, a self-referential reliance on its formal vocabulary⁵ and a detachment of the design object from its social and historical contexts⁶. The disconnection between 'space' and 'place' priorities, arising from this 'design schism', has been blamed for poor quality urban transformations rooted in urban design as "large-scale architecture" that ignore crucial issues such as social justice and well-being.⁷

Historical precedents

The growing disciplinary separation of planning from architecture has been questioned throughout the twentieth century given the importance attached to multi-scalar readings of the city. Without the need for mapping out a comprehensive history of this debate, we looked at events, projects, methodologies where the discourse intensified.

The *Congres Internationaux d'Architecture Moderne* (CIAM, 1928-59), in discussing the 'Functional City', enlarged its focus from the consideration of architecture to that of urban and regional planning. However, CIAM's 'tabula rasa' approach was a negation of the (non-modern) city itself⁸; planning was viewed mainly as 'physical transformation' and the group's prescriptions were "narrowly based on design solutions"⁹. There was also insufficient attention to the public realm: areas between buildings were condemned to be 'left over' spaces between architectural objects, which people just passed through. The group also considered nature, rather than the city, to be their primary reference and the natural partner to domestic space, thus ignoring the relationship of individual dwellings with a wider public realm¹⁰.

In the 1950s, Team Ten (CIAM's youth members) began critiquing CIAM's approach to the built environment and questioned the split between architecture and urban planning, which had been reinforced by the recognition of urban planning as a separate discipline some decades earlier – the first School of Planning in the UK was established in Liverpool in 1909. The group asked for the "architect-urbanist" to consider the built environment in its entirety, as an "indivisible whole"¹¹. Amsterdam's Municipal Orphanage, by Aldo van Eyck, comprised more than 300 interconnected units, grouped around several patios and a courtyard: a 'small city' designed as "a decentralized urban node"¹²; a 'city within the house'¹³. Despite seeking to create a new piece of the urban fabric, however, the orphanage reinforced the idea of building as artefact. Pedagogic endeavours were also hugely influential in this discourse: as an example, the 'Green Archipelago' (1977) introduced a reading of the city through its morphological fragments; the city became a source for its own renewal. In this project-manifesto, Ungers and colleagues reconceived Berlin as an archipelago, where 'urban islands' (design artefacts) would float within a 'sea' of natural areas¹⁴. By suggesting a city of many islands, they created "in effect, a polycentric urban landscape"¹⁵ of interconnected parts.

THE 'DESIGN LAB' AT THE UNIVERSITY OF LIVERPOOL IN LONDON

The 'Design Lab' was established in 2018. It brought together the Departments of Architecture, Geography and Planning, and Industrial Design in a shared space in central London, where the potential of project-based interdisciplinary learning could be tested. The joint studio for architecture and planning students was one of several collaborative projects. Design studios presented the most obvious pedagogical environment to foster interdisciplinary collaboration, employing design-led and project-based investigations informed by continual critical reflection and feedback. Only through hands-on collaborative practices can students understand the multi-scalar nature of every urban

challenge, different disciplinary rationales, languages and practices, and how professions relate to one another.

Urban Design as a meeting point

For the purposes of the Design Lab, 'the city' was considered a crucial meeting point for architecture and planning students. Both disciplines approach urban design differently, in light of their contrasting design cultures and tools: whilst the 'top down' architectural approach is, in its extreme form, considered "dogmatic, deterministic and elitist" – with urban design regarded as an "heroic act" led by the individual architect - urban design within planning schools relies on "collective and participatory effort" and is typically delivered in a "pluralistic, deliberative and participatory" way¹⁶. However, in many planning schools urban design is mistakenly considered a specialism rather than "a common grounding that all built environment students should cover". This can mean that planning students lack basic design skills and possess only "a rudimentary design appreciation"¹⁷. They generally know what "bad things" look like, but do not know how they "can be done better"¹⁸. A key problem in architecture schools is that the "importance of the urban realm" is often "undermined by a myopic focus on the object"¹⁹.

The Lab sought to tackle these issues by developing a methodology that combined problem-analysis with design-solution, drawing together core knowledge and skills of architecture and planning. The design process set shared priorities such as the appreciation of the complex notion of context, a common language for dealing with the 'wicked problems' of cities, and an understanding of 'good places' and place-making. Our 'research by design' approach guided students to think about design from first principles, to explore the environment through design at different scales, instead of considering analysis and design as two consequential steps in the process, so that "desirable" and "unexpected" outcomes could be generated, rather than "probable, but less desirable" ones²⁰.

THE DESIGN STUDIOS

Two design studios were run: the first focused on an inner city area (in 2018/19), and the second on a suburban location (in 2019/20). Both addressed the 'wicked problem' of London's housing crisis²¹, but whilst the first was concerned with urban transformation and retrofit, the second sought proposals for new development on the edge of the city. The architecture students were all undergraduates whilst the planning students were a mix of undergraduates and postgraduates.

The Studios' approach

A first task for the studios was to establish a 'common ground' for students on two fronts:

- through a 'thematic organisation' of the problems, whereby students acquired a more nuanced understanding of the context, that incorporated a multiplicity of design 'dimensions'²², and a knowledge of the different languages, roles and 'modus operandi' of the two built environment 'professions'; and

- through a 'multi scalar approach' to design, promoting an understanding of the reciprocal relationship between all scales of the built environment and between urban problems and stakeholders. The outcome of this guided approach was a shared 'toolkit': a set of resources that the students utilized for their thematic inquiries into the context (focusing, for example, on the urban form, the real estate market, or the movement of people), survey drawings at a variety of spatial scales, and also a series of possible planning and design tools that could be used for guiding and communicating design outcomes; from policies and master plans to design codes, from figure grounds to building and urban sections (Figure1).



Figure 1. Toolkit: Dynamic- Static elements in different scales (Zhang H.,Ma T., Ye Y.-left; Dolan O.,right)

Studio 1: Transforming Canary Wharf

The inner city studio focused on Canary Wharf in the London Borough of Tower Hamlets. Students were asked to imagine its transformation from a global financial district to a new local neighbourhood. The studio's hypothesis was that in the near future automation, and the corporate restructuring of work, would fundamentally shift the economic function of Canary Wharf, with redundant offices turned into homes and live-work spaces. Students were asked to explore new scenarios of live-work arrangements and investigate how these might impact on the public realm; how, for example, a new shared space infrastructure would redefine private and public boundaries. The aim was to steer students to two key questions:

- From the public realm to the flat: How would Canary Wharf change if it were populated by residents who also worked there?

- From the flat to the public realm: Would the area's daily / weekly life alter and what impact might this have on the wider neighbourhood?

Students were given a 'poster' template that guided them to address the challenges of the area at different spatial scales and across different timelines: from the global and national (drawing comparisons with other global cities), to the urban scale (with a view to understanding the function of the area within its city-wide context), to the Canary Wharf site itself, down to the building scale and the consideration of individual urban and architectural elements (such as external and internal corridors, for instance); they were also asked to consider various 'dimensions' of urban design²³, leading them to take account of socio-economic attributes and drivers, as well as demonstrate an appreciation of urban form (Figure 2 and Figure 3).



Figure 2. Poster1: Reactivating the City (Dolan O., Zhang H.,Ma T., Ye Y.)



Figure 3 Poster2: Urban Zones and Fragments (Gordon J., Li Y., Yao C., and Huang K.)

Each group, a mix of architecture and planning students, explored a different sub-theme within the same poster template – ultimately visualizing Canary Wharf's challenges and potentials, linked to the given scenario. On each poster a series of 'topics' emerged, providing a thematic lens for analysis (starting with 'what is the problem?'), leading to design operations through which solutions were proposed ('how do we respond?'). These 'topics' became part of the 'shared toolkit' that guided their design process at every scale and allowed the systematic re-assessment of the area:

- Diversity-Diversifying: in this case, the analysis looked at aspects - or lack thereof - of functional, socio-demographic, formal-typological, structural-material, ecological diversity, which then became the design drivers of the transformation (Figure 4).

- Zones-Re-zoning: the sectional and planar analysis allowed for horizontal and vertical re-zoning of the area. In addition to reconfiguring the programmatic-functional zones at all scales, different dimensions – e.g. acoustic, ecological, economic (real-estate) - were also considered (Figure 5).



Figure 4. Bio and Programmatic Diversity (Sun C., Zhang J., Xu J., Ye Y.-left; Dolan O.-right)



Figure 5. Functional -Economical-Typological Zones in all scales (Yao C., Huang K., Zhao Y. -left; Li Y.-right)

Studio 2: Developing New Suburbia

New Barnet, at the north-east tip of the London Borough of Barnet, provided the focus for the second studio. This typical suburban area is characterized by low-density car-dependent housing interspersed with green spaces and land recycling opportunities.

The premise of the studio was a future in which far fewer people commute to work and there is greater diversity of home ownership models. Students were asked to reflect on the impact that a shift to shared modes of transport would have on the architectural and planning infrastructure of peripheral developments and also what lifestyles this future suburbia would offer if residents worked primarily from home or in the local area.

Students were again steered to address two key questions:

- From the public realm to the flat: will streets, parks and public spaces become dominant spatial figures?

- From the flat to the public realm: how might the face of suburbia change if all new housing areas were developed according to a cooperative model? And how might suburbia cater for a mix of lifestyles, including the transience associated with short-term tenancies?

This time, students were asked to present their findings and ideas through a brochure and billboard, of the types used to advertise new development projects. They needed to imagine where the billboard might be located, if it were to appeal to and attract the inhabitants of this new suburbia. Again, students were asked to consider the area's context, characteristics, challenges and potentials across various 'dimensions': some remained constant while others, including ecology, were paid greater attention in the second studio, given the potential for connections beyond London's edge²⁴.

Students were confronted, in this suburban location, with a relative 'carte blanche' and were challenged to create an 'urban vision' where there was none. This meant that they had to define the 'rules of the game': a multi scalar, systematic approach that focused on designing new development types, 'formulas', standards, regulations and design codes (Figure 6).



Figure 6. Design Codes for Low Rise, High Density - Low Cost Self Built Cooperative (Tseng H-C.-left; Clarence A., Zhang, Baganz D.-right)

With titles ranging from 'Active Suburbia' to 'Botanical Suburbia', the billboards presented alternate visions for New Barnet while the brochures relayed the research and a critical position supporting those visions (Figure 7).



Figure 7. Billboard: Botanical Suburbia (Kleczek K., Lashhab M., Raja A., Li L., Wang Q., Wang Y.)

These included large scale design interpretations of the cooperative development model, typological explorations of the housing, and the development of 'design codes' that codified the design formula:

- Self-Built Cooperatives would be developed on a checkered grid urban pattern, where the footprint of the building equals the courtyard area. The metrics for this development was based on the measurement of the cheapest existing construction products (panels and frame members) aimed to produce a low cost, low rise, high density estate (Figure 6).

- Live-Work Cooperatives were envisioned through a series of connected courtyards framed by crescents. The elongated units of the crescent introduced patios (courtyards in the scale of the unit) so as to separate live-work areas. Party-wall development of the crescent aimed to maximise green space (Figures 8 and 9).

- Farming Cooperatives explored the 'mat' urban type in a continuous allotment-greenhouse-living development by the greenbelt. The varied, cascading section maximizes sun exposure. To form stable communities and initiate productive land use, the allotment sizes were optimised in relation to the size of collectives, length of tenancy and crop production (Figure 10).



Figure 8. Live-Work Crescents in Botanical Suburbia (Li L.)



Figure 9. Design Codes for Courtyards - Live-work Cooperatives (Zheng Z.-left; Li L.-right)



Figure 10. Design Codes for Living on Productive Landscape - Farming Cooperatives (Magsarjav T.)

CONCLUSION

The studios evidenced how the different disciplinary groups were able to broaden their appreciation of the use of space and the connectivity of place to wider socio-economic contexts. Students were also exposed to the political and economic frameworks that impact on design decisions at all scales, and to the power of design to lead systemic change by setting new standards and proposing new solutions. It was sometimes the planning students who arrived at architectural responses to the challenges of place (including through typological operations, such as codifying courtyards) and architecture students who used 'planning tools' (including design codes) to provide regulatory responses to urban challenges – evidencing beneficial cross-overs in thinking.

The studios were realized through the University of Liverpool's investment in an interdisciplinary Design Lab. Unfortunately, the London Campus – along with its Design Lab – closed in 2020, resurrecting many of the obstacles that such collaborations face. The physical separation of disciplines is a source of other problems. These relate to administrative and organizational challenges (centred on budgeting), timetabling (planning modules in Liverpool need to complete in twelve weeks, but architecture ones are longer) and the credit weightings attributed to modules. None of these should be insurmountable, but then tend to harden into departmental boundaries that front-line staff struggle to overcome.

Other challenges are discipline-specific. Planning schools frequently sit outside built environment faculties and too few people understand the role and relevance of design, viewing it as a desirable but not essential feature of planning education. This consigns students to design illiteracy and a poor understanding of place and place-making: masters' students, in particular, struggled with basic design tasks, lacking the broader grounding of their undergraduate peers. But there are problems also in RIBA accredited architecture school, where the focus is often skewed towards technology and exploration of the wider urban context remains superficial. Confronting 'reality' is narrowed down to addressing issues around construction and environmental sustainability, rather than understanding the politics of urban development and regulatory processes.

There is clear benefit in working across disciplinary boundaries and exposing students to new perspectives, new knowledge sets and new tools. The project-based studio pedagogy could be

extended to other disciplines – including business, real estate, communication studies and other design fields. This would involve further development of the methodology: a designed and phased iterative process with continuous feedback loops and a shared evaluation of projects. The diversity of student background and experience is both a challenge and an opportunity; cohorts of students are increasingly international, and students from different countries and contrasting planning and design cultures bring their own, often very particular and diverse ideas about place quality. As cities are increasingly diverse, it is important that we reflect this diversity in our teaching methods, so long as we can progress towards cultural understanding, and develop a common design language that brings professions together.

NOTES

¹ Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Policy Science* 4, no. 2 (1973): 155.

² Klaus R. Kunzmann, "Planning education in a globalized world," *European Planning Studies* 7, no. 5 (1999): 550.

³ "Study at University," Royal Town Planning Institute (RTPI), accessed December 07, 2020, https://www.rtpi.org.uk/accredited-qualifications.

⁴ Mahyar Arefi and Menelaos Triantafillou, "Reflections on the Pedagogy of Place in Planning and Urban Design," *Journal of Planning Education and Research* 25 (2005): 75.

⁵ Michael K. Jenson, "Educating the 21st century architect: complexity, innovation, interdisciplinary methods, and research in design", in *Design Studio Pedagogy: Horizons for the future*, ed. Ashraf M. Salama and Nicholas Wilkinson (Gateshead, UK: The Urban International Press, 2007), 48.

⁶ Anthony W. Shuman, "Introduction: the Pedagogy of Engagement", in *From the Studio to the Streets*, ed. Mary C. Hardin et al. (Sterling, VA: Stylus Publishing, 2006), 8.

⁷ Tridib Banerjee, "The brave new urban design pedagogy: some observations", *Journal of Urban Design* 21 no. 5 (2016): 540-41.

⁸ James Holston, *The Modernist City: An Anthropological Critique of Brasilia* (Chicago: University of Chicago Press, 1989), 83.

⁹ Simin Davoudi and Ali Madanipour, "Two Charters of Athens and Two Visions of Utopia: Functional and Connected," *Built Environment* 38 no. 4 (2012): 462.

¹⁰ Karin Jaschke, "City is house and house is city: Aldo van Eyck, Piet Blom and the architecture of homecoming", in *Intimate Metropolis*, ed. Vittoria Di Palma et al. (London and New York: Routledge, 2009), 175.

¹¹ Jaschke, "City is house and house is city", 176.

¹² Igor Fracalossi, "AD Classics: Amsterdam Orphanage / Aldo van Eyck," *ArchDaily*, accessed December 09, 2020, https://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck

¹³ Aldo van Eyck, "Is Architecture Going to Reconcile Basic Values?." In *CIAM '59 in Otterlo*, edited by Oscar Newman (Stuttgart: Krämer Verlag, 1961), 28.

¹⁴ Florian Hertweck and Sébastien Marot, *The City in the City - Berlin: The Green Archipelago* (Zürich: LarsMüller Publishers, 2013), 12.

¹⁵ Stefania Staniscia, "Sceptred isles," *The Architectural Review* 1460 (April 2019): 51.

¹⁶ Banerjee, "The brave new urban design pedagogy", 540.

¹⁷ Building Better Building Beautiful Commission (BBBBC), *Living with beauty* (London: Ministry of Housing Communities & Local Government, 2020), 112.

¹⁸ Kunzmann, "Planning education in a globalized world", 552.

¹⁹ Jenson, "Educating the 21st century architect", 48.

²⁰ Rob Roggema, "Research by Design: Proposition for a Methodological Approach," *Urban Science* 1 no. 2 (2016): 3.

²¹ Nick Gallent, Whose Housing Crisis? Assets and Homes in a Changing Economy (Bristol: Policy Press, 2019),
23.

²² Matthew Carmona et al., *Public Places - Urban Spaces. The Dimensions of Urban Design* (London: Routledge, 2010, Second Edition), 74.

²³ Carmona et al, *Public Places - Urban Spaces*, 77-266.

²⁴ Nick Gallent et al. *Planning on the Edge. The context for planning at the rural-urban fringe* (Routledge: London, 2005), 138.

BIBLIOGRAPHY

Arefi, Mahyar, and Triantafillou, Menelaos. "Reflections on the Pedagogy of Place in Planning and Urban Design." Journal of Planning Education and Research 25 (2005): 75-88.

Banerjee, Tridib. "The brave new urban design pedagogy: some observations." *Journal of Urban Design*, 21 no. 5 (2016): 540-44.

- Building Better Building Beautiful Commission (BBBBC). *Living with beauty*. London: Ministry of Housing Communities & Local Government, 2020.
- Carmona, Matthew, Tiesdell, Stepve, Heath, Tim, and Oc, Taner. *Public Places Urban Spaces. The Dimensions of Urban Design*. London: Routledge, 2010, Second Edition.
- Davoudi, Simin and Madanipour, Ali. "Two Charters of Athens and Two Visions of Utopia: Functional and Connected." *Built Environment*, 38 no. 4 (2012): 459-68.
- Fracalossi, Igor. "AD Classics: Amsterdam Orphanage / Aldo van Eyck." *ArchDaily*. Accessed December 09, 2020, https://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck
- Gallent, Nick. Whose Housing Crisis? Assets and Homes in a Changing Economy. Bristol: Policy Press, 2019.
- Gallent, Nick, Andersson, Johan, and Bianconi, Marco. *Planning on the Edge. The context for planning at the rural-urban fringe*. Routledge: London, 2005.
- Hertweck, Florian and Marot, Sébastien. *The City in the City Berlin: The Green Archipelago*. Zürich: LarsMüller Publishers: 2013.
- Holston, James. The Modernist City: An Anthropological Critique of Brasilia. Chicago: University of Chicago Press, 1989.
- Jaschke, Karin. "City is house and house is city: Aldo van Eyck, Piet Blom and the architecture of homecoming", in *Intimate Metropolis*, edited by Vittoria Di Palma, Diana Periton, and Marian Lathouri, 175-194. London and New York: Routledge, 2009.
- Jenson, Michael K. "Educating the 21st century architect: complexity, innovation, interdisciplinary methods, and research in design", in *Design Studio Pedagogy: Horizons for the future*, edited by Ashraf M. Salama and Nicholas Wilkinson, 47-62. Gateshead, UK: The Urban International Press, 2007:
- Kunzmann, Klaus R. "Planning education in a globalized world." *European Planning Studies* 7, no. 5 (1999): 549-55.
- Rittel, Horst W., and Webber, Melvin M. "Dilemmas in a General Theory of Planning." *Policy Science* 4, no. 2 (1973): 155–69.
- Roggema, Rob. "Research by Design: Proposition for a Methodological Approach." *Urban Science* 1 no. 2 (2016): 1-19.
- Royal Town Planning Institute (RTPI). "Study at University." Accessed December 07, 2020. https://www.rtpi.org.uk/accredited-qualifications
- Shuman, Anthony W. "Introduction: the Pedagogy of Engagement", in *From the Studio to the Streets,* edited by Mary C. Hardin, Richard Eribes, and Charles (Corky) Poster, 1-16. Sterling, VA: Stylus Publishing, 2006
- Staniscia, Stefania. "Sceptred isles." The Architectural Review 1460 (April 2019): 48-51.
- van Eyck, Aldo. "Is Architecture Going to Reconcile Basic Values?." In *CIAM '59 in Otterlo*, edited by Oscar Newman, 26-35. Stuttgart: Krämer Verlag, 1961.

ROLE OF THE MODEL: NOUN AND VERB

Authors: COL FAY, STELLA LANGE

Institution: OTAGO POLYTECHNIC, NEW ZEALAND

INTRODUCTION

Architecture, as an educational pedagogy, fundamentally has a theoretical framework that allows the practice of architecture to be simulated rather than replicated. Understanding the key expectations of this type of education mediates the tension that arises from a practice that critical outcomes negotiate the expectations of professional processes and creative processes. The polemics therefore are within providing a foundational body of knowledge that balances between pragmatics, theory, technologies, design and communication whilst engaging within a shifting social, economic, and political culture. While design-based practices are generally motivated by a desire to innovate and be creative, architecture has an obligation to accommodate the material and immaterial conditions of a living environment.

Professional Practice in Education

Design studios offer within that paradigm an opportunity of relative freedom to explore and understand the complexity of designing for a real environment whilst also developing capabilities more developmental rather than merely pragmatic. In this sense learning by discovery through the making process is a primary tool exercised in the education of creative industries that negotiate the simulation of a professional outcome. Gray and Malins provide analysis of the role of the model/maquettes in creative practice, as a three dimensional experiments involving 'materials and processes that may result in a range of approximations towards a more resolved construction/object'[112].¹ This description works in both Fashion and Architecture.

Fashion also an enquiry-based practice situates the body at the center of the educational paradigm as a vehicle to design for and against. This is a tangible practice utilizing the constructed model, that which presents a dressed human form, as a design tool to develop complex understanding of how concept is made real through considered material choices. For Fashion design, Vaughen describes this practice being a tension between the head and the hands, acknowledging the importance of making to the creative process.²

For Fashion, both in professional practice and in education, the development model is the toile, a facsimile used to evaluate design ideas. Toiles are valuable design tools, allowing concept, form and materiality to be tested, reviewed, and adjusted. The model in Architecture is somewhat different in that it miniaturizes the design. Architecture design expressed through a model suggests built form as a proxy of the 'real 'at best but is critical to the design process itself. Typically, this process allows
opportunities to explore architecture as a holistic investigation of a single organism that extends conceptually to Architecture when a critical mass is reached.

The Model and the development of the Proto-Practitioner

The 'model 'both as noun and verb is a mechanism to interrogate how the "doing" process for both Fashion and Architecture education is the same yet different. Whilst 'making 'is a primary method of evaluating depth of learning and critical thinking it is the differing attitudes to the process of making 'form 'in these disciplines that will be explored. In critically evaluating the shifting role of exploratory modelling its role in providing agency to bridge the relationship between potential client and proto-practitioner is revealed (Figure 1). Here, *Proto-practitioner* refers to the role the student assumes in education - that of a professional designer.



Model as performative simulation

Figure 1. Mapping educational space as a simulation of professional expectancies.

The role of the design model in education

Design Education replicates a process of review and evaluation through the use of Crits, review sessions where students present models to their advisors who question and model a professional interrogation of the 'model'. In education the model serves as an expression of the design. Educationally all the stages of design, both development and refinement of the artefact lie with the student, unlike the professional space. In the Fashion profession as in education, toiles are versions of the developing design made from lesser materials, and emulate commercial assembly. In Architecture profession, the model serves a different role depending on the specific studio, and is often replaced by 2D simulations, there is an expectation that professionals can model, and will do so when needed. The physical model therefore is known but may not be used professionally in the Architecture design process as the design is understood conceptually. The use of model by students develops this cognitive ability, understanding of complex form and concept. One key aspect to clarify is that for Architecture the model is primarily utilized to test the idea where for fashion it primarily tests the idea in terms of its viability.

The educational practices discussed here are deliberately generalized, acknowledging that there are invariably differences in approach, positioning and practice which form unique practices of individual educators and schools. What is universal in design education is the use of prototypes, models, maquettes or similar developmental pieces to help visualize, test forms and ideas without the cost and effort of producing a final works. It is that universal Design education practice, modelling, the use of a low-cost model to emulate a final design that is discussed here.

Here we discuss the Architecture & Fashion specific relationship with the model

Analogically, buildings are virtual formations of their designers 'ideas. Through the design process these ideas gradually become more refined and eventually materialize through the construction process (model). Educationally this graduation of complexity is mitigated through various vehicles of representation, namely drawing and modelling, as a means to explore and interrogate the ideation of architecture. Part of this is consideration of technical resolution, which is embedded in the fashion model and considered but not present in the architectural model.

Both practices, Architecture and Fashion, make use of the fluidity and spontaneous nature of sketching for early design developments. Sketching is taught as a preliminary development tool, echoing Nigel Cross's suggestion that for designers sketching provides a process of criticism and discovery, a space in the design process for reflection on ideas and detailed aspects of the implementation of the concept.³ This practice of sketches – with a focus on quick explorations of concepts, encourages risk to be part of the design exploration, more so than refining the details of designs. Yet sketching, as a 2D representation of ideas, of formed concepts, lacks the potential for critique that 3D forma offers, that deeper interrogation of design considerations.

Models as simulations of what could be

Models bridge the gap, between 2D representations and 3D simulations. Drawings are understood as a preliminary stage of designing, the process shifts to making as soon as ideas are firm enough to test in material forms; the polemics of which are discussed further by Jonathan Hill and others⁴⁵⁶. As the model progresses from simple structures articulating critical thinking, or what Juhani Pallasmaa suggests, "the thinking hand," so too does the critical review of students.⁷ In this sense the model's purpose becomes cognitive 'drawings 'that undergo a series of interrogation. Collectively understood these early iterations are loosely crafted, quick 3D 'drawings 'able to mutate at will and often (Figure 2). As the design solidifies the model starts to echo concrete ideas made more robust through white card yet still not understood as architecture until relationships are established within the site/context. The model, as drawing tool, therefore allows the understanding of Architecture to be represented physically in order to evaluate conditions of container and function…materiality is somewhat elusive, a conversation or statement but not realized. This is where the similarities of 'model 'in Architecture and Fashion transgress⁸.



Figure 2. The temporal nature of models as 'drawings'.

Materiality of the model

For fashion materiality is at the forefront of the interrogation process and if expressed not in the final textile then a suggested substitute is expected to be trialed throughout. Some Fashion approaches, Draping, allow for drawing through play with material, sculpting the form direct on a simulated body. Once the silhouette (*Forma*) has been established then the process undergoes scrutiny at a technical level that manipulates the solidification or fluidity of the finished outcome. In this way the final garments form having been established early on is refined or consolidated through knowledge gained in how to make possible a realizable outcome. The expectation of that final design is that it has the potential to be manufactured at its completion; sold to a retailer and put into production or manufactured by a bespoke design atelier

The important difference of scale

The use of scale influences students "realistic" understanding of their intended professions. In Architecture education the limitation of not being able to 'test 'ideas on a 1:1 scale creates a different understanding of the profession unlike fashion where works are full sized approximations of the final design/s. Typically, fashion designers work to the full scale of the human body although early concepts can be explored in one third or half scale for speed and to limit material costs. The human body in this case, is a rational expression of a 'fashion body'. The fashion mannequin is a standardized, uniform body, in white (or black), a neutral torso on a stand, sans limbs or head, a de-identified client, who provides an exemplar of human form in a one-to-one scale (Figure 3). This luxury of modeling full size is not an option in Architectural education, so scales are selected depending on the context and conventions, smaller domestic designs are often modelled using larger scales than more commercial or public designs.



Figure 3. The very real difference in scale used to consider the human form and experience between Architecture and Fashion Design Education.

The 'Thing 'vs a plan for the 'Thing'

The expectation of the final designs is very different in these two areas based on professional requirements, both in education and practice. For Fashion this lies in the student having concrete capabilities and knowledge around manufacturing/producing/construction learnt through the material explorative 'model '- for architecture the complexity is still within the education/professional practice paradigm. The thing vs the plan for the thing. Both Disciplines focus on Design and Designing as a creative practice – but the professional expectations around what a Designer knows and can do are very different.

The model as a proposal

Educationally, within an Architectural Design program, the advisor places importance on the development processes of architecture (criticality, robust design, research and drawing conventions). They demand the answers to complex designs, this territory is navigated by the student (protopractitioner) through digital and physical means of representation that often has little to no concrete expectation of ever being realized. In Fashion the advisor places equal importance on the student being able to design (criticality, robust design, research) and also a knowledge of suitable constructions (possibly the Fashion equivalent of Architectures drawing conventions). The fashion toile, the prototype, is an idea proposed by the designer, and has to be reconciled with what Gully describes as "what is not makeable and wearable [41]"⁹. This territory, the proposal space, acknowledges the acceptance by both educator and student that the design projects the student works on are mere proposals, unlikely to be ever realized. Here we reveal two very different expectations, in Architecture the designer is not expected to have the skills to construct the final design, whilst in Fashion a practical and applied knowledge of construction is an expected part of 'knowing 'how to design.

Professional Objects

Professional object alludes to the way models are experienced. Fashion students are encouraged to present their final models as if they were part of a professional space. Fashion students replicate the visual language and techniques of a fashion photoshoot, they use human models, and carefully select make up, styling, employ contemporary poses and professional photography to emulate professional fashion design outcomes (Figure 4).



Figure 4.G Ferguson's masters fashion collection development included positioning garment models as if in a magazine (2019, page 45) ¹⁰.

The Architecture students 'lack of fundamental experience of the implementation of their ideas in the 'real 'world for 'real 'people is a product of the class room environment which can only ever *emulate* the working world not *replicate* the working world. Not having the resources to physically test on a 1:1 scale (fragmentary elements see Figure 5) means that the tangible physicality of architecture, that is the experiential examination of form, material, and function remains a manifestation of the model, as an ideal. The model therefore transforms ideas from 'sketch 'to professional 'object'.



Figure 5. Detail element revealing the fragmentary nature of using a 1:1 model in architectural design development.

Looked upon, viewed from above on a bench surface or plinth takes away the ability to 'see 'built space other than an object in the round; an 'artistic 'impression of the way in which built space might be conceptualized. Presented to an audience as a miniature perfection of architecture/environment relationships somewhat diminishes the impact of angst that students negotiate whilst developing form in response to these complex relationships. The scale renders this aspect mute. Both Architecture and Fashion review the final model in terms of how well it is crafted, but differently, in Architecture at a small scale – and in fashion a full-sized preliminary version.

Reviews, in Architecture education therefore tend to focus on aspects of form, concept, location, and use, in response to the model and in Fashion extend to include also how well the technical proficiencies co-exist with aesthetic decisions.

Materiality, through the Architectural model, denotes a landscape made textural through the unification of the environment. Surface variances are utilized to suggest physical attributes but are muted, etched onto a substrate of whiteness or a ply-scape (Figure 6).

Topographical sensibilities and existing forms echo some of that blankness by being painted tonally inert. The decision to express more of the context by realistically representing it pushes the model into a museum diorama so this often is a conscious exclusion in order to not detract from the emphasis of form over environment. Conversely in Fashion Education, the model, a Toile is expected to replicate as completely as possible the final design (within the limits of the student's expertise, available time and finances). Where cost or time prevent replicating the final design – small sections or imitations of the 'real 'are expected to be produced.



Figure 6. Depiction of a contextualised site as a homogenized ply-scape. BAS graduate exhibition 2020, L Shaw.

Physical not digital

Interestingly the Digital model provides options for a very different aesthetic. These digital versions provide easy access to colour and other decorative elements – and so become a more photorealistic simulation. Alternatively, the digital versions can lack any sense of materiality, or skin, be made of nothingness. This version is markedly different to the white/'ply-scape more typical architectural models. These seem to demonstrate more a technical proficiency with technology than design ability and are used as such. Pallasmaa notes that computer aided designs place the designer as an outsider because of the ease with which complexity can be conceptualized. Drawing, and we note models, require a more considered physical understanding of the arrangement of elements, a perceptive understanding of form. The digital model lies beyond the scope of this discussion.

Thingking

In Design, Thingking, the "symbiotic relationship between thinking and making, between object and idea" [94] is theorized as critical to the design process.¹¹ This Thingking, an acknowledgement of making as a critical practice, is possible given the design process includes production of models/toiles. To examine the role of the model further between the domains of Architecture and Fashion, the ways in which models can be physically tested is explored. In Fashion the model can and does function as real artefact. Kristensen and Ræbild discussed the use of the prototype in professional design practice to simulate the experience of the wearer/client through wearing the toiles and sample garments in the design studio and evaluating them in mirrors and photos.¹² In Architecture the closest parallel is the VR generation that seems reserved for presenting rather than for designing. This highlights a critical gap between the two practices and the educational methods that develop professional designers.

CONCLUSION

So how do we bridge architecture education and profession expectations, where the student as 'designer 'has been prepared to be practiced in one and yet is in some ways a novice of the other. Unlike Fashion students, who have an expectation that their skill set can easily transfer into the professional field as head/lead designer, the architecture student must be prepared for their education to be ongoing, to start exploring the 1:1 scale through guided professional practices. This is not to say Fashion students are better prepared for their desired professional roles, the commercialization of

designs through manufacture is an area those students know as theory and occasionally in factory tours, and so must experience once active in their profession.

The vital role of the model

Therefore, the emphasis on the exploration of architecture through model making is a critical inclusion of the educational environment. The model is not there to emulate Architecture as the toile does in Fashion but rather its purpose is to cognitively bind the designer to examine built form as an extension of the 'drawn'. This practice, uses the model to develop a professional capacity to design 3D buildings using only 2D sketches, professionals can conceptualize easily. Pallasmaa's insightful critique of some Architecture education is the focus is largely esoteric in that it values the conceptual practice over knowledge gained through 'making'. Like Pallasmaa 'we feel the model is vital for architectural learning to be successful. Kristensen and Ræbild expresses similar concerns for Fashion, where offshore production and digital tools replace the hands-on workrooms in some design studios.¹³ Situating architecture beyond the physicality of form would suggest the education of architecture is a theoretical disposition that is based on being able to draw and operate computer programs. The removal of experiencing architecture through making similes of it (the model) would be detrimental in proving an education of architecture that addresses the 'reality of the practice that is 3D.

NOTES

¹ Carole Gray and Julian Malins, *Visualising Research A Guide to the Research Process in Art and Design* (London & New York: Routledge, 2004).

² Suzi Vaughan, "Sox and the City: Introducing First Year Students to Studio Based Learning, Teaching and Assessment" (FYE Curriculum Design Symposium, Queensland University of Technology, Brisbane, Qld: QUT Digital Repository, 2009), 5.

³ Nigel Cross, "The Role of Sketching in Design," in *Designerly Ways of Knowing* (Milton Keynes UK: Springer, 2006), 34–38.

⁴ Hill, Johnathan. 'Chapter 2 Hunting the Shadow'. In Immaterial Architecture, 33–38. Routledge, 2006

⁵ Leatherbarrow, David. 'Showing What Otherwise Hides Itself: On Architectural Representation'. *Harvard Design Magazine* 6, no. Fall (1998): 52.

⁶ Akalin, Aysu, and Ihsan Sezal. 'The Importance of Conceptual and Concrete Modelling in Architectural Design Education'. *Journal of Art and Design Education* 28, no. 1 (2009): 14–23.

⁷ Juhani Pallasmaa, *The Thinking Hand - Existential and Embodied Wisdom in Architecture* (New York: John Wiley and Sons, 2009).

⁸ Stella Lange and Col Fay, "Fay, C. & Lange, S. (2020) Role of the Prototype: Model as Noun-Model as Verb," (Conference Presentation, Teaching, Learning, Research, Design and Environments Conference, Amps Manchester School of Architecture., December 2, 2020), https://www.youtube.com/watch?v=guFoXXtveCQ.

⁹ Rebecca Gully, "Cognition and Process vs Design Artifact in Fashion Design Pedagogy," in *Cumulus Conference*, vol. Publication series G, G (Cumulus Working Papers Melbourne, Melbourne: Aalto University School of Art and Design, 2009), 40–45.

¹⁰ Georgia Ferguson, "Black Sheep - Expanding My Creative Focal Points" (Thesis Master of Design, Dunedin, New Zealand, Otago Polytechnic, 2019).

¹¹ John Dunnigan, "Thingking," in *The Art of Critical Making: Rhode Island School of Design on Critical Practice* (New Jersey: Wiley, 2015), 94–116.

¹² Tore Kristensen and Ulla Ræbild, "THE PROTOTYPE AS MEDIATOR OF EMBODIED EXPERIENCE IN FASHION DESIGN" (Nordcode 201, Southern University Denmark, Kolding, 2016), 13.

¹³ Kristensen and Ræbild.

BIBLIOGRAPHY

Cross, Nigel. "The Role of Sketching in Design." In *Designerly Ways of Knowing*, 34–38. Milton Keynes UK: Springer, 2006.

Dunnigan, J. "Thingking." In *The Art of Critical Making: Rhode Island School of Design on Critical Practice*, 94–116. New Jersey: Wiley, 2015.

Ferguson, Georgia. "Black Sheep - Expanding My Creative Focal Points." Thesis Master of Design, Otago Polytechnic, 2019.

Gray, Carole, and Julian Malins. *Visualising Research A Guide to the Research Process in Art and Design*. London & New York: Routledge, 2004.

Gully, Rebecca. "Cognition and Process vs Design Artifact in Fashion Design Pedagogy." In *Cumulus Conference*, Publication series G:40–45. G. Melbourne: Aalto University School of Art and Design, 2009.

Hill, Johnathan. 'Chapter 2 Hunting the Shadow'. In Immaterial Architecture, 33–38. Routledge, 2006.

Kristensen, Tore, and Ulla Ræbild. "THE PROTOTYPE AS MEDIATOR OF EMBODIED EXPERIENCE IN FASHION DESIGN," 13. Southern University Denmark, Kolding, 2016.

Lange, S, and C Fay. "Fay, C. & Lange, S. (2020) Role of the Prototype: Model as Noun-Model as Verb. ,." Conference Presentation presented at the Teaching, Learning, Research, Design and Environments Conference, Amps Manchester School of Architecture., December 2, 2020. https://www.youtube.com/watch?v=guFoXXtveCQ.

Pallasmaa, Juhani. The Thinking Hand - Existential and Embodied Wisdom in Architecture. New York: John Wiley and Sons, 2009.

Vaughan, Suzi. "Sox and the City: Introducing First Year Students to Studio Based Learning, Teaching and Assessment," 5. Queensland University of Technology, Brisbane, Qld: QUT Digital Repository, 2009.

VERTICAL SCHOOLS AND MEDIATED SPACES; THE NECESSITY OF INTERACTION WITH NATURAL ENVIRONMENT

Author: ELIA EBRAHIMI SALARI - ROSANGELA TENORIO - NIGEL WESTBROOK

Institution: THE UNIVERSITY OF WESTERN AUSTRALIA

INTRODUCTION

The idea of integrating schools with nature and community is not a new-found phenomenon. From the end of the 16th century and throughout the 17th century, significant childhood discovery development emerged. However, by the late 18th century, the concept of the child was firmly established as an 'institution'. This institution was seen as a 'walled garden' in which small and weak children are shielded from the harshness of the globe outside .¹ In the early 19th century, the educational garden concept commenced with the kindergartens established by Friedrich Froebel,² and emphasised the importance of integrating children's spaces with the natural environment.

Nevertheless, nowadays, children spend less time in natural settings than was normal in the past, due to space competitiveness, which is creating more high-rise buildings, including schools.³,⁴ The growing population, urban sprawl, densification strategies, and digital integration are indicators of time spent in and out of natural environments and have an undeniable impact on children's health and well-being.⁵,⁶ Given the excellent association between time spent in nature and better community well-being, people spend more than 80% in buildings, deprived of nature's opportunities.⁷ As a result, one of the necessary elements for encouraging progressive thinking in educating children is to create a functioning and supportive physical learning infrastructure in vertical buildings,⁸ which, in this paper, is called 'mediated spaces'.

This paper aims to propose criteria for designing mediated spaces to integrate indoor and outdoor environments in vertical schools. Moreover, by pursuing literature review on the impact of the natural environment on pedagogy, and reviewing related case studies in vertical schools that integrate with nature argues the importance and strategies of interacting mediated spaces with the natural environment to improve learning outcomes, health and well-being of children.

PROBLEMS IN SCHOOLS

The correlation between human health, well-being and the natural environment is well-documented.⁹ However, recently, reduction in time spent in nature and outdoor activities along with increasing inactive mode and indoor sedentary recreational activities may have significant consequences for children's health, well-being and social improvement. This lifestyle can influence their physical health, increasing the risk of obesity, affect their cognitive performance and relationships.¹⁰,¹¹

Richard Louv, the author of the 'Last Child in the Woods', invented the term 'nature-deficit disorder' to describe the lack of free-range children's discovery of 'wildlands' in towns. He also explained possible adverse effects on human well-being and social cohesion as children move indoors and away from direct interaction with the natural environment.¹² It is well documented,¹³ that excessive periods spent in buildings can lead to 'Sick Building Syndrome', affecting occupants through ill health effects, discomfort and reduced productivity. For example, an extensive study of over 345,000 people showed the prevalence of major categories of disease was at least 20% higher in people living in less green areas compared to those living in more green areas.¹⁴

FROM TRADITIONAL TEACHING TO INNOVATIVE TEACHING

In the late 1970s and 1980s, the priority of investing in educating staff and learning resources, made classrooms and school estate go out of fashion. This educational system is called subject-based learning. Nowadays, "the classroom, as the 'learning space', and the school, as the 'community hub', are critical to student-based learning and constructively aligned learning".¹⁵

Besides, traditional teaching involves students sitting in their assigned seats, and the belief is that the brain is unique from the body, and the body is not involved in the learning process. Nevertheless, it is widely accepted that learning takes place not just in traditional classrooms, but also in interaction with open spaces and physical activities. The research on plasticity and the brain tells us that the body and mind are interconnected. When a person is appropriately engaged in a tricky experience, multiple body/ brain/ mind systems are integrated and working together naturally; and to this matter, child-centred learning theories are responsible for such shift, where school design and planning ultimately found their way into innovation.¹⁶ For example, a survey of more than 800 Australasian schools illustrated that in innovative learning environments, flexible spaces promote deeper student learning compared to traditional classroom arrangements.¹⁷

BACKGROUND OF INTEGRATING EDUCATION, NATURE & COMMUNITY

Samuel Wilderspin (1792-1866), an English educator, and David Stow (1793-1854), a Scottish educator, both established education systems supported through school building laws and recognised the need for an outdoor playground area.¹⁸

John Dewey (1859-1952), a pioneering theorist in the education of children, introduced an evolutionary philosophy based on the idea that "children learn by experience".¹⁹ He argued that "the school is primarily a social institution" and "education, therefore, is a process of living and not a preparation for future living".²⁰ To achieve this, he believed that having interaction with open space environments should be considered in designing learning environments for children. Furthermore, bringing the outside in and naturalising play spaces could effectively join the outer community and landscape and provide unlimited exploration and discovery opportunities.²¹

An eminent Italian educational theorist, Maria Montessori (1870-1952), advocated that the "development of a child's mind comes through his movements". She claimed that mental growth must be related to and based on movement, and there is an almost mathematical correlation between the child's environment, activity, and development.²²

The importance of educational theory cannot be overstated, as it also impacts design theories. Richard Neutra (1892-1970), a modernist architect and advocate of the beneficial effects of exposure to the natural environment,²³ argued that schools must interact with the existing site. This interaction is for better learning and collaboration between students and teachers as a physical space and forming a connection between the school and the neighbourhood/ town. He also agreed to the advantages of outdoor education, an argument stemming from Ivan D. Illich, an Austrian theorist (1926-2002), and

his book "Deschooling Society".²⁴ According to Illich, the more children spend time in the natural environment; the more outstanding well-being affects them.²⁵

Reggio Emilia's concept by Loris Malaguzzi (1920-1994) believed that "by designing the spaces in a way that creates a pleasant learning environment for the child, space itself can become a third teacher for the students". It means that "space becomes a learning tool for the children",²⁶ and "both children and adults co-construct their knowledge through interactions with people and the environment".²⁷

NECESSITY OF CHILDREN'S INTERACTION WITH THE NATURAL ENVIRONMENT

Designing school and learning environments have always been a controversial issue; it is a highly complex interaction between the child's well-being requirements, learning processes, and innovative teaching methods. However, children's learning does not necessarily occur in a defined classroom. Children learn best when they spend unplanned and unstructured time outdoors; exploring, experimenting, exploring, and enjoying; not to mention delightfully planning their syllabus.²⁸ Furthermore, including the children in unstructured outdoor spaces will allow them to identify the risks of physical activity, mobility, and play and the opportunities for successful physical development and mental stability in unstructured outdoor spaces.²⁹ Referring to the Australian Curriculum and Assessment Authority (ACARA), the definition of outdoor learning is "learning for, with, and about the natural environment". The four outdoor learning measurements are skills and knowledge, human-nature relationships, conservation and sustainability, and health and well-being.³⁰

Evidence indicates that the formative years of an infant's life are the most critical period to cultivate an affinity with the natural world.³¹ Many scholars have studied the effects of children participating in the natural world and becoming physically active in open environments.³²,³³,³⁴,³⁵ For example, one-hour nature exposure can boost memory performance and attention by 20%.³⁶ Several empirical studies prove that "spending time in green outdoor environments, as part of a 'balanced diet' of childhood experiences, nurtures lifelong positive attitudes about nature and the wider environment".³⁷,³⁸,³⁹,⁴⁰

Other researchers recorded improvements in children's physical well-being, social interactions, and positive affective conditions due to outdoor recreational interactions in nature.⁴¹ Also, time spent in more natural settings (like parks, woods, nature-based classrooms or playgrounds) triggers the senses, increases the capacity to learn, and lets students link the aspects of the universe.⁴² Other benefits found are decreased stress levels, excellent self-regulation capability, and a self-determined commitment to play.⁴³ Children's executive output, including their cognitive flexibility and emotional control, is enhanced by even limited improvements in urban green space participation.⁴⁴,⁴⁵ Further studies in educational settings highlight the importance of natural environments in promoting meaningful and rich learning experiences, including changing perceptions of nature and the local plants and animals and enhancing gardening skills, life skills, and interpersonal relationships.⁴⁶

Ming Kuo from the Landscape and Human Health Laboratory at the University of Illinois claimed in a 2019 review that "experiences of nature boost academic learning, personal development, and environmental stewardship". There are clear indicators that nature can encourage learning by enhancing student focus, stress levels, self-command, engagement in learning, physical activity, and fitness. According to Kuo, nature-based teaching exceeds conventional teaching in academic contexts. To improve his statements, he exampled a "controlled trial of school garden-based instruction" involving over 3,000 students, demonstrating the students' improvement in learning in garden-based instruction compared to traditional education systems (Fig. 1).⁴⁷ Another study on the effects of school gardens on children's science knowledge found that knowledge scores improved from 46% to 57%

when children were presented with a very robust garden intervention.⁴⁸ Thus, it is time to acknowledge nature as a learning platform.



Figure 1. Nature-Based Learning: exposures, probable mechanisms, and outcomes

STUDENT WELL-BEING

One of the compelling elements in designing a learning environment is well-being. As schools shape students' well-being, they provide context and serve as agents for well-being transformation and should prepare children for life, a key consideration for well-being.⁴⁹ Fraillon defines student well-being as "the degree to which student is functioning effectively in the school community".⁵⁰ Similarly, another definition of student well-being as "a sustainable state of positive mood and attitude, resilience, and satisfaction with self, relationships, and experiences at school".⁵¹ However, optimal student well-being is described as a sustained state of positive emotions and attitudes, resilience, autonomy, relationships, and school experiences.⁵² According to PISA, students' well-being is defined as having a "happy and fulfilling life". Students' well-being relates to four domains, including psychological, social, cognitive, and physical.⁵³

Psychological dimension includes the "students' sense of purpose in life, self-awareness, affective states, and emotional strength". Social dimension involves students' interaction with their families, peers, teachers, and their perceptions of social life within and outside school. Cognitive dimension includes students' abilities to use academic expertise to address challenges, critical reasoning, and confront concepts from many viewpoints. Physical dimension offers self-reported statistics about how much physical exercise students participate in and what they eat consistently. For example, on average, across OECD countries, students who claimed to participate in mild to intense physical exercise were less likely to report feeling very stressed about school work and feeling like outsiders at school.⁵⁴

VERTICAL SCHOOL AS LEARNING ENVIRONMENT

Since urban densification is inextricably connected to today's lifestyles, engagement with the idea of vertical school (VS) is now imminent.⁵⁵ VS has been designed as learning environments for all teaching, management, and leisure activities in one or two buildings with elevated outdoor areas with four to 17 floors.⁵⁶ VS saves space and takes up less land, so more land can be used for developing other ventures. It enables students to be closer to the resources they need for their future careers since they are so close to the CBD. This leads to closer relationships with local businesses and more opportunities and occupies less space, which helps with overcrowding by building more of them. Multi-story schools, however, require innovative architecture and pedagogical approaches to ensure direct access to nature and green areas. The lack of natural playgrounds and schoolyards, outdoor workouts, and physical activities are the prevalent problems in every VS.⁵⁷

CASE STUDIES IN INTEGRATING NATURE WITH VERTICAL BUILDINGS

Integrating nature with architecture boosts self-regulation, energy usage, and overall efficiency of the building and promotes health and well-being.⁵⁸ The following case studies are already working with some types of in-between spaces in VS to maintain health and well-being (Table 1).

Building	Nature / outdoor integration concept to maintain well-Photo being		
Loreto Mandeville Centre Toorak, Australia 2015	Integrating the atrium with the courtyard facilitating a pedagogy in which inside and out learning experiences are combined. The north façade creates a seamless relationship with the landscape. ⁵⁹		
Early Learning Village Singapore 2017	Consistent with the Reggio Emilia philosophy of children's physical environment, this building focuses on children's well-being in a learning environment. Architects have sought to create an atmosphere bursting with natural light, external awareness, accessible and engaging. Four classrooms are grouped around a central space with an outdoor play area for 100 students. Analysis of stacked 'building blocks' have produced a playful atmosphere while providing weather protection. ⁶⁰		
South Melbourne Primary School Melbourne, Australia 2018	This building is designed using the concept, "Learning can take place indoors and outdoors depending on the weather". It provides both a learning hub and a community centre that connects learning and entertainment, students and neighbours. ⁶¹		

Royal Far West Manly, Australia 2018	The architecture maximises views from an open workspace and enables light penetration through the floor. The integrated education and workplace integrate external terraces and outdoor spaces with indoor areas. ⁶²
Gray Puksand, Melbourne Prahran High School Melbourne, Australia 2019	This building provides some outdoor areas at every level. The lower one is linked to a huge gym, transforming it into an active terrace, while the upper one linked to the food technology and canteen rooms. Indoor spaces have acoustics and a sense of light that make them feel like being outside. ⁶³

 Table 1. Top recent case studies in children's related spaces

MEDIATED SPACE / IN-BETWEEN SPACES

Referring to the above case studies, physical activities and interaction with the natural environment in vertical schools, occur in mediated space or in-between spaces. Mediated spaces are defined as interaction spaces between indoor and outdoor environments⁶⁴ including semi-open spaces like sheltered rooftops, patios, internal courtyards, and terrace, as well as transition spaces like corridors, foyers, lobbies, atrium, and staircases. Mediated spaces can be differentiated form open spaces since they create more sense of belonging to the space for the person or community.⁶⁵ These spaces facilitate knowledge sharing and peer-to-peer learning in the form of "chance encounters and social interactions".⁶⁶ Moreover, learning in informal settings like corridors, breezeways, circulation zones, and expanding in-between spaces outdoors enhances learning ability, well-being and builds relationships in education settings.⁶⁷ According to the previous case studies, creating physical, social relationships and recreational activity environments are the design benchmarks of mediated spaces in these vertical schools.

PRINCIPLES OF DESIGNING MEDIATED SPACES IN VERTICAL LEARNING SCHOOLS

To integrate with nature and design mediated spaces in vertical schools, the following strategies are extracted from the above case studies and literature review. These practices will encourage quality improvements in school design and sustain student-centred learning, health, and well-being.⁶⁸

• Creating an outdoor classroom by connecting a cluster of classrooms to mutual green, sheltered terraces in every level for small groups to study, build social skills, and promote creative play.

• Creating the window seat/ nook in the library or communal spaces of each level provides an informal environment to facilitate students' peer-to-peer and self-directed learning. Besides, daytime views of nature are an efficient use of space that can promote beneficial behavioural and learning effects.⁶⁹

• Creating grass sports pitches, hard game courts and pools in the rooftops since there is not enough land on the ground.

• Creating courtyards provides a secure, shared outdoor space protected and linked to indoor learning spaces for engaging pupils and the wider community. Courtyards will also provide opportunities for studying nature, growing food, and climate observation for environmental education.

• Creating central atria with 'Hellerup stair' to connect the building's spaces vertically. This expanded staircase doubles as a sitting area, encouraging connection, learning and relaxation.⁷⁰

• Creating a connected façade offers views to nature, light penetration through openable doors and windows for students to move outdoors, play and learn.

• Using deciduous trees and plants in the external play areas, which can provide shade for indoor spaces throughout summer, while allowing the sun to reach the classrooms throughout winter. Tree-canopies can minimise the influence of urban heat island in metropolitan areas.⁷¹

• Using natural materials like wood, sand and grass bring nature in the heart of the learning environment in indoor and mediated spaces.

CONCLUSION

In this paper, the importance of integrating learning spaces with the natural environment on improving the quality of student-centred learning, health and well-being has been put forward. Moreover, the necessity of designing mediated spaces as interaction spaces between the indoor and outdoor environment in vertical schools are argued through a systematic literature and case study review.

Despite other studies emphasising designing interacting spaces with natural environment in the conventional horizontal schools, this study focuses on why and how to implement interaction spaces to connect natural environment and learning spaces in vertical schools. Vertical schools are the prevalent result of the overpopulation and land scarcity in today's urbanising world and should adopt new pedagogies both in curricula and architecture to suit innovative learning curricula. This research's significant characteristic is redefining the image of traditional horizontal schools in response to higher demand for land in major dense cities. Proposing design strategies on creating mediated spaces in vertical learning environments to maintain learning outcomes, and well-being is another stunning feature of this paper.

NOTES

¹ Charlotte Landvoigt, John Dewey's Concept of the Child (ProQuest Dissertations Publishing, 1986). 8-9

² Anne R. Schutte and Julia C. Torquati and Heidi L. Beattie, "Impact of Urban Nature on Executive Functioning in Early and Middle Childhood". Environment and behavior 49(1), (2016): 3-30.

³ Ibid., 2016.

 ⁴ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.
 ⁵ Ibid., 2021.

⁶ David Kim, *Vertical School: A New Typology for the City*, editors. David Miller and Gundula Prosch (ProQuest Dissertations Publishing: 2017).

⁷ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.

⁸ David Kim, *Vertical School: A New Typology for the City*, editors. David Miller and Gundula Prosch (ProQuest Dissertations Publishing: 2017).

⁹ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.

¹⁰ Anne R. Schutte and Julia C. Torquati and Heidi L. Beattie, "Impact of Urban Nature on Executive Functioning in Early and Middle Childhood". Environment and behavior 49(1), (2016): 3-30.

¹¹ Kellie Dowdell and Tonia Gray and Karen Malone, "Nature and its influence on children's outdoor play". Australian journal of outdoor education 15(2) (2011): 24-35.

¹² Louise Chawla, "Benefits of Nature Contact for Children". Journal of planning literature 30(4), (2015): 433-452.

¹³ Ming Kuo and Michael Barnes and Catherine Jordan, "Do Experiences With Nature Promote Learning? Converging Evidence of a Cause-and-Effect Relationship", Frontiers in psychology 10, (2019): 305 ¹⁴ Ibid., 305.

¹⁵ Kerry J. Kennedy and John Chi-Kin. Lee, *Routledge handbook of international education and development* (London: Routledge, 2016). 128, 156, 207, 257-259, 264, 267, 272, 281

¹⁶ Dudley Barlow, *The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning* (Ann Arbor: Prakken Publications, Inc, 2012).

¹⁷ Clare Newton, "Vertical schools on the rise in Australian cities," Architecture Australia 108(5) (2019): 86-91.

¹⁸ Mark Armitage, "The influence of school architecture and design on the outdoor play experience within the primary school," Paedagogica historica 41(4-5) (2005): 535-553.

¹⁹ Sho Tetsutani, *Design Elements for a Vertical School Case Study: Kaka'ako*, (ProQuest Dissertations Publishing, 2018). 26,30.

²⁰ Dudley Barlow, *The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning* (Ann Arbor: Prakken Publications, Inc, 2012).

²¹ Ibid., 2012.

²² Ibid., 2012.

²³ Manfred Sack, *Richard Neutra*, editors, Richard Joseph Neutra and Willy Boesiger (Zürich: Verlag für Architektur, 1992).

²⁴ David Leatherbarrow, *Uncommon ground: architecture, technology, and topography* (Cambridge: MIT Press, 2000). 97,98,99,109.

²⁵ Sho Tetsutani, *Design Elements for a Vertical School Case Study: Kaka'ako*, (ProQuest Dissertations Publishing, 2018). 26,30.

²⁶ Ibid., 26,30.

²⁷ Arleen Dodd-Nufrio, "Reggio Emilia, Maria Montessori, and John Dewey: Dispelling Teachers' Misconceptions and Understanding Theoretical Foundations,". Early Childhood Education Journal 39(4) (2011): 235-237.

²⁸ Dudley Barlow, *The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning* (Ann Arbor: Prakken Publications, Inc, 2012).

²⁹ Kellie Dowdell and Tonia Gray and Karen Malone, "Nature and its influence on children's outdoor play". Australian journal of outdoor education 15(2) (2011): 24-35.

³⁰ "Curriculum Connections: Outdoor Learning," Australian Curriculum (ACARA), accessed September 7,2020. https://www.australiancurriculum.edu.au/resources/curriculum-connections/portfolios/outdoor-

learning/?searchTerm=Curriculum+Connections%3a+Outdoor+Learning#dimension-content

³¹ Son Truong, and Michael Singh and Carol Reid and Tonia Gray and Kumara Ward, "Vertical schooling and learning transformations in curriculum research: points and counterpoints in outdoor education and sustainability," Curriculum Perspectives 38(2) (2018): 181-186.

³² Kellie Dowdell and Tonia Gray and Karen Malone, "Nature and its influence on children's outdoor play". Australian journal of outdoor education 15(2) (2011): 24-35.

³³ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.

³⁴ Brian Wattchow and Geraldine Burke and Amy Cutter-Mackenzie, "Environment, place and social ecology in educational practice, in Environment, place and social ecology in educational practice," (paper presented at the AARE Annual Conference, Brisbane, 2008).

³⁵ Mohsen Ghasemi Ariani and Fatemeh Mirdad, "The Effect of School Design on Student Performance," International Education Studies 9(1) (2015): 175.

³⁶ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.

³⁷ Gill Tim, "The Benefits of Children's Engagement with Nature: A Systematic Literature Review," Children Youth and Environments 24(2) (2014) 10-34.

³⁸ Katherine King and Andrew Church, "We Don't Enjoy Nature like That: Youth Identity and Lifestyle in the Countryside," Journal of Rural Studies 31 (2013): 67-76.

³⁹ Shawn Renee Hordyk and Marion Dulude and Mary Shem, "When nature nurtures children: nature as a containing and holding space," Children's Geographies13(5) (2014) 1-18.

⁴⁰ Sabirah Adams and Savahl Shazly, *Children's Discourses of Natural Spaces: Considerations for children's Subjective Well-Being.* (Child Indicators Research, 2017). 10(2): p. 423-446.

⁴¹ Helen Little, *Outdoor Learning environments : spaces for exploration, discovery and risk-taking in the early years*, editors Sue Elliott and Shirley Wyver (Sydney: Allen & Unwin, 2017).

⁴² Richard Louv, "The more high-tech our schools become, the more they need nature," Science and children 49(7) (2012): p. 8.

⁴³ Helen Little, *Outdoor Learning environments : spaces for exploration, discovery and risk-taking in the early years*, editors Sue Elliott and Shirley Wyver (Sydney: Allen & Unwin, 2017).

⁴⁴ Anne R. Schutte and Julia C. Torquati and Heidi L. Beattie, "Impact of Urban Nature on Executive Functioning in Early and Middle Childhood". Environment and behavior 49(1), (2016): 3-30.

⁴⁵ Stephen Kaplan, "The restorative benefits of nature: Toward an integrative framework," Journal of environmental psychology 15(3) (1995): 169-182.

⁴⁶ Son Truong, and Michael Singh and Carol Reid and Tonia Gray and Kumara Ward, "Vertical schooling and learning transformations in curriculum research: points and counterpoints in outdoor education and sustainability," Curriculum Perspectives 38(2) (2018): 181-186.

⁴⁷ Ming Kuo and Michael Barnes and Catherine Jordan, "Do Experiences With Nature Promote Learning? Converging Evidence of a Cause-and-Effect Relationship", Frontiers in psychology 10, (2019): 305

⁴⁸ Nancy M. Wells, et al., "The Effects of School Gardens on Children's Science Knowledge: A randomized controlled trial of low-income elementary schools," International journal of science education 37(17) (2015): 2858-2878.

⁴⁹ Sangay Jamtsho, *Implementing a whole-school approach to student wellbeing: a study examining the implementation experiences of Bhutanese and Australian teachers in wellbeing leadership roles* (Melbourne: Graduate School of Education, 2015)

⁵⁰ Julian Fraillon, *Measuring student well-being in the context of Australian schooling : discussion paper*, editor J. Fraillon (Carlton South Vic: MCEETYA, 2004)

⁵¹ Toni Noble and Tim Wyatt and Robert Carbines and Leone Robb, *Scoping study in approaches to student wellbeing - Final report* (Canberra: DEEWR, 2008)

⁵² Ibid., 2008.

⁵³ OECD, PISA 2015 Results (Volume III) Students' Well-being (Paris: OECD Publishing, 2017).

⁵⁴ Ibid., 2017.

⁵⁵ Son Truong, and Michael Singh and Carol Reid and Tonia Gray and Kumara Ward, "Vertical schooling and learning transformations in curriculum research: points and counterpoints in outdoor education and sustainability," Curriculum Perspectives 38(2) (2018): 181-186.

⁵⁶ Clare Newton, "Vertical schools on the rise in Australian cities," Architecture Australia 108(5) (2019): 86-91.

⁵⁷ Son Truong, and Michael Singh and Carol Reid and Tonia Gray and Kumara Ward, "Vertical schooling and learning transformations in curriculum research: points and counterpoints in outdoor education and sustainability," Curriculum Perspectives 38(2) (2018): 181-186.

⁵⁸ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.

⁵⁹ "Loreto Mandeville Centre," accessed January 14, 2020, https://architectus.com.au/projects/mandeville-centre-loreto/.

⁶⁰ "Early Learning Village, Singapore Building Design," accessed January 14, 2021, https://www.e-architect.com/singapore/early-years-village-singapore-building.

⁶¹ "South Melbourne Primary School: The school with no classrooms," accessed January 17, 2021, https://www.architectureanddesign.com.au/projects/education-research/south-melbourne-primary-school-the-school-with-no#.

⁶² "Royal Far West," accessed January 14, 2021, https://architectus.com.au/projects/royal-far-west/.

⁶³ "Gray Puksand on the design challenges of Prahran's vertical school," accessed January 17, 2021, https://www.australiandesignreview.com/architecture/gray-puksand-design-challenges-prahrans-vertical-

school/?utm_source=newsletter&utm_medium=email&utm_campaign=ADR_19_June_2019_ID25463.

⁶⁴ Isın Can and Tim Heath, "In-between spaces and social interaction: a morphological analysis of Izmir using space syntax," Journal of Housing and the Built Environment 31(1) (2016): 31-49.

⁶⁵ Fergus Nicol and Elizabeth Wilson and Anja Ueberjahn-Tritta and Leyon Nanayakkara and Maria Kessler, "Comfort in outdoor spaces in Manchester and Lewes, UK" (*UK:* Oxford Brooks University, 2006).

⁶⁶ "The 'NATURE' of new school design – an evolving concept," Architectus, accessed January 11, 2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.

67 Ibid., 2021.

68 Ibid., 2021.

⁶⁹ Creating excellent primary schools: A guide for clients, (London: Commission for Architecture and the Built Environment, 2010).

⁷⁰ Clare Newton, "Vertical schools on the rise in Australian cities," Architecture Australia 108(5) (2019): 86-91.

⁷¹ Creating excellent primary schools: A guide for clients, (London: Commission for Architecture and the Built Environment, 2010).

BIBLIOGRAPHY

- Adams, Sabirah, and Shazly Savahl. "Children's Discourses of Natural Spaces: Considerations for Children's Subjective Well-Being." *Child Indicators Research* 10, no. 2 (2017): 423-46. https://doi.org/10.1007/s12187-016-9374-2.
- Architects, OWP/P, VS Furniture, and Bruce Mau Design. *The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning.* Vol. 25: Book News, Inc., 2010.

Ariani, Mohsen Ghasemi, and Fatemeh Mirdad. "The Effect of School Design on Student Performance." International Education Studies 9, no. 1 (2015): 175. https://doi.org/10.5539/ies.v9n1p175.

Armitage, Marc. "The Influence of School Architecture and Design on the Outdoor Play Experience within the Primary School." *Paedagogica historica* 41, no. 4-5 (2005): 535-5<35-53. https://doi.org/10.1080/00309230500165734.

Australian Curriculum, Assessment and Reporting Authority (ACARA). Curriculum Connections: Outdoor Learning, 2017.

Barlow, Dudley. "The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning." 71. Ann Arbor: Prakken Publications, Inc, 2012.

Can, Işın, and Tim Heath. "In-between Spaces and Social Interaction: A Morphological Analysis of Izmir Using Space Syntax." *Journal of Housing and the Built Environment* 31, no. 1 (2016/03/01 2016): 31-49. https://doi.org/10.1007/s10901-015-9442-9. https://doi.org/10.1007/s10901-015-9442-9.

Chawla, Louise. "Benefits of Nature Contact for Children." *Journal of planning literature* 30, no. 4 (2015): 433-52. https://doi.org/10.1177/0885412215595441.

- Dodd-Nufrio, Arleen. "Reggio Emilia, Maria Montessori, and John Dewey: Dispelling Teachers' Misconceptions and Understanding Theoretical Foundations." *Early Childhood Education Journal* 39, no. 4 (2011): 235-37. https://doi.org/10.1007/s10643-011-0451-3.
- Dowdell, Kellie, Tonia Gray, and Karen Malone. "Nature and Its Influence on Children's Outdoor Play." Australian journal of outdoor education 15, no. 2 (2011): 24-35.
- "The 'Nature' of New School Design an Evolving Concept." Architectus, 2019, accessed 11.01.2021, https://architectus.com.au/insight/the-nature-of-new-school-design-an-evolving-concept/.
- "Early Learning Village, Singapore Building Design." e-architect, 2018, accessed 14.01.2021, 2021, https://www.e-architect.com/singapore/early-years-village-singapore-building.
- Environment, Commission forArchitecture and the Built. *Creating Excellent Primary Schools: A Guide for Clients.* 2010. https://www.designcouncil.org.uk/sites/default/files/asset/document/creating-excellent-primaryschools_2.pdf.
- Fraillon, Julian. *Measuring Student Well-Being in the Context of Australian Schooling : Discussion Paper.* Edited by J. Fraillon. Carlton South Vic: MCEETYA, 2004.
- "Gray Puksand on the Design Challenges of Prahran's Vertical School." Australian Design Review, 2019, accessed 17.01.2021, https://www.australiandesignreview.com/architecture/gray-puksand-design-challenges-prahrans-vertical-

school/?utm_source=newsletter&utm_medium=email&utm_campaign=ADR_19_June_2019_ID25463.

Hordyk, Shawn Renee, Marion Dulude, and Mary Shem. "When Nature Nurtures Children: Nature as a Containing and Holding Space." *Children's Geographies* 13, no. 5 (2014): 1-18.

https://doi.org/10.1080/14733285.2014.923814.

- Jamtsho, Sangay. "Implementing a Whole-School Approach to Student Wellbeing: A Study Examining the Implementation Experiences of Bhutanese and Australian Teachers in Wellbeing Leadership Roles." Doctor of Philosophy, the University of Melbourne 2015. http://hdl.handle.net/11343/59152.
- Kaplan, Stephen. "The Restorative Benefits of Nature: Toward an Integrative Framework." *Journal of environmental psychology* 15, no. 3 (1995): 169-82. https://doi.org/10.1016/0272-4944(95)90001-2.
- Kim, David. "Vertical School: A New Typology for the City." ProQuest Dissertations Publishing, 2017.
- King, Katherine, and Andrew Church. ""We Don't Enjoy Nature Like That": Youth Identity and Lifestyle in the Countryside." *Journal of Rural Studies* 31 (2013): 67-76. https://doi.org/10.1016/j.jrurstud.2013.02.004.
- Kuo, Ming, Michael Barnes, and Catherine Jordan. "Do Experiences with Nature Promote Learning? Converging Evidence of a Cause-and-Effect Relationship." [In eng]. *Frontiers in psychology* 10 (2019): 305-05. https://doi.org/10.3389/fpsyg.2019.00305.
- Landvoigt, Charlotte. "John Dewey's Concept of the Child." ProQuest Dissertations Publishing, 1986.
- Leatherbarrow, David. Uncommon Ground: Architecture, Technology, and Topography. Cambridge, Mass: MIT Press, 2000.
- Little, Helen. Outdoor Learning Environments : Spaces for Exploration, Discovery and Risk-Taking in the Early Years. Edited by Sue Elliott and Shirley Wyver. Sydney: Allen & Unwin, 2017.
- "Loreto Mandeville Centre." accessed 14.01.2020, https://architectus.com.au/projects/mandeville-centre-loreto/.
- Louv, Richard. "The More High-Tech Our Schools Become, the More They Need Nature." *Science and children* 49, no. 7 (2012): 8.
- Newton, Clare. "Vertical Schools on the Rise in Australian Cities." Architecture Australia 108, no. 5 (2019): 86-91.
- Nicol, Fergus, Elizabeth Wilson, Anja Ueberjahn-Tritta, and Leyon Nanayakkara. "Comfort in Outdoor Spaces in Manchester and Lewes, Uk." (01/01 2006).
- Noble, T., McGrath H., Wyatt T., Carbines R., Robb L. Scoping Study in Approaches to Student Wellbeing Final Report. Canberra: DEEWR, 2008.
- OECD. Pisa 2015 Results (Volume lii) Students' Well-Being. 2017.
 - doi:doi:https://doi.org/10.1787/9789264273856-en.
- https://www.oecd-ilibrary.org/content/publication/9789264273856-en.
- Routledge Handbook of International Education and Development. Routledge Handbooks. Edited by Simon A. McGrath and Qing Gu. London, [England] ;: Routledge, 2016.
- "Royal Far West." Architectus, accessed 14.01.2021, 2021, https://architectus.com.au/projects/royal-far-west/.
- Sack, Manfred. *Richard Neutra.* Studiopaperback. Edited by Richard Joseph Neutra and Willy Boesiger. Zürich: Verlag für Architektur, 1992.

- Schutte, Anne R., Julia C. Torquati, and Heidi L. Beattie. "Impact of Urban Nature on Executive Functioning in Early and Middle Childhood." *Environment and behavior* 49, no. 1 (2016): 3-30. https://doi.org/10.1177/0013916515603095.
- "South Melbourne Primary School: The School with No Classrooms." Architecture and Design, 2018, accessed 17.01.2021, https://www.architectureanddesign.com.au/projects/education-research/south-melbourne-primary-school-the-school-with-no#.
- Tetsutani, Sho. "Design Elements for a Vertical School Case Study: Kaka'ako." ProQuest Dissertations Publishing, 2018.
- Tim, Gill. "The Benefits of Children's Engagement with Nature: A Systematic Literature Review." *Children Youth and Environments* 24, no. 2 (2014): 10-34. https://doi.org/10.7721/chilyoutenvi.24.2.0010.
- Truong, Son, Michael Singh, Carol Reid, Tonia Gray, and Kumara Ward. "Vertical Schooling and Learning Transformations in Curriculum Research: Points and Counterpoints in Outdoor Education and Sustainability." *Curriculum Perspectives* 38, no. 2 (2018/09/01 2018): 181-86. https://doi.org/10.1007/s41297-018-0053-y. https://doi.org/10.1007/s41297-018-0053-y.
- Wattchow, Brian, Geraldine Burke, and Amy N. Cutter-Mackenzie. "Environment, Place and Social Ecology in Educational Practice." In *Environment, place and social ecology in educational practice*, Australian Association for Research in Education, 2008.
- Wells, Nancy M., Beth M. Myers, Lauren E. Todd, Karen Barale, Brad Gaolach, Gretchen Ferenz, Martha Aitken, et al. "The Effects of School Gardens on Children's Science Knowledge: A Randomized Controlled Trial of Low-Income Elementary Schools." International journal of science education 37, no. 17 (2015): 2858-78. https://doi.org/10.1080/09500693.2015.1112048.

DESIGN AS A META-MODE OF INQUIRY FOR ADVANCING SOCIAL INNOVATION- PROBLEM-BASED LEARNING IN SERVICE DESIGN PEDAGOGY

Author: FANKE PENG

Affiliation: UNIVERSITY OF CANBERRA, AUSTRALIA

INTRODUCTION

Malpass¹ argued that design practice, 'moves away from traditional approaches that limit the design's role to the production of profitable objects, focusing instead on a practice that is interrogative, discursive and experimental'. 'The transition to a sustainable society is one of the biggest design challenges the human race has ever faced. Meeting this challenge will require countless designed solutions that will be created by people from all walks of life, using design thinking and design processes.'² Thus, design education for the 21st Century requires different skills and design educators are challenged to teach new skills, within an already packed curriculum³. Although Service Design (SD) research and practice have flourished as a discipline in recent years⁴, there is a need to reflect on the design pedagogy of SD and focus on the transition of knowledge inquiry in the process of tackling wicked problems in design 3.0 and 4.0. As service design engages with larger and complex problems, design education needs to reflect these transitions.

Richard Buchanan⁵⁶⁷⁸ introduced four orders of design, according to the levels and nature of problems: the 1st order of design involves problems of communication; the 2nd order involves problems involving the construction of products; the 3rd order involves problems of actions in activities and services; and the 4th order involves problems of integration in organisational and social systems. Elizabeth Pastor⁹ articulated the four orders of design and suggested four types of design, according to the levels of complexity: Design 1.0 Traditional Design thinking, Design 2.0 Product / Service Design thinking; Design 3.0 Organisational, Transformational Design thinking; and Design 4.0 Social, Transformation Design thinking. 'There is a need to shift attention to more contextualised research and argument around the value and limitations of service design and for the development of more effective dialogue and collaboration across disciplines and sectors; and the need to connect service design with digital innovation, social innovation, social change or policy making, opening up novel realms of investigation and raising questions that need our attention.'¹⁰

Today, service design that emphasises holistic, co-creative, multi-disciplinary and integrative characteristics, has become an important strategic means by which many organizations can drive social innovation¹¹. Through participatory action research with a Master of Design Strategies course at the University of Canberra (UC), this study is designed to reflect on semester-long projects of a postgraduate unit (Service Design), to investigate the benefits of teaching design process, as being

modes of inquiry in Problem-Based Learning (PBL). The service design projects were focused on collaboration on a variety of interdisciplinary projects, in working towards improving our current service for social innovation. The opportunities and challenges of combining service design thinking, modes of inquiry and PBL, as an instructional framework for learning and teaching, will also be revealed through the case studies and reflection.

Social innovation and design as a mode of inquiry

'Social innovation has many challenges in practice due to the complexity of stakeholders and ecological systems involved in the framework of value co-creation.'¹⁰ The same challenges apply to the teaching service design for social innovation. In addition, design driven social innovation is different from design practice in the 1st and 2nd orders 'because it focuses not only on the creation of new products or services, but also focuses on adoption and diffusion'¹².

As suggested by Sun and Runcie¹³, there is a shift, 'from a dominant industry-government dyad in the Industrial Society to a growing triadic relationship between university-industry-government in the Knowledge Society'. The value of design driven social innovation has been identified and analysed by various scholars¹⁴¹⁵¹⁶. Cruz, Rebourseau and Luisi¹⁵, provided an overview of how the idea of social innovation/entrepreneurship has emerged in the higher education systems. Service design has made a meaningful contribution to advancing social innovation¹⁷. Based on this proposition, literature has articulated rationalising the role of service design pedagogy, to innovate in the growing transition to a sustainable society. The focus of this paper is on the teaching and learning service design for social innovation in the higher education (mainly at postgraduate level).

As discussed previously, the transition toward public and third sectors and the rise of social innovation and sustainability, disrupted the traditional design education that had focused on problems of construction and communication. These fundamental transitions, 'require the exploration of new ways of teaching design effectively and efficiently, at a much broader scale and continuum of learners (K12 through post-graduate levels).¹⁸ For the service design unit of the Master course, students have to identify wicked problems, which involve complexity, uncertainty and conflict.

Identify wicked problems in the transition to a sustainable society

In traditional design education, most design students at undergraduate level were used to starting a design unit with given design briefs, which normally have well-defined problems of the 1^{st} and 2^{nd} orders of design. Our design graduates then have become excellent solvers of well-defined problems. 'However, they were uncomfortable with ill-defined, unstructured problems – the "wicked" problems for which there is no single correct answer and that characterize most innovation.'¹⁹

The wicked problems of service design are, however, not simply concerned with the creation of a new product or service. Wicked problems in the 3rd and 4th orders of design can be difficult to formulate and define and exist at various levels of the scale. This can pose a real challenge for students in recognising the requirements to identify wicked problems in the transition from 1st and 2nd order problems, to the 3rd and 4th orders. More importantly, 'creative innovation requires a high tolerance for uncertainty, confusion, paradox, and the willingness to "fail forward fast and frequently'¹⁹, which is critical for all PBL, in teaching service design at postgraduate level.

RESEARCH DESIGN

This study explored the development of students' service design thinking and learning experience, to test the value of inquiry in PBL. In this study, we aim to investigate how service design thinking, through the concept of inquiry, has influenced PBL, specifically in relation to design practice and

design pedagogy. Currently, there is a need for a more nuanced understanding of inquiry strategies in design thinking²⁰. When we start to integrate social and sustainability concerns into the PBL and an inquiry frame, it is important to reflect on the design process, which is in opposition to fast pace and narrow view of 'problem' that focuses on generating 'solutions'²¹. This study involved 8 service design projects in the Master of Design Strategies course. Due to the length of this paper, some projects and their PBL were selected, to share some insight on the topics.

Ejsing-Dunn and Skovbjerg²⁰ reviewed Dewey's²² concept of inquiry and how other scholars applied the inquiry²³²⁴²⁵²⁶. They then proposed three modes of design inquiry, these being, Process (Reflective Practitioner), Design-Based Research (DBR) and Politics (Critical Design). In our service design practice and teaching service design for the Master of Design Strategies course, students are encouraged to understand the three modes of inquiry and to combine them in their design practice and research, to achieve the fourth mode – a meta-mode of inquiry, which Ejsing-Dunn and Skovbjerg¹⁴ suggested should be incorporated in their future teaching design. This research design aims to elaborate on and reflect the meta-mode of inquiry for design pedagogy, at post-graduate level.

In order to review the students' progress and performance in the service design unit (2019-2020), the three modes of inquiry were used to evaluate the students service design thinking and process in the PBL. The core teaching team also aims to support the students who are struggling to work with ill-defined problems, in the initial stages of their design process, by providing this self-checking framework. The design students were used to starting a project for clients' problems, and aimed to solve issues for the target groups (sometimes as requested in the design brief). As a result, they aren't familiar with critical service design that asks questions about the meaning and value of design actions, the methods employed in the practice and the people and living things that are excluded or exploited by certain design actions. This study added to the current research on pedagogical implementation of the modes of design inquiry.

DISCUSSION AND REFLECTION

The theme of the service design unit concerns the role of transformative service design, in leading change in times of disruption, crisis and transition. The topics are broadly construed as including service challenges that range from, 'safe grocery shopping service during the period of pandemic', 'bushfire recovery', 'improving youth mental health and wellbeing', 'sustainable tourism', to 'sustainable e-commerce packing'. This study identified three major challenges confronting students, in pursuit of a meta mode of inquiry. They are: 1. Discover and define wicked problems for social innovation. 2. Engagement with key stakeholders. 3. Design for a possible future: from creative thinking to critical service design.

Discover and define the wicked problems for social innovation

Although most of the students in the service unit had training and project experience of design thinking as an iterative process, 'the students' process from problem to solution was short and that they struggled to reconsider the problem, most likely because they had already developed a possible solution or solutions.'²⁰

For example, there is a student project on bio-design, to make sustainable lighting service on campus. Early in the process (the discover and define stages of the design process), the student quickly developed a design concept – a bio-design road lamp for lighting paths on campus. She then spent much time just trying to explore the materials that she could use for prototyping, as her focus was mainly on finding the perfect solution for a specific problem (in the 2^{nd} order of design). Although the core teaching team encouraged her to explore the problems from various perspectives, the student

stuck to the concept throughout the process, without questioning whether the problem had evolved. When students focused primarily on the design as an object and solution, they failed to use the design process to explore and experiment with different ideas and concepts. The result was that, their inquiry was unable to address the real problems in our society, which is the core for PBL in the service design unit.

Nonetheless, there were students who successfully managed to turn a solution focused design inquiry into a meta-mode of inquiry. A student started her project on how might we tackle the environment and health problems caused by using the grocery shopping trolley. As the project developed, she soon realised the interlinked wicked problems within the service system, which could not be solved by simply redesigning the shopping trolley. The problems include: returning a trolley, remains an inconvenience and is particularly difficult for shoppers who have no choice but to use public transport to do their shopping. Trolley dumping is a relentless, ongoing phenomenon, despite the diverse range of strategies and legislation adopted over the years, which have cost supermarkets and local councils millions of dollars each year just to keep it under control. Aside from shoppers who are only buying for themselves, there are those who do not mind shopping more regularly. She then looked into how customers can avoid using a shopping trolley and how to use the online grocery shopping service (Figure 1) offered by a range of major retailers, especially during a pandemic, when social distancing and sanitization have never been more important.



Figure 1. Students using Roses, Buds & Thorns Method to compare in-person and online grocery shopping journey

Engagement with key stakeholders

Service design thinking values the co-creation process of multi-disciplinary stakeholders because of their diverse viewpoints and backgrounds. However, it's also a challenge to engage the key stakeholders in the process¹², especially for a semester long student project. The DBR (the second mode of inquiry) was used as a pedagogical approach, to enhance cooperation, communication and ideation.

As Ejsing-Dunn and Skovbjerg²⁰ identified, 'when using DBR as a pedagogical approach, there's some difference between the research context and students using DBR in a learning context. Normally design researchers are often working in fields very familiar to them'. The first step for the students in DBR is to understand the fieldwork. They began this process by collecting both primary and secondary data for their PBL. When collecting the primary data, students are required to involve key

stakeholders, from the beginning of the design process. During the COVID lockdown, the students were creative to use social media for stakeholder engagement. A student put up a Facebook post asking members of the Simple Savers group in Australia to share their preferred grocery shopping method(s) and comment on what works or doesn't work for them. She soon received 77 comments (Figure 2). From the 77 comments generated by the post, a total of 60 responses were identified as original and relevant, which allowed for her primary trend analysis.

	Sunday at 19	:28 • 🥥	
Hi All, ju grocery grocerie the mar online? around unsure stressfu time wo etc. Wh	ist wanted shopping es at the su kets? Non- l'm frankly each week what will bu il! And l'm rk, 3 kids, at works fo	to find what every method is? Do you permarket? Do you perishables online over pushing a ver as I shop for a fam e more cost effecti very time poor of c study, hubby with I or you? Or what doe	one's preferred do all your do fruit/veg at ? Everything y full trolley illy of 5 but ve and less ourse with full his own business esn't work if you
feel like	a rant 🤕	thanks!	
16 🚺			77 comments
ഗ്	Like		🖒 Share
	I work at woolies, but still do my groceries online and pick up when I finish work (find I don't spend as much plus time plays a factor too) then just top up as we go, milk and bread. Meat we always bulk buy from butcher's.		
•	2 d Like online ex fruit and crowds a woolies a me and s workers. my supp- health	Reply cept meat, Coles vege. i suffer any and doing the mai and having it deliv saves time with m i can do other the ort that look after	1 🕐 specials and kiety in n shop with vered saves by support ings during r my mental
	2 d Like	Reply	3 🖒

Figure 2. Students use social media for stakeholder's engagement

Unlike the design researchers, who have some contacts in the field, students need to build their network in a new domain. The core teaching team provided some useful connections to the students. It

is, however, the responsibility of the students to maintain build and maintain relationships and be active in the process, to make progress, and actively engage in the conversation. The core teaching team also invited industry partners to give a presentation at the beginning of the unit, who could potentially be involved in the students' project-based learning. 'There's an important difference to notice while researchers focus on producing new knowledge and work collaboratively, with key stakeholders. The students are more focused on solving the issue for the clients. In this context, the students' knowledge of domain is crucial for both clients and their own learning process.'²⁰

Students 'must stretch beyond the confines of what they may be comfortable and familiar with'²⁷, to achieve critical engagement, because of the amount of work required in collecting primary and secondary data to establish the knowledge for the domain (multidisciplinary). The core teaching team noticed the length of time required for the knowledge inquiry, and encouraged students to extend their project from a semester long unit and go further. This also means that, they can carry on applying their domain knowledge for different units in the subsequent semesters, as in that way, they can deepen their knowledge and become able to invite stakeholders to be a part of the disruption and to influence social innovation.

A possible future: from creative thinking to critical service design

Students were encouraged to consider the policy-making in their chosen domain, through a critical service design (the third mode of inquiry). Dunne & Raby²⁸ proposed the concept of speculative design and the practice of it in four types of future cone, these being, probable, preferable, plausible and possible. Among the four types of future cone /scenario, designers are normally practicing towards a probable future. In the possible scenarios, 'we develop we believe, first, they should be scientifically possible and second, there should be a path from where we are today, to where we are in the scenario. A believable series of events, that led to a new situation is necessary, even if entirely theoretical. This allows viewers to relate the scenario to their own world and to use it as an aid for critical reflection.'



Figure 3. Student's research poster, for the "Youth mental health in Australia" project

In this context, a student project proposed improving youth mental health and wellbeing, through service design thinking (Figure 3). Youth mental illness is a significant social issue, impacting on millions of young Australians each year²⁹. The student identified that, the Australian Government's initiatives are underutilised by young people and there are a number of barriers apparently limiting

access and uptake. She proposed to reconsider the mental health service offered and improve its effectiveness in bettering mental health outcomes for young Australians, through easier access to information, new training for teachers in mental health and more funding for school counsellors. Through working critically, analysing the insights and findings from the literature and interviews, a better solution was developed, to improve the mental health service offered to young Australians. Better, more streamlined communication through a digital platform for information and resources is recommended, coupled with an Instagram page targeted at engaging with young people, plus, a campaign with downloadable and printable resources to help raise awareness.

In the PBL, each of the three modes of inquiry is a valuable approach to knowledge. 'For the future of university design pedagogy, students must be able to manage a broader repertoire of inquiry practices.'²⁰ Design and design pedagogy must, 'challenge the status quo by facilitating other types of encounters, conversations, imaginaries, and giving voice to people, things, and animals otherwise marginalized'³⁰.

CONCLUSION

This study reviewed the PBL in the service design unit. The core teaching team tested the application of the theoretical framework - three modes of inquiry, to guide the students' service design thinking for social innovation. As evidenced in the students' project, the students who applied, reflected and combined the three modes as a meta-mode of inquiry, achieved more in their projects.

It is important to explore and discuss the concept of wicked problems with students, at the beginning of the unit. The concept itself may seem easy to understand, however, the discovery and definition process of wicked problems for a complex society is challenging in a semester unit. The application of design processes, as modes of inquiry, provided a practical strategy for the students' self-reflection in their design journey. This helped to prepare them for the transition from designing a tangible thing, to designing an intangible service. When considering design for social innovation and sustainability, there are often no clearly defined problems and there may be no total solution.

Engagement with stakeholders is also a crucial part of the service design process, which is another challenge in the students' PBL. We looked into this challenge, through the lens of students. Stakeholder's engagement became a way of collecting primary data, listening to others and managing the complexity of the process. 'In an increasingly diverse, global society, this ability to engage with the ideas of others is especially crucial to democratic citizenship.'³¹

The three basic modes of design inquiry provided an inquiry strategy for Master students to understand the difference involved in the transition from product/solution driven design process at undergraduate level, to a critical design driven and knowledge inquiry mode at postgraduate level. Unlike finding quick solutions by reapplying their expertise and experience for one defined problem, the PBL in the postgraduate unit, encourages the meta-mode of inquiry, due to the social complexity and disciplinary boundaries. With the combined framework, students can go through the hard transition, and learn how to tackle real problems, for a possible future with social innovation.

NOTES

¹ Malpass, M. Critical Design in Context: History, Theory, and Practice, (Bloomsbury, 2017).

² Irwin, T., Tonkinwise, C., Kossoff, G, and Scupelli, P. "Transition Design," (Carnegie Mellon Design 2015). accessed 21 November, 2020, https://design.cmu.edu/sites/default/files/Transition_Design_Monograph_final.pdf.

³ Scupelli, P., Stuart, C. and Brooks, J. "Teaching Futures: Trade-offs Between Flipped Classroom and Design Studio Course Pedagogies," International Association of Societies of

Design Research Conference 2019

⁴ Sun, Q. "Towards a New Agenda for Service Design Research." The Design Journal 23(1) (2020): 49-70. doi: 10.1080/14606925.2019.1694808

⁵ Buchanan, C., Junginger, S., & Terrey, N, Service Design in Policy Making. In D. Sangiorgi & A. Prendiville (Eds.), Designing for Service: Key Issues and New Directions. (London: Bloomsbury 2017).

⁶ Buchanan, R. Myth and Maturity: Toward a New Order in the Decade of Design. Design Issues 6, no. 2 (1990): 70-80.

⁷ Buchanan, R. Wicked Problems in Design Thinking. Design Issues 8, no. 2 (1992): 5-21.

⁸ Buchanan, R. Design Research and the New Learning. Design Issues 17, no. 4 (2001): 3-23.

⁹ Pastor, E. "The other Design Thinking," (Design Thinkers Conference, Toronto, 2013).

¹⁰ Sangiorgi, D. "Transformative Services and Transformation Design." International Journal of Design 5, no. 1 (2010): 29–40. Retrieved from http:// www.ijdesign.org/ojs/index.php/IJDe sign/article/view/940/344

¹¹ Yang, C. F., & Sung, T. J. Service design for social innovation through participatory action research. International Journal of Design 10, no. 1 (2016): 21-36.

¹² McKeown, M. *The truth about innovation* (Upper Saddle River, NJ: Prentice Hall 2008).

¹³ Sun, Q and Runcie, C, "Is Service Design in Demand," Design Management Journal 11, no. 1 (2017): 67-78. ISSN 1948-7169

¹⁴ Fabrizio C, and Idil G, "Evolution of design for sustainability: From product design to design for system innovations and transitions," Design Studies, Volume 47 (2016): 118-163,

¹⁵ Cruz, P. R., Luisi, A. and Rebourseau. V. Social Innovation and Higher Education in the BRICS (2): a multiscalar governance approach with evidence from DESIS Labs (BPC Papers 5, no. 3 (2018).

¹⁶ Manzini, E., Staszowski, E. (2013). Public and collaborative. Exploring the intersection of design, social innovation and Public Policy. Desis Network.

¹⁷ Manzini, E. Design, *When Everybody Designs: An Introduction to Design for Social Innovation* (Cambridge, MA: MIT Press (2015).

¹⁸ Scupelli, P., Stuart, C. and Brooks, J. "Teaching Futures: Trade-offs Between Flipped Classroom and Design Studio Course Pedagogies," International Association of Societies of Design Research Conference 2019

¹⁹ Irwin, T., Tonkinwise, C. and Kossoff, G. "Transition Design: An Educational Framework for Advancing the Study and Design of Sustainable Transitions," (Carnegie Mellon Design 2015).

²⁰ Ejsing-Duun, S. and Skovbjerg, H.M., Design as a Mode of Inquiry in Design Pedagogy and Design Thinking. Int J Art Des Educ, 38 (2019): 445-460. https://doi.org/10.1111/jade.12214

²¹ Irwin, T. "Wicked Problems and the Relationship Triad," Grow Small, Think Beautiful: Ideas for a Sustainable World from Schumacher College, (Floris Books 2012).

²² Dewey, J. Logic: The Theory of Inquiry (New York: Holt, Rinehart and Winston 1938).

²³ Schön, D.A. Educating the reflective practitioner: Toward a new design for teaching and learning in the professions. (San Francisco, Cal: Jossey-Bass 1990).

²⁴ Schon, D. A. (1983) The Reflective Practitioner: How Professionals Think in Action. London: Temple Smith.

²⁵ Barab, S. & Squire, K. Design-based research: putting a stake in the ground, Journal of the Learning Sciences, Vol. 13, No.1 (2004), pp. 1–14.

²⁶ DiSalvo, C. Design and the construction of publics, Design Issues, Vol. 25, No. 1 (2009), pp. 48–63.

²⁷ Graff, G. and Birkenstein, C. They Say, I Say: The Moves That Matter in Academic Writing. Gildan Media, 2006:28

²⁸ Dunne, A, and Fiona, R. *Speculative Everything: Design, Fiction and Social Dreaming*, Cambridge MA: The MIT Press 2013.

²⁹ Australian Bureau of Statistics 2008, 4326.0 - National Survey of Mental Health and Wellbeing: Summary of Results, 2007, Retrieved 28 August 2020,

https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4326.0Main+Features32007?OpenDocument

³⁰ Kjearsgaard, M. et al. "Introduction," Design Anthropological Futures. New York: Bloomsbury, 2016: 13.
 ³¹ Graff, G. and Birkenstein, C. They Say, I Say: The Moves That Matter in Academic Writing. Gildan Media, 2006.

BIBLIOGRAPHY

Buchanan, R. "Surroundings and Environments in Fourth Order Design," Design Issues 35, no. 1 (2019): 4-22.

Manzini, E. Small, "local, open, and connected: design for social innovation and sustainability," The Journal of Design Strategies 4, no. 1 (2010): 8-11.

Jacobs, Jessica. "Designing Equitable Futures," Design Management Review 31, no. 3 (2020), 30–36. https://doi.org/10.1111/drev.12238

Kincheloe, J.L. and McLaren, P. Rethinking critical theory and qualitative research. In Key Works in Critical Pedagogy. Brill, 2011.

Manzini, E. "Making things happen: Social innovation and design," Design Issues 30, no.1 (2015): 57-66.

Martin, R. L. *The Design of Business: Why Design Thinking Is the next Competitive Advantage*. Boston, MA: Harvard Business 2009.

Mazo, D. What a strategic designer does. Strategic Design Lab. Retrieved November 19, 2016, https://medium.com/strategic-design-lab/what-a-strategic-designer-does.

Meroni, A. (Ed.). Creative Communities. People inventing new ways of living. (Milan: POLI.design 2007).

Meroni, A. Strategic design: where are we now? Reflections around the foundations of a recent discipline. Strategic Design Research Journal 1, no. 1 (2008), 31-38.

Meroni, A., Fassi, D. & Simeone, G. Design for social innovation as a form of designing activism. An action format. NESTA (ed.) Social Frontiers: The next edge of social innovation research. Retrieved January 12, 2014, http://www.nesta.org.uk/event/socialfrontiers.

THE ANSWERS TO THE QUESTIONS OF TODAY LIE WITHIN LANDSCAPE ARCHITECTURE

Author: MOJTABA HASSANZADEH

Institution: UNIVERSITY OF MANITOBA, CANADA

INTRODUCTION

This essay addresses the procedures involved in creative question-making in landscape architecture pedagogy. A goal of landscape architectural education is to educate creative and holistic landscape designers who can think *beyond* the scope of their design programs, enabling their design intuition and ideas to become explicitly accessible and enacted in the creation of spaces for those who dwell in the built landscape. This discipline seeks to promote ways of living harmoniously within nature whether in rural or urban environments; thus, it aims to promote nature-human relationships to a fitter, sustainable, and regenerative trajectory for the future. The inclusiveness of a well-designed environment closely relates to how spaces embrace humans, assisting one to embrace the built and natural environments with pleasure, grace and harmony.

However, these aspirations are not easily achieved in landscape architecture. Questions in landscape architecture are conditioned by a plethora of socio-cultural, historical, and environmental factors, which are all in a highly dynamic state. These factors, along with global environmental challenges, work to make the teaching of landscape architecture very challenging. Questions re-frame interests. So, what questions are *relevant* today?

An educational time-frame of five years is essential at schools of landscape architecture to develop a comprehensive understanding of the past and possible prospects to make environmental inquiries *relevant* for the future. The role of landscape educators is to encourage and cultivate creative thinking tools and methods, which many academic research publications offer, for landscape design students to develop before entering the profession.

This work argues that a focus of landscape architectural education on *relevant* question-making and thinking skills to creatively intensify the relationship between the known and unknown environmental questions in the design process is critical. *Creative* and *relevant* question-making, or thinking skills have inherent characteristics appropriate to multilateral subjects embedded within landscape architecture. These qualities contribute to educational disciplines that seek exposure to challenging aspects of a subject, which are open to multiple interpretations. This essay argues with urgency, for the inclusion of creative question development skills, in both academic research and the design process, as a *relevant* objective in landscape architecture.

CREATIVE VERSE RELEVANT AS AN IMAGINATIVE MIND-PROJECT

Creativity and creative acts are generally paired with innovation, forming and making something new,¹ and less as an *orchestral score* of human cognition in the process of thinking.² This deficiency in defining creativity is tangible in the education of landscape architecture,³ and more often than not, in professional practice. Throughout the design process, a practice that begins with a design question (question-matter) with an expectation of a response met by specific deadline (time-matter), the inevitable rushed enthusiasm for *solving* a design issue works to create boundaries around *imaginative thinking procedures*. The conventional and critical determinants of many landscape design creative processes are both the time-matter and the functional-matters vying each other, urging the designers to approach design questions by Cartesian means through pragmatic and reductive forms and methods.⁴ This inquiry argues for *creative question-making and critical thinking skills* as an interpretation of *relevant creativity*, defined by a collective embedded within cultural contexts,⁵ contributing to our understanding of *relevant questions* in landscape education.

The understanding of creative questions as an alternative to current approaches meant to encourage original imaginative design, aims to emerge as a critical, relevant approach to creativity and inquiry, to become an indispensable factor of the design process in landscape architectural education. This interpretation of creative questioning frames *critical relevant* questions as being *inclusive*, rooted from and embedded within an immediate socio-cultural context, and *imaginative*, going *beyond* the already known. Pertinent questions in landscape design could lead *relevant* and *imaginative* interests within the educational and project context. Thus, developing *creative and relevant questions* in the landscape design process finds its utmost value in the pedagogy of the discipline.

James Corner has stated that, "cultural ideas condition construction" and construction in return "conditions the play of landscape ideas in a larger cultural imagination".⁶ Socio-cultural *inclusiveness* of landscape means and ideas within human imagination contribute to the meaning of space,⁷ making ideas relatable,⁸ and thus *relevant*. The socio-cultural account of *imagination* in the psychology of creative thoughts grounds *question-making* as an interpretation of creativity.⁹ In the text, *Imagination in Human and Cultural Development*, "imagination" is described as a loop of momentary "disengagement" with human's proximal experiences.¹⁰ Imagination is "disengaging from the here-and-now of a proximal experience, which is submitted to causality and temporal linearity, to explore, or engage with alternative, distal experiences, which are not submitted to linear or causal temporality. An imagination event thus begins with a decoupling of experience and usually concludes with a recoupling".¹¹ Moreover, in Bergson's philosophy of perception, imagination is defined as connectormatter, a mediator, working in between image-matters (an observed-idea), perception-matters (a mind-idea), and memory-matters (a memory-idea),¹² thus ground in the *imaginative* projects of the mind as real, existent, and acting and reacting upon the object-world.¹³

Acknowledging reductive definitions of a creative action in spatial design as making newer pragmatic *forms* that *could* respond to the functionality of a design, might have imperiled landscape education to compromise the design's functional scopes to be read as creative work,¹⁴ rather than seeking the creative skills, thoughts, and impacts of landscape architecture in its educational objectives.

Inclusive Questions

The fallacy of *new forms*, the physical entity of objects, being indulged as *meaning* itself is rooted in modern arts.¹⁵ Modern art movements have engendered the idea that any *form* could be appreciated through any media and its meaning could survive through the test of time.¹⁶ In respect to architectural space, a good *space* was found in good *forms*, Corner reasons.¹⁷ In respect to new forms in landscape architecture, he stated, "This [new formalistic space] was a crystalline product of the Enlightenment,"

that could produce efficient landscapes, "practical for the user, and aesthetically pleasing, yet often strangely empty, without depth, mystery, or qualities of anything other than functional".¹⁸ *Space*, as "autonomous sets of Cartesian coordinates, floating infinitely, without context or place," being emptied of any referential meaning, "was put forth as a substitute for the continuity of lived experience".¹⁹ Corner characterized the landscapes of Gabriel Geuvrekian and Fletcher Steele as instances of such gardens.²⁰

The division between function and beauty of the object-world as one of the legacies of Cartesian thinking has weakened the role the discipline of landscape architecture could play in the quality of human life,²¹ and in healing their harmful impacts on nature.²² The highly engineered and objectified responses to the observed, noted, and measured phenomena of the world reflect humans' shift in understanding natural spaces as objects to own and modify for their "profit and gain only".²³ The Cartesian worldview prevalent in every layer of modern human life, associating the notion of creativity with "appropriateness, usefulness, or meaningfulness" in the psychology of human thoughts,²⁴ frames a paradoxical trajectory for the discipline. Landscape architecture aims to respond to humans' fundamental needs within their context by establishing comprehensive designed settings for life to unfold. However, involuntarily adhering to a Cartesian worldview has created an ambiguous climate in landscape pedagogy, making the borders between *creative works* and *relevant creative works* most often difficult to distinguish in the time-limited process in the schools of landscape architecture. Nevertheless, in responding to global environmental warnings as *relevant* issues today, critical creativity and creative acts could recapture their true meanings. From landscape design's perspective, the questions change to *what is relevant*?

The *inclusiveness* of projects created and experienced through meaningfully designed spaces demarcates the value of landscape projects within human hopes and imagination.²⁵ Moreover, inclusive landscape designs embrace humans in their totality as a safe home to dwell within,²⁶ to contribute to its meaning from use,²⁷ while protecting people from harm. Acknowledging landscape architecture's role in framing humans dwelling habits within built environments at macro scales, "as a setting for society [...] a reflection or expression of hopes and fears for survival and social perpetuation,"²⁸ not reducing projects to isolated modifications upon the land, but raising the question of what a critical *relevant* creativity could mean, may find its paramount value within landscape education.

Creative and Relevance; a Psychological Perspective

Extolling landscape inquiries as *relevant* does not necessarily render them creative. Nor are all creative questions always *relevant*; conversely, a critical collision between *relevant* and *creative* questions captivates what this essay is trying to convey. *Relevant* questions of landscape design address the issues at stake in the immediate physical and cultural context. *Creative* questions of landscape could be framed as *accruing layers* throughout the design process.²⁹ In other words, creativity in spatial question-making in the landscape design process is an *ever-present attribute* that could be *traceable*, seeking *relevant* questions in the landscape design process emphasizes a corelation between landscape experiences being an *imaginative* project of the mind that is extensively traceable but not reducible. "Imagination is likely a necessary condition for creativity, but it is not the case that all imagination leads to creative outcomes".³⁰ The value of imagination resides in being "independent of any output, community judgment, or validation".³¹ However, the criteria for validating processes and outcomes as creative are social constructs, thus depending on the given socio-cultural conditions and prospects of a society.³²

The purpose of posturing these statements is to situate the characteristics of *relevant* questions in the imaginative-creative projects of the mind. Moreover, it aims to demonstrate how one *relevant* question could move toward the next; thus, such a consecutive trajectory for a design process might work toward the redefinition of design interests in landscape design.

The exchange between *relevant* and *creative* inquiries could be followed in the anthropological perspective in the psychology of creativity.³³ From an anthropological standpoint, creativity is defined as "a situated, ordinary and central feature of human beings".³⁴ This interpretation of creativity is restructured and studied as an *ecological term* in *Creativity as A Developmental Ecology*.³⁵ In ecological terms, creativity is described as "the joining of relationships in a dynamic world to find or sustain form".³⁶ Creativity is also defined as "shaping human awareness and experiences".³⁷ Finally, in this framework, creativity is characterized as the "transcendence over the totality of human experiences".³⁸ In other words, in an ecological reading of creativity, "ordinary practice and daily life" are also accepted as involving creativity.³⁹

Relevance in human decisions is grounded in a common and collective sense of judgment – a *consensus*.⁴⁰ Accordingly, through *relevant question-making skills*, landscape design education could address the *consensus*, challenge its scopes, or enrich its experience. For instance, there is a consensus between scientists that global environmental warnings need urgent attention from all areas of knowledge. Also, the consensus between landscape designers and researchers entails the role this discipline could play in creating environments that could reverse or heal human harms to nature. Acknowledging the two consensuses above, a relevant question is how landscape educators could creatively intensify landscape investigations in education and practice to that end?

Creative as Compelling, Relevant as Imaginative?

Posing intentions (*relevant*-matters) at any stage of a landscape design inquiry sets many other design matters into motion. Through the deadline-oriented design process and the pragmatic-practical modifications made during project representation, the initially framed intentions experience fluctuations in form and their original weights and values. Accordingly, the outcome of the design might echo a trivialized iteration of the originally proposed intentions. Instigated by generally loose or stagnant design questions (and thus thinking approaches) during the inquiry stage, the quest for *relevant* questions (*what could be imagined?*) downgrade to *convenient* questions (*what could be done?*) in the time remained by both students and instructors.

Fostering Corner's notion of 'thin/thick representations' and his discussion on 'fit measures' in landscape architecture, this inquiry situates *creative and relevant questions* as a compound notion to be addressed as the middle ground between *measure* and *representation*, and possibly as a framework to ponder any stages of landscape design process.

Girot and Imhof, in their book, *Thinking the Contemporary Landscape*, address the methods and approaches used in landscape representation as potent but reductive tools that, "[...] both enable, and are symptomatic of, a way of thinking about the landscape that suppresses the particularities of place".⁴¹ The zoning and map-driven abstraction, vastly used in landscape design, are addressed as engendering a 'thin representation,' and thus a thin understanding of landscape space, instigating a set of 'unspecific-foreign' design responses to the spatial inquiries in practice.⁴² However, in Corner's description of a 'fit measure' for landscape architecture, he encourages landscape designers to think about landscape *representations* as *measures* that could exploit the *poetic, symbolic, metaphoric, and meaningful* nuances of land.⁴³

The inevitable separation between the *imaginative*, *what could be imagined*, from the *compelling*, *what could be convincingly framed*, frames a *relevant* question for further landscape inquiries. While

imaginative spatial questions in landscape architecture try to capture interconnected *relevant questions* and methods, the *compelling* strives to realize the design's *imaginative* projects through the forms, media, and the data at hands reach. Could the *compelling measures* become *imaginative*? Could the tools, media, and the rhetoric used in the design process act in an *imaginative* mode?



Figure 1. Imaginative-Compelling exchanges in creative-relevant representations of landscape projects. Images produced by the author, 2015.

The images above (Figure 1) illustrate using collage as a tool to investigate creative questions in a landscape design process. The educational objective is to spatially study the design subject, a schoolyard in this case, in the socio-cultural context of its site. Creative-relevant processes of landscape designs aim to regenerate creative and relevant arguments through a circuit of interconnected iterations of design questions, grounding the design inquiry into the site's immediate context.

Mediated Meanings

The meaning of the world as experienced by individuals - the auto-poetic world - depends on the perception of *matters*. The on-rush of humans' perception upon matters (the world as aggregated images – the idea) creates a void behind them, asserted Henri Bergson.⁴⁴ However, the lived experience is described as a continuity of time and matter. According to Bergson, perception of matters occurs through the interplay of memory, perception, and image-matters.⁴⁵ Moreover, according to McGrath and Gardner, humans' sensory-motor schema dwells in these images in a state of flux, called the matter-flux.⁴⁶ The intervals within the matter-flux allow humans to experience the world in its *duration*, where humans can embody the world in its multiple layers through multiple simultaneous interims of meaning-to-memory reactions.⁴⁷

In a landscape experience, as a discipline that sets the criteria for future embodied experiences,⁴⁸ the *spatial quality* of spaces germinates by the dwellers of design.⁴⁹ Spatial qualities of space instigate humans reactions to the layers of designed spaces by engaging them in imaginative mind-projects.⁵⁰ However, in landscape education, the space as experienced, or in other words, the matter-flux of landscape space, is often lost in the translations mediated by the utilitarian strategies. The objectives of landscape education are impacted by deadlines for individual projects and degree programs. They act in collusion with the reductive media conventionally used in the discipline and can work to impede the creative objectives of landscape education. Landscape projects are always time-oriented, and media is always an abstracted iteration of the real;⁵¹ nevertheless, these constraints do not render the current educational methods as irresponsible, unprofessional or obsolete. Conversely, the multiplicity of educational methods granted by its dynamic nature, and the ambiguity of media adds much to the landscape discipline. The tools used in creating any media are extensions of our
hands and thoughts, states Pallasmaa.⁵² A *relevant* question is to what extent do landscape educators exploit the potential of alternative media in their work?

Juhani Pallasmaa, in *The Thinking Hand*, cites from Rushdie that in artworks, the border between the world and the self softens through the artist's hands.⁵³ Moreover, he identifies the human body as a 'knowing entity'.⁵⁴ An artist 'un-learns' the world in practicing art, thus stays a step outside of the real world, adding a new layer to the human imagination,⁵⁵ that we acknowledge as being in flux. The *un-learning*, the momentary *imaginative* disengagement with the real, grants us the joy of experiencing the world as new through its *otherness*. The *un-learning* could enrich the experience of thinking by grounding a Zone of Proximal Development,⁵⁶ thus becoming *relevant* in a critical, creative education for landscape architecture. In an analogy with artistic modes of thinking and doing, to what extent does conventional media and tools grant students of landscape architecture the opportunity to experience a one-step of *otherness*, the zone of proximal development?

CONCLUSION; CREATIVE QUESTION-MAKING CHARACTERISTICS IN PEDAGOGY AND LANDSCAPE EDUCATION

This inquiry concludes with the expectation that creative questions in landscape design will lead to increasingly *relevant* questions. Moreover, this enquiry aims to magnify traceable readings of *creative and relevant questions* in landscape pedagogical endeavors. In this interpretation, creativity echoes the closely connected processes within humans' imagination as intensely reflecting on question-matters, thus framing itself as an orchestral score of human thoughts. Creative questions frame creative interests, and thus become *relevant* in the creativity objectives of education.

Relevant questions are, first and foremost, the generative inquiries associated with a subject in its immediate context. Moreover, a *relevant question* should be traceable within a network of other *relevant questions*. Situating inquiries within the context of a subject aims to be *inclusive*, addressing a comprehensive range of matters that reflect on the consensual dynamics of the subject. *Relevant question-making skills* aims to address *imaginative questions* to become compellingly valid, feasible, and traceable. Hence the condition for generating creative questions resides on how intensely the inquirer is exposed to the subject-matter, and to what degree the representation of the subject-matter echoes the intensified exposure – the middle step between measure and representation.

In landscape architecture, the representation of humans' relationships with the world as experienced in its continuity (the *relevant* subject, the substance of landscape, the essence, the matter-flux of space, the flesh of experiences), and the conventional media used in education and practice, epitomize a weakened (a thin) iteration of the real. Mediated by Cartesian media, landscape's original weight and depth, the poetic, symbolic, and metaphoric qualities of space turn out to be falsely and thus weakly measured in landscape design processes. These tools and this method might notoriously contribute to 'thin layers,' 'un-specific' approaches,⁵⁷ and consequently might allude to stagnant spatial questions in landscape education. *Creative and relevant questions-making and thinking skills* can critically contribute to the middle-step, working between measures and representations of landscape architecture.

This essay finally argues for the possibility of framing *spatial experience* as a relevant question in landscape education. The scope of human dwelling upon spaces, including its qualitative and quantitative depth, occurs in a continuum of perception to memory reactions, dependent on a landscape design's spatial quality. Humans' and specifically design students' spatial experiences could add to the scope of their spatial imaginations, which could influentially act upon any other spatial judgment in the environment.

Ultimately, intensifying the relationship between the *spatial experience* and *spatial inquiries* renders itself as a *relevant* framework in landscape education. *Relevant questions*, comprehensively situated within context, contributes to the *inclusiveness* of a landscape design. To that end, any design methods that try to multiply the exposure to the world as it is, a world that could and should be functional, beautiful, and wholesome, could be a *relevant and creative question* to ponder in landscape education and practice.

NOTES

¹ Max Helfand, James C. Kaufman, and Ronald A. Beghetto, "The four-C model of creativity: culture and context." In *The Palgrave handbook of creativity and culture research*, pp. 15-36. Palgrave Macmillan, London, 2016.

² Matthew Walls, and Lambros Malafouris, "Creativity as a developmental ecology." In *The Palgrave handbook of creativity and culture research*, pp. 623-638. Palgrave Macmillan, London, 2016, 626.

³ Christophe Girot, and Dora Imhof, eds, *Thinking the contemporary landscape*. Chronicle Books, 2016, 8.

⁴ James Corner. *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014.

⁵ Fathali M. Moghaddam, and Lauren Covalucci, "Macro, Meso, and Micro Creativity: The Role of Cultural Carriers." In *The Palgrave Handbook of Creativity and Culture Research*, pp. 721-741. Palgrave Macmillan, London, 2016.

⁶ James Corner, *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014, 116.

⁷ James Corner, *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014, 116.

⁸ Marc Treib, "Must landscapes mean?: approaches to significance in recent landscape architecture." *Landscape Journal* 14, no. 1 (1995): 47.

⁹ Tania Zittoun, and Alex Gillespie, "Imagination: Creating alternatives in everyday life." In *The Palgrave handbook of creativity and culture research*, pp. 225-242. Palgrave Macmillan, London, 2016, 226.

¹⁰ Tania Zittoun, and Alex Gillespie, *Imagination in human and cultural development*. Routledge, 2015, 40.

¹¹ Tania Zittoun, and Alex Gillespie. "Imagination: Creating alternatives in everyday life." In *The Palgrave handbook of creativity and culture research*, pp. 225-242. Palgrave Macmillan, London, 2016, 229.

¹² Henri Bergson, and Frank Lubecki Pogson, *Time and free will: An essay on the immediate data of consciousness*. Courier Corporation, 2001, 7.

¹³ Henri Louis Bergson, and Nancy Margaret Paul, "Matter and Memory, tr. by NM Paul and WS Palmer." (1911), 21.

¹⁴ James Corner, *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014, 60.

¹⁵ Ibid, 70.

¹⁶ Ibid.

17 Ibid.

¹⁸ Ibid, 72.

¹⁹ Ibid, 70.

²⁰ Ibid.

²¹ Ibid, 7.

22 Ibid.

²³ James Corner, and Alex S. MacLean. *Taking measures across the American landscape*. Yale University Press, 2000, 28.

²⁴ Max Helfand, James C. Kaufman, and Ronald A. Beghetto, "The four-C model of creativity: culture and context." In *The Palgrave handbook of creativity and culture research*, pp. 15-36. Palgrave Macmillan, London, 2016, 15.

²⁵ Laurie Olin, "Form, meaning, and expression in landscape architecture." *Landscape Journal* 7, no. 2 (1988): 159.

²⁶ Treib Marc, "Must landscapes mean?: approaches to significance in recent landscape architecture." *Landscape Journal* 14, no. 1 (1995): 52.

²⁷ Ibid, 47.

²⁸ Olin, Laurie. "Form, meaning, and expression in landscape architecture." *Landscape Journal* 7, no. 2 (1988): 159.

²⁹ James Corner, *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014, 68-71.

³⁰ Tania Zittoun, and Alex Gillespie, "Imagination: Creating alternatives in everyday life." In *The Palgrave handbook of creativity and culture research*, pp. 225-242. Palgrave Macmillan, London, 2016, 227-228. ³¹ Ibid, 227. ³² Vlad Petre Glăveanu, Alex Gillespie, and Jaan Valsiner, eds. *Rethinking creativity: Contributions from social and cultural psychology*. Routledge, 2014.

³³ Matthew Walls, and Lambros Malafouris, "Creativity as a developmental ecology." In *The Palgrave handbook of creativity and culture research*, pp. 623-638. Palgrave Macmillan, London, 2016, 623-638.

³⁴ Ibid, 624.

³⁵ Ibid, 623-625.
³⁶ Ibid, 624.

³⁷ Ibid.

³⁸ Ibid, 625.

³⁹ Ibid, 624.

⁴⁰ Vlad Petre Glăveanu, "Rewriting the language of creativity: The Five A's framework." *Review of General Psychology* 17, no. 1 (2013): 72.

⁴¹ Christophe Girot, and Dora Imhof, eds, *Thinking the contemporary landscape*. Chronicle Books, 2016, in "Particularities of Place: A Response to the Landscape Architecture of Christophe Girot," Rice Design Alliance, accessed may 10, 2021, https://www.ricedesignalliance.org/particularities-of-place-a-response-to-the-landscape-architecture-of-christophe-girot.

⁴² Christophe Girot, and Dora Imhof, eds, *Thinking the contemporary landscape*. Chronicle Books, 2016, 121.

⁴³ James Corner, and Alex S. MacLean, *Taking measures across the American landscape*. Yale University Press, 1996, 37.

⁴⁴ Henri Louis Bergson, and Nancy Margaret Paul, "Matter and Memory, tr. by NM Paul and WS Palmer." (1911),24.

⁴⁵ Ibid, 19-23

⁴⁶ Brian McGrath, and Jean Gardner, *Cinemetrics: architectural drawing today*. Chichester: Wiley-Academy, 2007, 29-38.

⁴⁷ Henri Louis Bergson, and Nancy Margaret Paul, "Matter and Memory, tr. by NM Paul and WS Palmer." (1911), 19-27.

⁴⁸ Laurie Olin, "Form, meaning, and expression in landscape architecture." *Landscape Journal* 7, no. 2 (1988): 154-159.

⁴⁹ Marc Treib, "Must landscapes mean?: approaches to significance in recent landscape architecture." *Landscape Journal* 14, no. 1 (1995): 47.

⁵⁰ James Corner, *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014, 24.

⁵¹ Ibid, 164.

⁵² Juhani Pallasmaa, *The thinking hand: Existential and embodied wisdom in architecture*. Chichester: Wiley, 2009, 20.

⁵³ Ibid, 6.

54 Ibid, 3.

⁵⁵ Ibid, 68.

⁵⁶ Lev Semenovich Vygotsky, "Imagination and creativity in childhood." *Journal of Russian & East European Psychology* 42, no. 1 (2004): 7-97.

⁵⁷ Christophe Girot, and Dora Imhof, eds, *Thinking the contemporary landscape*. Chronicle Books, 2016, 117.

BIBLIOGRAPHY

Bergson, Henri, and Frank Lubecki Pogson. *Time and free will: An essay on the immediate data of consciousness*. Courier Corporation, 2001.

Bergson, Henri Louis, and Nancy Margaret Paul. "Matter and Memory, tr. by NM Paul and WS Palmer." (1911). Corner, James. *The landscape imagination: collected essays of James Corner, 1990-2010.* Princeton Architectural Press, New York, 2014.

Corner, James, James M. Corner, and Alex S. MacLean. *Taking measures across the American landscape*. Yale University Press, 1996.

Girot, Christophe, and Dora Imhof, eds. Thinking the contemporary landscape. Chronicle Books, 2016.

- Glăveanu, Vlad Petre, Alex Gillespie, and Jaan Valsiner, eds. *Rethinking creativity: Contributions from social and cultural psychology*. Routledge, 2014.
- Glăveanu, Vlad Petre. "Rewriting the language of creativity: The Five A's framework." *Review of General Psychology* 17, no. 1 (2013): 69-81.
- Helfand, Max, James C. Kaufman, and Ronald A. Beghetto. "The four-C model of creativity: culture and context." In *The Palgrave handbook of creativity and culture research*, pp. 15-36. Palgrave Macmillan, London, 2016.
- McGrath, Brian, and Jean Gardner. Cinemetrics: architectural drawing today. Chichester: Wiley-Academy, 2007.
- Moghaddam, Fathali M., and Lauren Covalucci. "Macro, Meso, and Micro Creativity: The Role of Cultural Carriers." In *The Palgrave Handbook of Creativity and Culture Research*, pp. 721-741. Palgrave Macmillan, London, 2016.
- Nilsson, Monica, and Beth Ferholt. "Vygotsky's theories of play, imagination and creativity in current practice: Gunilla Lindqvist's" creative pedagogy of play" in US kindergartens and Swedish Reggio-Emilia inspired preschools." *Perspectiva* 32, no. 3 (2014): 919-950.
- Olin, Laurie. "Form, meaning, and expression in landscape architecture." *Landscape Journal* 7, no. 2 (1988): 149-168.
- Pallasmaa, Juhani. The thinking hand: Existential and embodied wisdom in architecture. Chichester: Wiley, 2009.
- Treib, Marc. "Must landscapes mean?: approaches to significance in recent landscape architecture." *Landscape Journal* 14, no. 1 (1995): 46-62.
- Vygotsky, Lev Semenovich. "Imagination and creativity in childhood." *Journal of Russian & East European Psychology* 42, no. 1 (2004): 7-97.
- Walls, Matthew, and Lambros Malafouris. "Creativity as a developmental ecology." In *The Palgrave handbook of creativity and culture research*, pp. 623-638. Palgrave Macmillan, London, 2016.
- Zittoun, Tania, and Alex Gillespie. "Imagination: Creating alternatives in everyday life." In *The Palgrave handbook* of creativity and culture research, pp. 225-242. Palgrave Macmillan, London, 2016.
- Rice Design Alliance. "Particularities of Place: A Response to the Landscape Architecture of Christophe Girot." Accessed May 10, 2021. https://www.ricedesignalliance.org/particularities-of-place-a-response-to-thelandscape-architecture-of-christophe-girot.
- Zittoun, Tania, and Alex Gillespie. Imagination in human and cultural development. Routledge, 2015.

ARCHITECTURAL FOREST OR APPLYING RHIZOME-LEARNING TO TEACHING ARCHITECTURE

Author: ISABEL BARBAS

Affiliation: LUSÓFONA, ECATI, PORTUGAL

INTRODUCTION

This essay arises from the analysis of learning exercises assigned to 1st year students enrolled in the subject Design Studio, 1st semester, at Universidade Lusófona de Lisboa. These exercises have an overarching theme: the Architectural Florest.

We think it's important that architecture teaching and learning begin with reflection on what is architecture, on how we inhabit the space that surrounds us, and how we can record/communicate the ideas on the spaces that we experiment and imagine. Stemming from the relation between thought and action, students are challenged to create drawings, models and objects, relating mental and manual activities, without recourse to restrictive rules and hard-set instructions.

The teacher promotes what is known as divergent thinking (the thinking of artists, researchers and innovators), searching all possible solutions by an experimental methodology, by trial and error. Creative activity thus makes familiar what is strange and reveals what was thought to be already known to be often strange. The creative, transformative potential resides in this dynamics, as preconceptions are challenged, and the focus is set instead on the exploratory, scientific spirit, anchored in the idea of discovery.¹

For most of our students, architecture is still a strange place. Many arrive with preconceptions, others with wrong certainties, and others hesitating on their course choice – but all of them expecting to learn how to make 'houses'.

To address this, and to free them from pre-set views on what is architecture, the first step of the *rhizome-learning*² concept is to place students in the unexpected medium we call 'Architectural Forest'. The aim is that students look for a shelter where they can take refuge, leading them to understand the importance of building an identity that allows them to face the challenges in architecture project, with the awareness that any construction begins by its foundation. Let's be clear: in face of the contact with the cities in which they are immersed, students must explore and develop their own concepts and tools for work and analysis of the space they inhabit.



Figure 1. Student: Marta Manso, perception of the riverside market area.

ARCHITECTURAL FOREST

Our cities have become *forests* indeed. This is a concept that we can interpret according to the increasingly complex and often alienating urban spaces that we live in. Issues of scale, form, rhythm, time, overlap and dialogue with our inner space (our own dreams, expectations, values...), a hostage of the digital era that simultaneously seduces and entraps us in a virtual context that we do not master, fostering a feeling of insecurity. Zygmunt Bauman warn us to this in *Confiança e Medo na Cidade*.³

Byung-Chul Han, in his *A Sociedade do Cansaço* (The burnout Society), also warns us about the excess of stimuli and information to which we are daily exposed. Han establishes a parallel between current society and wild life, reaching the conclusion that man, like the animal in the wild, must be watchful about all that surrounds him. This is the reason why man is losing perceptive capacities, those left getting ever more fragmented and scattered, and instead developing a new form of awareness that Han calls "hyperattention".⁴

This does not favour the contemplative awareness proper to the creative and artistic processes. According to Han, the contemplative capacity can be only ransomed by art and by culture, both propitiating the deep attention: "Paul Cézanne, a master of contemplative, deep attention, once remarked he could *see* the fragrance of things. This visualization of things requires profound attention."⁵

According to Bernice Rose,⁶ Cézanne establishes the turning point from which drawing stops being just a preparatory medium for the work of art and constitutes itself as the form of its execution, that is, becomes autonomous through the *dynamics of doing*⁷. The fracture that Cézanne started, later taken to the limit by Cubism and Abstract Art, makes evident the two components of drawing, conceptual and autographical -- we want to work upon the two.

On the other hand, 'Forest' as a concept for the architectural space offers ample stimuli for "peripheric vision", or the type of phenomenological vision that Pallasmaa defends to more truly apprehend space itself:

"A walk through a forest is invigorating and healing due to the constant interaction of all sense modalities. Bachelard talks about the 'poliphony of the senses'. The eye collaborates with the body and other senses. One's sense of reality is strengthened and articulated by this constant interaction. Architecture is ultimately an extension of nature in the anthropogenic sphere, providing the ground for perception and the horizon of the experimentation and understanding of the world."⁸

Architect Sou Fujimoto is also interested in the relation between Forest and Architecture. At the *Arquitectura como Floresta* (Architecture as a Forest) exhibition of his work at Centro Cultural de Belém, Lisbon, in 2015, Fujimoto defends the idea that future architecture will resemble a forest: all

will be harmonized in the diversity that will be the main character of this future city. This new space will emerge from the relation between order and chaos.⁹

By the light of this conception, Fujimoto shows a set of projects from the smallest, even microscopic architectures to colossal, 700m-high buildings and urban structures. Some have been built, others are still to be built, and many are representations of ideas. We want to reflect on the value of these last ones.

Exercise

Forest alludes to natural space, but also to the city space. The complexity of forms, sounds, colours, element repetitions, routes, heights, light, shadow, etc., are characteristics that we can find both in the natural forest as in the urban forest and that evoke diverse states of mind.

The exercise challenges the students to think on these formal and psychological aspects and to interpret them by selecting from their context the 'motifs' that impress them the most. Either by imagining themselves in the natural or urban landscape, or, following the purpose of this exercise, imagining themselves in a geometrical, abstract forest – an architectural forest – it is expected that students will represent spatial or emotional conceptions proper to human relation with space through specific forms of conceptual and abstract communication: models and sketches, 3D and 2D representation.

Lastly, the exercise aims to showcase the work of several architects and thinkers on the international architecture panorama, since that, following the *rhizome-learning* concept that we defend, students will cross theoretical and practical knowledge, relating architecture to philosophy, the visual arts, cinema, history and other related subjects.

Process

Students are then asked to create objects that, though still devoid of function, can already be considered 'architectural objects', being the result of the materialization of ideas answering a programme that sets as a problem, and thus enunciates, distinct architecture dimensions, such as: thought/emotion, form/content, organic/geometric, mass/void, light/shadow, light/heavy, path, scale, and materials.

The psychological, compositive, and formal aspects are perceived, experimented, and tested through a methodology implying the constant dialogue between the immateriality of thought (reasoning, intention, memory -idea) and the materiality of the representation (drawings and models). The reciprocal relation between 2D and 3D representations is tested so that, when passing from thought/idea to form, the representation capacities of both drawing and physical model are explored. The verification of the form that the object can acquire results from this dialogue between drawing and model. The purpose is to present, right from the first semester, the understanding of the importance of the conception of the 'images' and 'objects' that are created to represent the ideas in architecture, either drawings, models, or a written text. Also, to understand that these representations are charged with meaning and that if they are the attempt to materialize an idea, they also acquire autonomy and suggest new possibilities. It is this dialectic play of formal experiences – their analysis, showing, critique, interpretation, and reformulation – that consolidates the idea without which any architecture is void.



Figure 2. Student Pedro Figueiras: 'movement' and 'colou'r in the city/forest, dynamic views

References

The performer and conceptual visual artist Esther Ferrer has developed a series of space installations, little known mostly due to the non-availability of means and space. Nevertheless, Ferrer developed her projects for years through drawing and artisanal models.

Ferrer considers 'space' -- both natural and architectural -- as her 'raw material', over which she works "three fundamental elements: time, space and presence". In her book *Maquetas e desenhos de Instalações* Ferrer explains that when developing her "Proyectos Espaciales", space matters, not only when she is model making, but also when thinking about her own actions. She adds:

"Model making is an activity that gives me a lot of satisfaction, manual work relaxes me and the physical model allows me to work with much tranquillity: it is not a *finite* object, it is a project that evolves as I am conceiving it and that sometimes, happily, and due to the freedom that it allows me when working, takes me along pathways that I would have never imagined. When I am in the making process, I do not look for perfection, but instead to visualize an idea $(...)^{10}$.

That is, the model becomes tangible and thus real, and the artist declares: "If I have the opportunity to build the model in a real space, great; but if not, that is not a problem (...) Actually, I never had a lot of interest in realizing my projects in a real, large-scale space; if the model I am making works, then for me the work is done.¹¹

Here we should note that we are witnessing a change in the traditional relation between reality and representation. Many artists and architects show by their work that we do no longer evolve from model to reality, but from model to model, recognising that both are real, and that by stopping to be polarized modalities they now work at same level. Olafur Eliasson, in his book *Ler es respirar, es devenir* highlights the idea that *models* become *co-producers* of reality:

"Previously, models were conceived as rationalized stations in the path to a perfect object. For example, the model for a house would be part of a time sequence, as a refining of the house's image, but it was considered that the real, true house was a static, final consequence of the model. Thus, the model would be just an image, a representation of the reality that was not real in itself."¹²

Thus, and resorting to these examples shown and discussed in the classroom, we are challenging the preconceived notion that most students have that the model, and the drawing as well, are media of representation that are posterior to the conception of the idealized object. If we want to apply the *rhizome-learning* concept, it is important to stress the fundamental role of the physical model as a tool for the process of conception/ideation.

In a similar way to the reflection suggested on the autonomy of the drawing, we too propose to the students, when developing these exercises, that they understand that models cannot be the translation of airtight ideas, since it is in the materialization/execution process that the idea appears with clarity.

Steven Holl, in his preface for *The Eyes of the Skin: Architecture and the Senses* writes on the contact he had with Pallasmaa's architecture, namely Rovaniemi Art Museum and the wooden house on the

rocky island at Turku: "The way spaces feel, the sound and the smell of these places, has equal weight to the way things look."¹³

This testimony shows that it is possible to reach the desired correspondence between ideas (and their representations) and built reality. Such correspondence results from a careful project research, the stages of which stimulate *phenomenological insights* – the concept used by Holl to characterize Pallasmaa's practice.

To resume, we want to stress the importance of stimulating the various senses in the training of project practice.

Answers

After problematizing the concept 'architectural forest', it is asked of students that they visit a densely arborized natural space, referring to the idea of Forest, and also that they wander across the city of Lisbon (some of these visits are faculty-oriented group visits). In both spaces, natural and artificial, it is asked that students choose both a psychological/emotive aspect and a spatial/formal one, and that, out of the two, they make 2D and 3D representations, taking care that each is not the representation of the other one.



Figure 3. Student Inês Silva: anxiety in a densely wooded nature

The complexity implied in selecting just one feeling and one physical aspect out of each visited environment compels to an exercise of careful analysis that is a consequence of the physical and intellectual experience of the visited spaces, thus promoting the individual, phenomenological understanding of the sites.¹⁴ It is also proposed that students write a paragraph justifying their selections, and that they will present to the group. The presentation of their ideas and sensations in class generates a map of diversified concepts, revealing a number of aspects that characterize architecture.

It is asked of students that they materialize both emotions (such as fear, tranquillity, unrest, safety, claustrophobia, comfort, etc.) and spatial characteristics (such as labyrinth, diversity, rhythm, scale, symmetry, light/shadow, etc.) though free, intuitive experimentation of a number of distinct materials or matters (pencil, paint, paper, cardboard, modelling clay, metal wire, cloth, nails, cotton, plaster, cement, wood, wax, Styrofoam, photography, sound, video, etc.).



Figure 4. From left to right, students: Rosa: light; Rui Neto: labyrinth; Joaquim: density; Rita: loneliness

Students will represent both emotions and space in drawing and in physical models, the model not representing the drawing, and the drawing not representing the model, both having in common only the search for the same theme. The purpose is to acquaint the students with the distinctive possibilities of representation of an idea, and that they develop the abstract, sensitive capacity to find complementarities that reinforce the communication power of the concept that they want to transmit. Can one have creative ideas, and the capacity to execute them, without the necessity of executing a

single sketch or physical model? Conceptual art has affirmed the supremacy of the idea over material reality. Still, the necessity to communicate "thinking" necessitates some mediation. In this sense, we could interpret Duchamp's "readymade" as a mediation between Federico Zucari's "internal drawing" and "external drawing" concepts that Lino Cabezas proposes to be a division between the idea arising in the artist's mind and its plastic expression.¹⁵

At this formative stage, we think that the best way to bring on the students' understanding of this relation between the internal and external drawings lies on experimentation and artistic practice. Thus, architecture's complexity and the representation of its spatial and conceptual elements can be introduced at an early stage through plastic experimentation.



Figure 5. Student Diogo Moinhas: disorientation, Alfama neighborhood in Lisbon

It is not by chance that Lino Gonçalves in his A arte descobre a criança declares that plastic expression widens the human capacity for understanding, thus concluding that "all people have the

right to be educated according to their nature. Free expression constitutes one of the indispensable factors for the harmonious development of individuals".¹⁶

Thus, we do not set limits or rules for scale, colour or materials. Students are completely free to explore all forms and ideas that they decide upon, with complete freedom of representation. This freedom, justly so, constitutes the largest obstacle that students must overcome – they ask for more directive exercises with accurate indications on materials, specific scale, and other work directions that do not promote *rhizomatic learning* and the phenomenological focus.

By the end of the process, most students acknowledge the benefits of these experiments and learn to play (and this is a key verb) with the distinctive analogical tools that still are, in our opinion, fundamental in the development of the architecture project, despite the surrounding digital world, and justly so because it reapproximates students to a forgotten making by hand. As Juhani Pallasmaa comments:

"Computer creates a distance between the creator and his object, while both drawing by hand and the elaboration of conventional models put the creator in a tactile contact with the object or space. In our imagination, the object is simultaneously in our hands and inside our head, and the projected, created image is modelled by our bodies. We are at the same time inside and outside the object. Creative work demands an identification of body and mind, empathy and compassion."¹⁷



Figure 6. Student Vasco Moreira: disarray; rise, in the old seven hills of Lisbon

To this we should add the pleasure involved in making by hand, so evident in children's play and drawings, lost in the process of our ever more mechanized training.

Le Corbusier's testimony in his 77th year of age (the last of his life) showcases the importance of *playing* architecture every day with enjoyment:

"Drawing is also playing. If you tell me that the secret of wisdom is to enjoy free time, I agree. I am permanently in a state of leisure. Play all day (...) both children and adults place all their seriousness in this.¹⁸

NOTES

¹ Lino Gonçalves, *A arte descobre a criança* (Lisboa: Raiz editora,1991), 24.

² This concept arises from Deleuze's notion of *rhizome*. Taken as a biology loan, we apply this concept to a multiplicity of approaches in the teaching of polymorphism. Cf. Gil Deleuze, Felix Guattari, *Mille Plateau*, (Paris: Minuit, 1980).

³ Cf. Zygmunt Bauman, Confiança e medo na cidade, (Trust and fear in the city), (Rio de Janeiro: JAHAR, 2009).

⁴ Byung-Chul Han, A Sociedade do Cansaço [The Burnout Society], (Relógio D'Água. Lisboa, 2014), 13-34.

⁵ Byung-Chul Han, *op.cit.*, 28.

⁶ Bernice Rose, "Une perspective du dessin aujourd hui" in Javier Segui de la Riva, *Dibujar, Proyectar [I],* (Madrid:Cuadernos del Instituto Juan Herrera, 2003), 4.

⁷ Emphasis mine.

⁸ Juhani Pallasmaa, *Os olhos da pele, A arquitectura e os sentidos* [The Eyes of the Skin: Architecture of the Senses], (Porto Alegre: Bookman, 2011), 39.

⁹ Sou Fujimoto, *Arquitetura como Floresta – Textos, maquetas, fotografias*, (Lisboa: CCB, exhibition catalogue, 2013).

¹⁰ Esther Ferrer, *Esther Ferrer: Maquetas y dibujos de instalaciones 1970/2011,* (Madrid: EXIT Publicaciones, 2011), 14.

¹¹ Op. Cit. 15

¹² Olafur Eliasson, *Ler es respirar, es devenir – Escritos de Olafur Eliasson*, (Barcelona: Editorial Gustavo Gili, 2012), 68.

¹³ Steven Holl, "Gelo Fino" [Thin Ice] in Juhani Pallasmaa, *Os olhos da pele, A arquitectura e os sentidos*, (Porto Alegre: Bookman, 2011), 5.

¹⁴ It is in this sense that we can recall Merleau-Ponty, when he declares in his *O Olho e o Espírito*: "To think is to experiment, to operate, to transform, with the reservation only of the experimental verification where only highly 'worked' phenomena intervene". The conception of our exercises relates to this thinking-in-action idea that Merleau-Ponty formulates. Cf, Maurice Merleau-Ponty, *O Olho e o Espírito* [*The Eye and the Spirit*], (Lisboa: Vega, Coleção Passagens, 2000), 14.

¹⁵ Lino Cabezas, "Dali. Estrategia y escenificación", in AAVV. *Estrategias del dibujo en el ate contemporâneo*, coord. Juan José Gómez Molina, (Madrid: Cátedra, 2002), 230.

¹⁶ Lino Gonçalves, *A arte descobre a criança* (Lisboa: Raiz editora,1991), 3.

¹⁷ Juhani Pallasmaa, Os olhos da pele, a arquitectura e os sentidos. (Porto Alegre: Bookman, 2011),12.

¹⁸ Le Corbusier cited by: Lino Cabezas, in "Le Corbusier. Estratégia Y processo. El cuaderno de notas como viaje iniciático" in AAVV., *Estrategias del dibujo en el ate contemporâneo*, coord. Juan José Gómez Molina. (Madrid: Cátedra, 2002), 112.

BIBLIOGRAPHY

Bauman, Zygmunt. Confiança e medo na cidade [City of fears, city of hopes]. Rio de Janeiro: JAHAR, 2009.

Cabezas, Lino. "Dali. Estrategia y escenificación", in AAVV. *Estrategias del dibujo en el ate contemporâneo*, coord. Juan José Gómez Molina. Madrid: Cátedra, 2002.

Deleuze, Gil; Guattari, Felix. Mille Plateau. Paris: Minuit, 1980.

Eliasson, Olafur. Ler es respirar, es devenir – Escritos de Olafur Eliasson. Barcelona: Editorial Gustavo Gili, 2012.

Ferrer, Esther. Esther Ferrer: Maquetas y dibujos de instalaciones 1970/2011. Madrid: EXIT Publicaciones, 2011.

Fujimoto, Sou. Arquitetura como Floresta – Textos, maquetas, fotografias. Lisboa: Exhibition catalogue, CCB. 2013.

Gonçalves, Lino. A arte descobre a criança. Lisboa: Raiz editora, 1991.

Han, Byung-Chul. A Sociedade do Cansaço [The Burnout Society]. Lisboa: Relógio D'Água, 2014.

Merleau-Ponty, Maurice. O Olho e o Espírito. Lisboa: Vega, Coleção Passagens, 2000.

Pallasmaa, Juhani. Os olhos da pele, A arquitectura e os sentidos [The Eyes of the Skin: Architecture of the Senses]. Porto Alegre: Bookman, 2011.

Rose, Bernice. "Une perspective du dessin aujourd hui" in Segui de la Riva, Javier. *Dibujar, Proyectar (I).* Madrid:Cuadernos del Instituto Juan Herrera, 2003.

VIRTUAL MATERIALITY: DESIGN PEDAGOGY IN THE AGE OF COVID-19

Authors: GALIT SHVO, JONATHAN VENTURA

Affiliation: HADASSAH ACADEMIC COLLEGE, ISRAEL

INTRODUCTION

In a famous description, Roland Barthes¹ expresses his admiration for plastic in his oeuvre *Mythologies*. According to his description, plastic has the fluid potential to fulfil almost everything in the designer's imagination, thus serving as a material link between the realm of possibilities and that of reality:

So, more than a substance, plastic is the very idea of its infinite transformation; as its everyday name indicates, it is ubiquity made visible. And it is this, in fact, which makes it a miraculous substance: a miracle is always a sudden transformation of nature. Plastic remains impregnated throughout with this wonder: it is less a thing than the trace of a movement.

Indeed, just reflecting on this description brings to mind an almost endless array of possibilities, thus making this text an ideal option for teaching students to harness theoretical knowledge to advance innovation and ideation. Yet, how does one materialize their ideas in a general age of virtuality? To add to this conundrum, how does one teach students how to materialize their ideas in the virtual age of COVID-19? Should we forego our classic teaching methods, built solely on the virtual sphere and move on?

Vilem Flusser in one of his poignant short musings, ideal for combining theory and applied knowledge,² reflects on the essence of design and on the difference between materiality and immaterial design. Contrary to the postmodern philosophers, Flusser³ takes another angle to this classic debate:

The word materia is the result of the Romans' attempt to translate the Greek term hyle into Latin. Hyle originally meant 'wood', and the fact that the word materia must have meant something similar is still suggested by the Spanish word madera. When, however, the Greek philosophers took up the word hyle, they were thinking not of wood in general but of the particular wood stored in carpenters' workshops [...] The basic idea here is this: The world of phenomena that we perceive with our senses is an amorphous stew behind which are concealed eternal, unchanging forms which we can perceive by means of the supersensory perspective of theory. The amorphous stew of phenomena (the 'material world') is an illusion, and reality, which can be discovered by means of theory, consists of the forms concealed behind this illusion (the 'formal world') [...] The word stuff is both a noun and a verb ('to stuff'). The material world is that which is stuffed into forms; it gives them a filling. This is much more

plausible than the image of wood being cut into forms. For it demonstrates that the world of stuff only comes about when it is stuffed into something.

Condensed as usual, Flusser offers us two key notions to ponder. First, the classic inherent relation between form and its materiality, rooted in the Roman craftsmanship and carpentry. Interestingly, wood is indeed one of the most sensual maters - in that it connects with all our senses, memories, and personal narratives, making it an almost haptic matter. Second, there is an inherent link between the creator, or designer, and the very essence of the material.

Indeed, the relation between materiality and immateriality is complex, yet two famous theories bring to the surface this relationship. Broudriallard's⁴ classic simulacra allude to a world wherein images and representations replace their real counterparts. Thus, Disneyland's Sleeping Beauty Castle erased the memory of its origin - Neuschwanstein Castle. The complex political and social history of buccaneers and pirates were replaced by Captain Jack Sparrow from Disney's Pirates of the Caribbean etc. In the world of design, the simulacra are ever-present when presenting a client with an HD imaging, completely realistic up to the dew formulating on the car's surface. When working with students, devoid of the materiality and handy experience of the workshop, the boundaries between the real and physical versus virtual imagery and generated renderings become even more fluid.



Figure 1. A simulacrum process: Tortoise shell representations replacing the material

From another angle, French anthropologist Marc Augé⁵ proposed the concept of the non-place as an inherent part of hypermodernity. Auge describes these places as devoid of history and specific contextualized identity, such as elevators, highways, and parking lots. The age of hypermodernity includes three key characteristics: time, space, and the ego. The presence or passing of time in hypermodernity is both fragile and extremely rapid - we are in constant FOMO fear, yet each day brings an avalanche of global and local events. Similarly, space is both very limited but in the same instance limitless - we can reach almost everywhere, yet our personal space is extremely limited. Finally, the ego is more fragile than ever - embedded in an all-out extreme individuality yet presented in a constant friction between local and global identities. Juxtaposed between the classic national and traditional identity versus virtual, knowledge-based communities was never so articulated. In a way, then, we live in a reality wherein the constant stage of our connection with the world is through the lack of non-place, which could be perceived as a necessary evil. Thus, designers should not ignore

these spaces or label them as anathema, but rather redesign these through a different approach. The non-place, then, much like the classic Japanese concept of ma, allow us needed pause, reflection and quiet amidst our contemporary urban chaos.

Famously, Gaston Bachelard described the importance of the feeling, architectural or imaginary, of 'nesting', associated with his call to return to daydreaming as an active choice. Bachelard⁶ associates this material and ephemeral feeling with simplicity, warmth, and security:

A nest, like any other image of rest and quiet, is immediately associated with the image of a simple house. When we pass from the image of a nest to the image of a house, and vice versa, it can only be in an atmosphere of simplicity.

Albeit linear and psychoanalytical in nature, Bachelard's description resonates with the essence of Flusser's intriguing dive into the being (in its classic Heideggerian meaning) of our personal space. Although keeping these safe spaces are crucial in 'ordinary times', they are even more so when dealing with a global pandemic, rendering our relationship with the physical world even more important.

The reality of COVID-19 presented an interesting alternative to Auge's theory. While the non-place is classically considered a necessary yet problematic area from a design/architecture point of view, in our current reality, whereas we are constantly in a 'place', i.e., our home, we long for a 'quiet' sphere devoid of history or personal attributes, where our mind could be at ease. Just as in classic Japanese aesthetics, whereas the possibilities of shadows are perceived as an independent entity rather than the light's negative,⁷ the non-place is not a negative of the place, but another type of entity. Furthermore, the three characteristics of hypermodernity are still very much relevant: time has seemingly stopped, as we are cooped in our homes, apparently in a new completely altered routine where all outside systems are irrelevant. Our characterised 'times' are all mixed up, as new norms allow for virtual meetings to take place late at night, or aerobic lessons with our children present in the middle of the living room, just before lunch. Space is also hindered, as all our outside spaces (consumer, social, professional, familial spheres) are condensed inside our living room. Our children study on the sofa, across from our desk where we are supposed to share a screen with working colleagues. Our sleeping area mixes with our dining area, recreation, play space for children etc, and most importantly - a garden, if existent, or a balcony, becomes our place of refuge. Finally, the ego is also strained and chafed as our professional identity is mixed with parenthood, family caregiver and other identity roles. Furthermore, as the pandemic is unhindered by geo-political borders, yesterday's enemies become grudging partners and close allies fight for resources.

In this complex reality, then, anchoring our pedagogic lessons in a real, physical sphere, or at least negotiating these dilemmas and offering a possible solution becomes critical. Therefore, we created a survey, passed to all practical design teachers in our department. The survey was relatively simple and concise, focusing on 5 simple questions:

1. What is the most crucial element you miss when teaching virtually instead of physically in the studio?

2. Please describe a specific situation in which a problem relating materials arose in one of your virtual classes.

- 3. Which creative solution did you use?
- 4. Please upload a scanned example.
- 5. Please upload two images from the same course, one prior to COVID-19 and one after.



Figure 2. images from a zoom class dealing with archetypes

Survey Results

Most of the lecturers that took part in this research, shared their difficulties in vying for a meaningful discussion in a classroom format, with 20 to 30 students present in a virtual space. Feeling the "atmosphere" in the classroom - in terms of attention, the students' involvement, their lack of ability to closely examine models and prototypes nuances, details, delicate surface morphology, were some of their reported difficulties.

Product design mentors told us they were missing live development of 3D models in the studio, since effective feedback requires holding the model, rotating it, feeling its weight and texture, etc. The last difficulty - conveying information about materials, shapes, and proportions - has to do with the descriptive and presentation skills of product design students, as we shall see in the next pages. The new reality of the COVID-19 crisis emphasized this notion. On the other hand, more radical voices were heard from other lecturers that took part in this research, calling to embrace the new situation, as pronounced through one's description:

"It may be a private case, but I don't feel there are significant problems, but mainly archaic perceptions about how a studio should be run".

These lecturers claimed that online tools (Moodle, Instagram, YouTube etc..) allow the students to achieve more precise work and enable tighter monitoring, while preventing "hidden unemployment" among students in the studio. Few side effects in favour of online classes were that there is less wasting time on travel, students arrive at class on time, fresh and attentive and perform their tasks on time. Furthermore, the ability to integrate additional and enriching media while lecturing, discussing, and presenting, integrating guest lecturers, regardless of space or time, marked an optimistic future for the academy although it probably requires adjustments on the part of all those involved.

Analysing the teachers' feedback from our survey, we divided the key subjects into three categories:

1. The virtual class as part of an inherent timeline of broader design studies.

2. Separating conceptual classes from "hands-on" classes when coming to decide which classes can take place physically in the studio versus others that could continue online.

3. Descriptive and interpretation skills of industrial design students as essential skills in online classes.

In our curricula, the first two years are dedicated to design essence, i.e., basic skills with materials, ergonomics, feelings and developing the students' intuition. Throughout these formative years we will probably still need the face-to-face process - with the students' mentor, with various materials, as well as with the ways design interacts with the body and the needs and constraints of design partners. In the 3^{rd} and 4^{th} years we can rely on the students' material memory and move towards conceptual projects,

research, and design theories, which can take place online. These stages require a semioclastic motivation and a hermeneutic ability from the student, as well as good descriptive skills (visually and verbally).⁸



Figure 3. Conceptual course data through Padlet platform

In addition, we identified two aspects of this unique situation in which the relationship between the virtual and the material is redefined:

1. Lack of materiality in its broader form, i.e., working solely with computerized "nonmaterial" shapes and objects.

2. Remote communication through which one works with "real material" under virtual guidance.

The first situation can be problematic for us when coming to design objects for use in the real world, such as a chair or a medical device for example. The students are not always aware of material intricacies, thinking their design can be easily translated to a physical object solely based on virtual representation, which can lead to frustration.

The second is a situation where students work with the material sphere, prototyping and developing, and need to communicate their work online. In this case, new online tools can be converted or used in innovative and creative ways. For example, we can see the use of an Instagram account as a design log in a 3^{rd} year class that dealt with bicycle archetypes. The process of design, prototyping and testing various outcomes were all uploaded to the project's accounts.



Figure 4. Instagram accounts converted into design logs

Naturally, we opt for this path, yet we must articulate its potential as well as highlight a few key features of its modus operandi.

So, What Do We Do?

The importance of reflection as part of the practitioner's toolbox is manifested in Schon's⁹ classic research. Our focus on the pedagogic importance of interpretation and descriptive abilities follows the same string of thought. Indeed, Schon continues to stress the importance of the designer's ability to recreate an object, yet the reflective practitioner, moves beyond this skill of imagination to include a process of personal interpretation based on the viewer's point of view and interest. This intricate process also involves a continuous movement from details to the broader apprehension of a designed product, much as Gadamer's hermeneutic circle.¹⁰

This unique act of expression, or hermeneutic articulation echoes the theoretical framework of three key thinkers – John Dewey, Georg Gadamer and Ivan Illich. John Dewey¹¹ in his important work, elaborates on the unique aesthetic experience, which derives subjectively from a combination of lived experience and a rooted and ordered framework. Indeed, the work of the artist links their own

expression of creation and the viewer's appreciation. Without elaborating on the comparison between art and design, suffice to say that the act of design encapsulates a complex framework of needs and constraints encompassing every relevant design partner. Therefore, the ability to articulate various needs and to develop a visual and material interpretation of these needs and constraints follows Dewey's approach.

This approach also echoes Gadamer's classic hermeneutic circle. In his theory, Gadamer¹² links our understanding between the micro-level of individual parts and the macro-level of the whole. Thus, a book is understood both from its chapters and the whole narrative presented in the complete oeuvre. This abstract understanding of a basic philosophical concept is crucial in the practice of design. Focusing on a chair's leg, or the necessity of creating a functional ornamentation, could not be understood without the larger understanding of the object's purpose, concept, or relevance. Indeed, when developing socially oriented or inclusive products, this link is even more important. Therefore, the student's ability to translate, iterate and interpret a complex idea and its materialized attributes becomes crucial, especially in our current reality.

Finally, our pedagogical example illustrates the four learning principles presented by Illich.¹³ Illich expressed the importance of what he called 'educational webs', or funnels functioning as spheres of learning, sharing, and caring. These 'opportunity webs' includes four layers:

1. **Reference Services to Educational Objects** that will serve to facilitate access to things or processes used for formal learning. These include libraries, learning centres and even working areas. Now we face the need to rearrange these 'services' in the shape of online coworking platforms (Miro, Padlet, etc...), "hacking" existing platforms and converting them to our needs (Instagram, google slides, etc...) and creating our own new tools.

2. **Skill exchanges** which permit people to acknowledge their skills, adding to a network of services and knowledge, for the use of others. In working online on the same board, we can find it very rewarding: students can share ideas, references and feedback (even shy students that usually don't take part in the discussion in the physical class took part in these kind of "discussions" and shared knowledge).

3. **Peer-Matching** which enables people to list their interests and learning activities, searching for suitable partners.

4. **Reference Services to Educators-at-Large** – a list of professionals, paraprofessionals, and freelancers along with conditions of access to their services.

The last two are even more accessible now, as we share all our outcomes online.

Indeed, we hope that COVID-19 will pass and we survive the apocalypse, yet we need to consider the possibilities forced on us by the virus' restrictions. Conversely, teaching design practice remotely is far from easy but it is not impossible, which brings us to the following applicable options:

1. We declare that design practice cannot be taught remotely, titling this year as a lost cause. Naturally, we are not in favour of this route.

2. We declare that facing these constraints, we shift our teaching to theory and research, shifting our limited resources to physically imbue students with the "memory of material" to 1st year students. Moreover, the rest of our students will be able to go through a deeper learning process of integrating theory in design practice and professing design research from their second year.

3. In addition to the previous route, or independently, we wish to harness COVID-19 restrictions to develop with our students several key practices, regularly less practiced in "normal years". First, we need to acknowledge the need for and develop the use of descriptive and interpretive methods/abilities. As we got accustomed to visual and material interpretation, students got weaker in

verbal, graphic and written descriptive methods. As these go hand-in-hand with comprehensive theoretical knowledge and subjective interpretation skills we believe this could propose a benefit to us all.

Descriptive Understanding

A good starting point for rethinking our ways of sharing knowledge combines several key theories mentioned briefly before: Schon's active practitioner, Dewey's creativity and Illich's innovative approach to pedagogy. The common denominator to these theories is the necessity to approach sharing knowledge in an innovative manner, more so when dealing with practice-oriented disciplines, such as design. Schon¹⁴ describes the work of the designer as:

A designer makes things. Sometimes he makes the final product; more often, he makes a representation—a plan, program, or image—of an artifact to be constructed by others. He works in particular situations, uses particular materials, and employs a distinctive medium and language.

Two important points arise from this description - first, that the act of designing is rooted in a virtual manifestation of the designer's imagination; and second, that design happens vis-a-vis a specific set of materials, technologies and modes of production. Indeed, the actual designed product, be it material or virtual, is surrounded with layers of narrative, descriptive attributes and reflections.

Following classic cultural anthropology or design anthropology in particular, understanding our design partners rests primarily on a dual translation process. First, we acquire knowledge gathered in the field (while images and videos are paramount, fieldnotes will serve the purpose of going back to descriptive abilities), or in other words "what did I see". This descriptive process focuses mainly on gathering information and learning to distinguish between what is important and what is not. Second, we move to interpretive mode, showcasing the second phase consisting of "what does that mean". Again, the students will practice articulating their description of a design situation and then the practical ramifications and understandings stemming from these. Third, integrating between theoretical, methodological and gathered data, the students will continue to the third stage, focusing on translating all this data into applicable outcomes.

This approach correlates with our 3-tier theoretical framework towards interpretation: First, the basic layer is built upon the principles of classic semiotics, highlighting the use of colour, material, finishes, textures, shapes and configuration. This is followed by the need to identify new opportunities for design actions by breaking the language of design, i.e a semioclastic process that first diagnoses cultural archetypes and perceptions, analyses them, and finds out new configurations and new hybrids objects or solutions. Second, the middle layer is built with a slightly more complex implication of hermeneutics in design. I.e., the intricate dialogue between the designer, the design partner and the designed product. Through a commonly articulated interpretation, the product regains meaning and use. This requires a more subjective, critical and expressive work from the students. Finally, the third layer is built on applied phenomenology, through which the students harness their gathered knowledge to design haptic products that deal with the design partners' feelings, emotions, memories and senses. Through these guidelines, we can reintegrate the students with the material 'real' world, while

enhancing their theoretical and interpretational skills. We further believe that these abilities are crucial to the designers of the post-COVID era, since truly understanding our design partners and tackling the 'wicked questions' of design, become paramount in the near future.



Figure 6. Our three-layered approach to design teaching and practice

NOTES

- ¹ Barthes, *Mythologies*, 97.
- ² See Toister and Ventura, "Slouching Towards the Abyss".
- ³ Flusser, Shape of Things, 22.
- ⁴ Broudriallard, Simulacra and Simulation.
- ⁵ Augé, Non-Places: Introduction to an Anthropology of Supermodernity.
- ⁶ Bachelard, *The Poetics of Space*, 98.
- ⁷ Tanizaki, In Praise of Shadows.
- ⁸ Ventura and Shvo, "Breaking the Language of Design: Semioclastics in the World of Industrial Design".
- ⁹ Schon, The Reflective Practitioner: How Professionals Think in Action.
- ¹⁰ Grondin, "Gadamer's Basic Understanding of Understanding".
- ¹¹ Dewey, Art as Experience.
- ¹² Gadamer, *Philosophical Hermeneutics*.
- ¹³ Illich, *Deschooling Society*.
- ¹⁴ Schon, The Reflective Practitioner: How Professionals Think in Action, 93.

BIBLIOGRAPHY

Augé, Marc. *Non-Places: Introduction to an Anthropology of Supermodernity*. New York: Verso, 1995. Bachelard, Gaston. *The Poetics of Space*. London: Penguin Classics, 2014.

- Barthes, Roland. *Mythologies*. New York: Noonday Press, 1991.
- Baudrillard, Jean. Simulacra and Simulation. Ann Arbor IL: University of Michigan Press, 1994.
- Dewey, John. Art as Experience. London: Penguin, 2005.
- Flusser, Vilem. Shape of Things: A Philosophy of Design. New York: Reaktion Books, 2013.
- Gadamer, Hans Georg. Philosophical Hermeneutics. Berkeley CA: University of California Press, 2008.
- Grondin, Jean. "Gadamer's Basic Understanding of Understanding." In *The Cambridge Companion to Gadamer*, edited by Robert Dostal, 36-51. Cambridge: Cambridge University Press, 2002.
- Illich, Ivan. Deschooling Society. London and New York: Marion Boyars, 1971.
- Schön, Donald A. The Reflective Practitioner: How Professionals Think in Action. New York: Basic Books, 1983.
- Tanizaki, Jun'ichirō. In Praise of Shadows. New York: Random House, 2001.
- Toister, Yanai, and Jonathan Ventura. "Slouching Towards the Abyss." Flusser Studies 30 (November 2020 online).
- Ventura, Jonathan and Shvo, Galit. "Breaking the Language of Design: Semioclastics in the World of Industrial Design". *International Journal of Design Creativity and Innovation* 4, no. 3-4 (2016): 222-233.
- Ventura, Jonathan and Shvo, Galit. "Yellow as 'Non-Black': Prosthetics, Semiotics, Hermeneutics, Freedom and Function". *The Design Journal* 20, no. sup1 (2017): S4652-S4670).
- Ventura, Jonathan and Shvo, Galit. "I Just Cut my Finger in a Ninja Fight: The Semiotics and Hermeneutics of the Band-Aid". *Punctum: International Journal of Semiotics* 4, no. 1 (2018): 179-201.

DIGITAL TOPOGRAPHIES: REMOTE-ONLINE SPOT ELEVATION SURVEYING AS A LEARNING METHOD

Author: VINCENT JAVET

Affiliation: RUTGERS UNIVERSITY, USA

INTRODUCTION

Traditional site surveying is done in person and on site, often using electronic total stations and global positioning system (GPS) receivers. More recently, laser scanning using drones or in situ devices have served as an alternative method of site surveying. Using these methods as a means of education can be costly, abstract and hard to administer. This paper explores remote-online methods for site surveying and topographic education within landscape architecture pedagogy. Elevation data can be observed using Google Earth Pro® and can be spatially mapped for any given site available on the platform. By using their computer curser, students can take note of elevation information and observe topographic features through real time first-hand remote site surveying.

The observation and annotation of relative elevation values allows for an applied, hands on experience into contour formation as an abstract representation of topography. This form of topographic investigation is a low-cost and accessible form of remote-online surveying education. By pairing this method with 3D modelling methods using RhinocerosTM, Grasshopper® and Lands Design's 'Earth Scanning' application, students can engage in multiple processes for understanding topography as 2D and 3D digital traces of their respective sites of investigation. The act of manual data processing as an educational model is central to developing the skillsets of topographic articulation and analysis. This paper presents learning opportunities through the act of applied topographic data collection and manipulation. Data acquisition and manipulation are further supplemented with ready-made Grasshopper® scripts that allow for real time visualization of abstract concepts of topography including 3D digital terrain models, slope analysis and drainage analysis as derived from individual remote-online spot elevation surveying and interpolation.

The paper explores the principles of surveying and topographic representation while examining how digital tools can be harnessed to implement these methods of articulating the landscape. The approach is a bricolage method of easily accessible, low-cost digital tools. Although no representation is free of its medium, the methods work to develop digital models that are efficient for site visualization and development within a larger focus on landscape architecture pedagogy.¹ The tools explored in this paper are established software that are re-framed with a focus on topographic investigation and site grading education. The tools are specifically framed to explore spot elevations data collection and contour creation as an abstract representation of the land. The paper establishes additional methods for learning and exploring the subjects of topography, surveying and landscape visualization. Through

remote-online site surveying methods students explore and visualize topographic features of landscapes at Rutgers University and beyond as part of the Department of Landscape Architecture visualization and construction curricula.

METHODS

Topographic Data Acquisition

Surveying is the art and science of mapping and measuring the land using points and lines. Today, surveying is almost always associated with the physical documentation of the data through mapping, plans or sections.² Surveying documents the physical characteristics on or near the surface of the earth, drawing relationships with distances, angles, directions, locations, elevations, areas and volumes.

There are two categories of land surveys that require different surveying methods – geodetic surveys and plane surveys.³ A geodetic survey takes into account the true shape of the earth, offering highly precise spatial information over large areas.⁴ A more common method of surveying is plane surveying. This type of surveying method considers the surface of the earth to be planar (flat) and affords surveyors acceptable precision for small-scale limited areas.⁵ The most common methods for topographic surveying are total station, Global Positioning System (GPS), remote sensing using satellite images and aerial photogrammetry.⁶ Though these methods can be highly technical, costly and difficult to administer.

This exercise uses plane surveying in the form of a control survey to establish horizontal and vertical positions along arbitrary points within the experiment site. Students engage in topographic data acquisition methods, both analogue and digital to arrive at a topographic survey. Students work to gather data to produce a topographic map as a means of studying, understanding and visualizing the terrain of the landscape through natural and human-made objects. Through the assemblage of elevation points, students are able to derive contours and digital terrain models that can articulate the results of topographic surveying of our example experiment site, Passion Puddle, and beyond.

The methods presented in this paper are intended for applications that are educational in nature. Methods are applied in order to teach, learn and explore topography as an abstract concept and are not meant to serve an a highly accurate approach to site surveying. Studies and methods in this paper are carried out with undergraduate and graduate students of landscape architecture at Rutgers University.

Experiment Site

Analogue and digital site surveying methods are tested at Rutgers University in New Brunswick, New Jersey. The site used for testing data acquisition methods is Passion Puddle, a central landscape feature on Douglass campus situated between the Cook and Douglass campuses, across Red Oak Lane and the Department of Landscape Architecture's building, Blake Hall.



Figure 1. Passion Puddle, New Brunswick, New Jersey used as experiment site for data acquisition.

The site measures approximately 48,000 m² and is of specific interest to studying topography due to its considerable slope from Red Oak Lane towards the main pond and fountain landscape feature.

Analogue Data Acquisition

Many analogue surveying methods require varying types of optical equipment that can be expensive as well as subject to calibration issues or user error. An auto level is the primary method taught and used at Rutgers for analogue topographic data acquisition. This tool is used to establish differential leveling on site through the interpolation of space from a known and unknown point to establish elevations between two points. Interpolation is the estimation of an unknown value of unsampled space based on known information; it is a critical step in creating topographic maps to fill space where point data was not collected. ⁷ Other on-site measuring methods that could be used are global positioning systems and electronic total stations. The overall procedural logic within the introduction to the measuring elevation points on the experiment site remains true between the digital and the analogue methods.



Figure 2. Analogue site surveying using tripod and measuring rod. Courtesy of Chris Ingui, Rutgers.

The physical measuring of the land as seen in Figure 2 displays the auto level or site level and a measuring rod used to study the relief between Passion Puddle seen in Figure 3 in plan.

The yellow line in Figure 3 represents the traverse line, which is a datum whereby the measurements will be documenting using these tools in an analog manner. The "T" represents the site level in the tripod and then the "R" represents the measuring rod. The distances in between are backsights and foresights, which pivot around one another to establish base elevations.



Figure 3. Process of site surveying using analogue method along transect line, foresighting and backsighting T=Tripod, R= Measuring rod. Image courtesy of Chris Ingui, Rutgers.

The outcome is articulated as a form of differential leveling and the established distance then between Bartlett hall and passing puddle in terms of a topographic relief. As seen in Figure 2 the analogue experiment articulates 31.37 feet or 9.5 meters of relief along the traverse line from top of curb to the water feature of Passion Puddle.

Digital Data Acquisition

The software used for data modeling are Google Earth Pro®, McNeel® RhinocerosTM with plug-in components including Grasshopper® and Lands Design. RhinocerosTM is a NURBS based geometric modeling program developed by Robert McNeel & Associates used by architects, landscape architects and industrial designers for its versatility in generating three-dimensional geometric form. A plug-in

for RhinocerosTM, Lands Design, allows RhinocerosTM to import elevation data in the form of a Delaunay mesh from its online mapping platform.

Figure 4 depicts a digital search of the Passion Puddle landscape in Google Earth Pro®. Originally set at a bird's eye view of the landscape. The platform allows insight into relative elevation, informing the viewer that the vantage point of the camera is at 258 meters from the site. Similarly, elevation data of the surface relative to the placement of the curser over the image is given in meters above sea-level. This form of information is the basis of the data acquisition for deriving digital spot elevations through this remote surveying method.



Figure 4. Sequential process of site surveying using digital methods along multiple transect lines. Software depicted Google Earth Pro® and RhinocerosTM.

Not unlike the established yellow traverse line in the analogue data acquisition method shown in Figure 2, a digital traverse line is established. By using the computer curser and following along the established traverse line, spot elevations can be documented as the relative elevation data changes, indicating values in relation to elevation above sea level. Further site surveying can be done by replicating the method by establishing a grid formation of traverse lines to take additional measurements of every numerically observed change in elevation.

The primary traverse line mimics that of the apologue surveying method, with the digital method articulating the relief of top of curb to the water feature of Passion Puddle as 10 meters. This suggests a 0.5m differential from the measured 9.5m of topographic relief measured using the measuring rod and site level on site.

The documented digital spot elevations can then be transcribed in computer drafting software such as AutoCAD or RhinocerosTM. The spot elevations are then connected using line segments in the form of lines, polylines or curves. This is a valuable learning opportunity for students as the exercise bridges contour information is derived and interpolated through spot elevations in a manual and applied manner. The principles of this articulate the methods by which LiDAR and electronic total systems establish a topographic survey as well.



Figure 5. Student work that used digital site surveying methods for parks in New Jersey. Samples are represented as 2D contour maps depicting topographic relief within a defined site boundary.

Data Visualization and Testing

To begin to visualize and test the derived elevation data students engage in visual scripting, using ready-made scripts for Grasshopper[®]. The primary script used creates a singular mesh based on the contour information derived in the digital data acquisition method, articulated as a curve in RhinocerosTM. The script uses a Delaunay Mesh command to triangulate a pre-determined distance between the curve information of the contours. Students are able to manipulate the resolution of the interpolated triangulation by altering the segment length, which has a default setting of six units, responsive to the defined drawing units established in the RhinocerosTM drawing file. If the drawing file is set to inches (or centimeters) instead of feet (or meters), the generated terrain model will be triangulated at six inches, making the mesh denser and more accurate to the input curve information than if the drawing file was set to feet.

The Grasshopper® generated 'baked' mesh seen in green in Figure 6 features a blue planar surface representing the water surface of Passion Puddle. Continuing with Passion Puddle as the site of investigation, we can further test the digital elevation survey method using Lands Design to generate an additional mesh, which serves as a control. Lands Design's 'LA Earth Scan' feature is used to derive a readymade mesh as a reference dataset. The 'LA Earth Scan' command allows a Delaunay Mesh to be imported into RhinocerosTM at a maximum resolution of a 10-meter sample plot. Figure 6 depicts the downloaded mesh topography with a texture mapped aerial image. Using RhinocerosTM's 'contour' command new contours can be generated from the secondary mesh. Students are encouraged to overlay the new mesh and contour datasets against their previously derived contour and Delaunay mesh datasets. Students are prompted to consider some of the following questions: Are there anomalies? Why or why not? What is the overarching gesture of the land? How does the automated contour information compare to the initially derived datasets? Figure 6 ends with comparative mesh geometry derived into contour linework, the automated elevation information using Lands Design LA Earth Scan is in green and the manually derived data using Google Earth Pro® is in red.



Figure 6. Sequential process of topographic data visualization and data testing using visual scripting through Grasshopper® for 3D modelling software RhinocerosTM and plug-in Lands Design.

RESULTS & DISCUSSION

The outcome of this visualization exercise resulted in a data modelling and various visualization methods using the digital elevation information derived for case studies that were either local and or international, with site visits not required. For the purposes of demonstrating this remote-online spot elevation surveying method in this paper, Passion Puddle in New Brunswick, NJ was used as an experiment site. Figure 7 features student work that has come out of this workflow and learning method for deriving digital elevation data remotely. All visualizations are based entirely on remote research. Three-dimensional space and representation work to capture both ontological and phenomenological characteristics of the case-study sites as understood by students in their site research.

Students have been very open to this kind of learning method for a concept such as topography, which can be difficult to understand and articulate. Site engineering courses that concern themselves with spot elevations, contours and grading are often some of the most difficult courses for landscape architecture students.⁸ Providing an opportunity for students to understand topographical data capture through analogue and digital methods is essential to the dissemination and effective use of technology in the landscape architecture profession.⁹

The pairing of applied and in-person studies of the land through analogue site surveying allows for an intimate understanding of site. Passion Puddle is used as the applied and theoretical teaching site for the analogue and digital methods described in this paper. By maintaining the experiment site students are able to focus on the online digital surveying method in a more abstract form, while understanding the landscape in which they are virtually operating. This tether between the physical and virtual world allows students to grasp abstract concepts such as spot elevations and virtual transects in a more applied manner. The digital data acquisition method allows students to continue to investigate elevation data for sites anywhere in the world without the need for a site visit, though this is not without issue. There is a loss of connection to the land, increasing time on screen, lack of definitive accuracy and opportunity for human error. As educators, we continue to use the classroom as a laboratory for testing methods for deriving elevation data, learning about surveying, spot elevations and contours in relation to topography and topographical analysis for landscape architecture.



Figure 7. Student work showcasing outcomes for visualizations of site atmosphere using digital topographic data and remote-online site surveying tools.

CONCLUSION

To help students understand surveying, topography and design this multivariate experiment uses a continuous test site. The test site, Passion Puddle, allows students to work between analogue and digital surveying methods for understanding elevation data acquisition and visualization. Students explore the use of elevation data visualization tools using RhinocerosTM, Grasshopper® and Lands Design platforms to parameterize input values recorded by Google Earth Pro® software through manual digital sampling methods as outlined in this paper. Students engaged in additional local and international case studies of completed works of landscape architecture where they deployed the remote-online digital elevation surveying method. The method allowed students to visualize sites in three dimensions without visiting the site in person. Various visualization methods were used by students to articulate the topographic data derived through the learned study methods. The established rational for elevation data acquisition serves as a viable method for learning to understand elevation data, contours, topography and digital terrain models. This paper demonstrated the merits of lower accuracy and digital tracing methods as a valuable learning method that fosters an intimate understanding of the gesture and characteristics of the landscape.

NEXT STEPS

As previously mentioned, the intention of this exercise is to explore analogue and digital site surveying methods for learning about topography through spot elevations, contours and digital terrain models. The next steps would be to integrate the use of GPS and electronic total stations as well as the integration of publicly available GIS data to further cross reference experiment outcomes against one-another. Tools such as ESRI's ArcGIS Collector App, a spatial data collection application, could offer students the opportunity to explore this paper's methodology in reverse through the act of ground-truthing existing topographic datasets in the form of contour maps. The integration of aerial photogrammetry as a well-established tool for land surveying for intermediate scales should be explored as well as the use of imaging and processing techniques of remote sensing.¹⁰ The exercise should continue to find ways to develop an understanding the landscape beyond contours and datasets. There is a need to ensure education in landscape architecture remains rooted in the land, at the human scale and experience, to not lose sight of the fundamental tenets of the profession.

NOTES

¹ Ervin, Stephen M. "Digital landscape modeling and visualization: a research agenda." *Landscape and Urban Planning* 54, no. 1-4 (2001): 49-62.

² Paul, Raymond, and Walter Whyte. *Basic Surveying*. Routledge, 2012.

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ Luh, Lau Chong, Halim Setan, Zulkepli Majid, Albert K. Chong, and Zieana Tan. "High resolution survey for topographic surveying." In *IOP Conference Series: Earth and Environmental Science*, vol. 18, no. 1, p. 012067. IOP Publishing, 2014.

⁷ Andrews, BrianD, Paul A. Gares, and Jeffrey D. Colby. "Techniques for GIS modeling of coastal dunes." *Geomorphology* 48, no. 1-3 (2002): 289-308.

⁸ Ellis, Christopher D. "Understanding Site through Electronic Data Collection: Total Stations and GPS Make Digital Design a Reality." *CELA 2002: GroundWork* (2002): 83.

⁹ Ibid.

¹⁰ Böhler, Wolfgang, and Guido Heinz. "Documentation, surveying, photogrammetry." In *XVII CIPA Symposium.* Recife, Olinda. Brazil, vol. 1. 1999.

BIBLIOGRAPHY

Booth, Norman K., and James E. Hiss. *Residential landscape architecture: design process for the private residence*. Vol. 576. Prentice Hall, 1999.

Burrough, Peter A., Rachael McDonnell, Rachael A. McDonnell, and Christopher D. Lloyd. *Principles of geographical information systems*. Oxford university press, 2015.

- Desmet, P. J. J. "Effects of interpolation errors on the analysis of DEMs." *Earth Surface Processes and Landforms: The Journal of the British Geomorphological Group 22*, no. 6 (1997): 563-580.
- Ervin, Stephen M., and Hasbrouck, H.H. "Landscape Modeling: Digital Techniques for Landscape Visualization". New York: McGraw-Hill. 2001.
- Hanna, Karen Calhoon. *GIS for landscape architects*. No. 743.84 H243. Environmental Systems Research Institute, Redlands, CA (EUA), 1999.
- Hanna, Karen C., Karen Calhoon Hanna, and R. Brian Culpepper. *GIS and site design: New tools for design professionals.* John Wiley & Sons, 1998.
- Haugerud, Ralph A., and D. J. Harding. "Some algorithms for virtual deforestation (VDF) of LIDAR topographic survey data." *International archives of photogrammetry remote sensing and spatial information sciences* 34, no. 3/W4 (2001): 211-218.
- Hutchinson, Michael F., and John C. Gallant. "Representation of terrain." *Geographical information systems* 1 (1999): 105-124.
- Lam, Nina Siu-Ngan. "Spatial interpolation methods: a review." *The American Cartographer* 10, no. 2 (1983): 129-150.

Langenegger, O., and W. J. Verwoerd. "Topographic survey." (1971).

Mayoh, Joanne, and Anthony J. Onwuegbuzie. "Surveying the landscape of mixed methods phenomenological research." *International Journal of Multiple Research Approaches* 8, no. 1 (2014): 2-14.

Roy, Sitesh Kumar. Fundamentals of surveying. PHI Learning Pvt. Ltd., 2010.

USACE. "Control and Topographic Surveying." US Army Corps of Engineers (Manual No. 1110-1-1005), Washington (2007).

EMBEDDING STUDIO CULTURES DIGITALLY: AN INVESTIGATION ON STUDIO CULTURES IN PHYSICAL AND DIGITAL LEARNING ENVIRONMENTS

Authors: STELLA PANGILINAN, JAVIER ÁNTON SANCHO, ÁLVARO VELASCO PEREZ

Institution: UNIVERSIDAD DE NAVARRA, SPAIN

INTRODUCTION

The global lockdown due to the COVID-19 outbreak has disrupted architecture and design education. With virtual spaces substituting physical ones, educators and students are undergoing a critical reevaluation of their roles and that of technology in the design studio. Through ethnography and userresearch, this paper describes how the shift to online learning has revealed the limitations of the classical understanding of the pedagogy in the Architectural Association, Central Saint Martins, and The London School of Architecture. By evaluating their responses to physical school closures, this paper explores how the loss of a tangible space affects the loss of a nuanced studio culture that is unique to an institution and its approach to design. The implications of the results pose the pedagogy to scrutiny and highlights some of the foundational interactions that are lost in the virtual realm, which require digital alternatives to improve online learning experiences and preserve an institution's studio culture.

AN INTRODUCTION TO THE PEDAGOGY

The studio acts as both a physical space and pedagogical approach that merges into what is considered the heart of most architectural and design curricula¹. It is structured in such a way that students are encouraged to "learn by doing"² through open-ended project briefs, iterative feedback from peers, and public critique upon completion³. Crowther (2013) has defined the studio as the "signature pedagogy" of design education as it is the dominant learning environment, mode of delivery, and form of assessment in the field⁴. Opposing the spatial arrangement of a traditional lecture hall, the contemporary studio space is conventionally a spacious room consisting of adjustable or movable desks and storage for student models or prototypes. The space is designed to accommodate dialogue, which is a core element of the studio as it shapes interaction and deepens understanding between students and educators through encouraging casual conversation and transparency⁵.



Figure 1. Design Studio Activities.

The historical relevance of the pedagogy can be further understood by looking into examples of its earlier structures in the École Des Beaux-Arts and the Bauhaus, of which some foundations continue to permeate their contemporary studio approaches to this day⁶. At the École, pupils were tasked with independently completing their rigorous year-long projects under the guidance of an atelier of their choice. The school provided students with a network of collaborative work environments distributed throughout the city, treating the studio like an ephemeral network of mixed spaces and perspectives. Architect Jean-Paul Carlhian (1979) wrote that the institution's culture reflected competition, casualness, and the intimacy of the atelier life⁷.

Another pivotal point in architecture and design curricula took place in 1919 Post-War Germany, at the Bauhaus. It was founded and directed by Walter Gropius to close the widened divisions between the technical and artistic realms of architecture, design, and art⁸. Gropius believed that a school's methodology should arise from the character of the studio, which the Bauhaus demonstrates by conflating the workshop and the studio space⁹.

METHOD OF STUDY

Various literature¹⁰suggests that despite the rise of emerging complexities and technologies in architecture and design, classical approaches to the studio pedagogy are not fit for the twenty-first century¹¹. For example, methods of the École such as guidance from practicing tutors or the final evaluation of student work by a private jury continue to remain¹². In the Bauhaus, a prioritization of craftsmanship is still imbued in the pedagogical approach of "design by making¹³, where modelling, building, and tactile experimentation remain at the fulcrum of studio learning¹⁴. These methods continue to contribute to the open-ended form of discussion, review and assessment that take place in modern-day design methodologies¹⁵.

While the contributions of these classical institutions to studio learning cannot be disregarded, the COVID-19 pandemic urged the need for the pedagogy's re-evaluation. The shift towards a virtual environment has threatened the fulcrum that defines the studio learning experience: its physicality. The loss of the studio space reveals a limitation of the signature pedagogy and challenges it as one of the classical approaches to architecture and design education.

To further explore the pedagogy, a field study was conducted with three schools in London: the Architectural Association, Central Saint Martins, and the London School of Architecture. With transient student bodies encompassing a mix of nationalities¹⁶, the schools of London pose challenges to traditional studio pedagogies that predate before and will remain after the pandemic. We see this condition as an opportunity to research in one of the forefronts of global discussions on design education. Taking Ockman's synthesis of the studio in the metaphor of the 'desk-crit it London, in ,¹⁷, is hard to situate the studio in a fixed piece of furniture, when the students arrive with concerns well

beyond the walls and leave to practice in places well beyond the island. The insights of this study will be conveyed in case studies that highlight the relationship of the institution's spatial arrangement and their approach to studio learning.

THE ARCHITECTURAL ASSOCIATION

The Architectural Association (AA) School of Architecture was founded in 1847 and is known for its widely-imitated structure¹⁸ of the unit system, which was pioneered under the directorship of Alvin Boyarsky¹⁹. This system introduced an approach that upheld "maximum autonomy, maximum choice and minimal interference", in which each student explores a topic of study for a year-long period²⁰ under their respective unit masters in their designated unit space.

The interplay of the unit system and the building's domestic infrastructure influences its existing approach to design; the fragmentation of units and their workspaces make the entire school a studio in itself. Farshid Moussavi (2012) explored how the building's original domestic architecture influences an intimacy that thrives in the AA's infrastructure²¹. She regarded the school as a social space by highlighting some of its central locations, such as the bar and the library, where discussions and debates are extended outside of the designated unit spaces²². Additionally, in interviews it was confirmed that students perform certain studio-related tasks outside of their unit spaces due to spatial constraints. For example, they mentioned that they prefer to create their model prototypes in the basement where the workshops offer larger desk spaces and proper lighting. Others mentioned a preference to work or draw in a café or at home; that the principal purpose of the unit space is to share the work in progress as "an intricate process of accumulation" curated to prompt discussion and eventually arrive at a final outcome. More often than not, these outcomes are unique and original, branching into other disciplines such as film or politics²³.

This pedagogical approach does not mean to polarize 'making 'from the studio experience of the units, but to ensure that 'making 'is fragmented into dispersed spaces or experiences that are accessible to the student. In effect, following Boyarsky's vision, the entire school becomes alive, platforming for a "myriad of exchanges" through exhibitions, student-led initiatives, alumni projects, collaborations, publications, or open events and debates²⁴.

CENTRAL SAINT MARTINS

The Central Saint Martins (CSM) College of Art and Design was founded in 1989 and is known to be rated among the best design schools in the world, particularly for its fashion programs²⁵. Along with its high ranking²⁶, the school is known for its role in shaping the cultural history of London, particular during the punk-rock explosion in the eighties²⁷.

CSM's approach to the studio demonstrates an emphasis on craftsmanship, tactile experimentation, and cross-pollination, which are reflected in the spatial arrangement and architecture of the school. Upon entering its campus, visitors are greeted by an expansive atrium that acts like a "vast architectural canvas" that is "almost anything but peaceful" where students, tutors, and visitors shuffle between workshops, studios, or the 24-hour library. Stanton Williams, the official architecture firm of its new campus, stated that the overhead bridges that connect the main buildings are designed to "maximize the connections between different degrees and departments within the building"²⁸. "Making tables"—as referred to by students—are situated around different corridors and adjunct spaces in the campus, making communal spaces more visible and collaboration actively present throughout the campus. When asked about the relevance of the studio, the school's vice-chancellor Jeremy Till said they are fundamental to CSM's educational approach²⁹. The school offers more than 15 different workshops to accommodate a variety of design procedures that students are open to explore and

experiment with³⁰. This freedom enables strong tendencies for collaboration or cross-pollination between students, leading to popular student-led initiatives. An example of this is Nearly, a student-built online platform that showcases the final work of the Graphic Communication Design class of 2020 as a response to studio closures³¹.

THE LONDON SCHOOL OF ARCHITECTURE

The London School of Architecture, founded by Will Hunter in 2012, offers students a non-traditional approach to architecture education by requiring students to work alongside operational practices in the city whilst completing their studies³². The LSA operates on partnerships characterized by a unique and active collaboration between the school itself, its students, and over a hundred practices listed in their internal network³³. This model is designed to help students understand their strengths as practitioners while rapidly developing collaborative projects in shared work environments³⁴.

The school's central location accommodates an office for their staff and desk spaces for final-year students. The rest of the lectures and activities are dispersed into spaces around the city that are either shared or borrowed from practices within the school's network. On multiple occasions, classes take place in museums, office spaces, hotel lobbies, or community halls. The school also owns a database of partner workshops and studios in the city that are available for students to rent when needed. According to the school's Research Director James Soane, the benefit of this network model is that students are pushed to acquire a deeper and richer connection with the city rather than an abstraction of it³⁵. LSA co-founder Deborah Saunt mentioned that one of her students had the opportunity to visit 26 different operating studios in the span of a single year, noting how this achieves a sense of perspective unique from those of other schools. Instead of using a single physical space, the LSA uses its network to a pedagogical advantage, which results in a forward-thinking approach where students are encouraged to define what studio means for themselves.

By merging academia and practice, students are referred to as self-starting proto-professionals who are, "encouraged to be experimental and to take risks in the context of critical realism³⁶. As a practitioner herself, Saunt believes that through this model there is a constant and active engagement between parties in developing new design knowledge³⁷.

STUDIO CULTURES

Observing how the studio pedagogy is approached in different institutions, it is evident that the interdependence between a school's pedagogy and spatial adequacy, among others, create a *studio culture*. This encompasses the set of intrinsic nuances, qualities, and interactions that make the institution what it is beyond its policies, curricula, and programs. Moussavi wrote how different learning spaces affect different pedagogical structures and strategies, and how the relationship between these results in a character that students take on in future practice³⁸. We argue that it is in the presence and equilibrium between these two vital elements that a particular culture emerges and is experienced.


Figure 2. How studio cultures are formed.

We can further understand how studio cultures are formed through the schools of study. The AA's unit system producing multiple variants of a single project brief combined with the building's intimate domesticity converge into a studio culture that is exclusively avant-garde. The AA becomes a competitive forum of individualistic and original talent that is socially and culturally conscious. On the other hand, CSM's results-driven approach of design by making matched with its expansive purpose-built communal campus with connecting workshops create a studio culture that could never thrive in a domesticized infrastructure. By keeping the studio and quality of expectation at the center of their pedagogy, a breed of robust and proactive multidisciplinary creatives emerges with polemic projects and radical collaborations that exude individuality. And finally, pairing the proto-professional network model of the LSA and its lack of a physical space contributes to a studio culture that is peripheral and anti-institutional³⁹, and is reflected in how students interpret their learning experience as more independent, entrepreneurial, and "less-service based"⁴⁰.

POST-PANDEMIC RESPONSES

Taking insights from the case studies, a category mix was created to **compare the relationships between pedagogy and spatial adequacy among the aforementioned institutions.** The axes of the category mix follow the defined characteristics of the schools of study.



Figure 3. Category Mix of the relationships between pedagogical approach and spatial adequacy among schools of study.

As the pandemic broke out in March 2020, there was an opportunity to speak to students and professors about how they felt about studio closures. Schools on the right side of the diagram experienced a larger struggle in closing studios and shifting online, likely due to a high reliance on physical spaces and service-based facilities. These also happened to be schools that followed a more stringent "design by making" approach where tactile and tangible learning and output are prioritized. CSM's Jeremy Till⁴¹ referred to studio closures as a "nightmare"; in contrast, James Soane⁴² of the LSA thought they were able to transition seamlessly. This figure suggests that an over-reliance on a physical learning space may be correlated to student and staff responses that reflect a larger difficulty of adjusting to a virtual or hybrid studio experience. However, despite the varying responses from students of each institution, generally all students admitted that no school was fully prepared for this sudden adjustment, and that learning online felt less organic with almost no room for open-ended discussions and experimentation⁴³.

As quarantines progressed and more interview responses were gathered, it became clearer that architecture and design schools were not only suffering from the loss of a tangible location but the loss of a nuanced culture and atmosphere that these spaces created. Interviewees expressed that they felt alienated from their peers and that remote learning methods lacked the "informal engagements and exchanges" that made studio learning possible⁴⁴. Students found it difficult to gauge their personal progress while educators shared sentiments about the lack of fluidity in discussion from feeling detached from their students 'work. This overall response from institutions led to the discussion of how the studio pedagogy could be made more resilient and how their cultures could be preserved in both physical and digital working environments.

The results of this study suggest that some key features of the pedagogy rely heavily on a physical space and are lost virtually, and therefore must be embedded digitally and reassessed for a post-pandemic future. These main features are: (1) the informal and casual micro-interactions between peers and educators that spontaneously spark discussion, (2) the ability for professors to review tangible documentation of progress over time, and consequently (3) the lack of peer exposure and reference for students as a form of self-evaluation. While further exploration in the fields of User Experience or Human-Computer Interaction is necessary to realistically identify their precise and optimal digital alternatives, it is possible to speculate general possibilities for these particular features of focus.

SPECULATIVE SOLUTIONS

To tackle these specific features, a virtual space must be defined that either familiarly reflects or further extends the existing spatial adequacy of the institution. Without establishing the role of space, the school's culture ceases to exist or will replicate a culture that is not self-actualized. Once this virtual space is consolidated, perhaps schools must find ways to intuitively map out the digital interactions that occur between people as a way to document the informal and casual exchanges that take place. The result can be a map that monitors and marks interactions like questions, references, disagreements and praise in real time, giving the institution a sense of activity and life even within a digital sphere. To appease the lack of documentation that connects teachers to their students' work, it is possible that students can collaborate on curating images, texts, links and references on a shareable digital pin-ups or whiteboard that can be remotely accessed by professors in or out of the institution. These pin-ups can be automatically publicized for a public exhibition or open critique, or given solely to professors or unit masters for a silent revision. Once this thriving digital environment is present and felt, maybe architecture and design schools will mirror the LSA's approach and focus on their network instead of their facilities. Schools may begin to confidently practice "spatial intelligence" by pushing

their studios to disperse outside of their buildings; making students connect with the pulse of their cities and actively engaging with the public sector.

These speculative solutions, albeit general, are ideated to empower the studio pedagogy by enabling its culture to become a mobile and porous entity that is platform-agnostic and unthreatened by the loss of a physical meeting space.

CONCLUSION

The studio acts as a microcosm of an institution, where pedagogy and approach to design are visibly perceived. By altering the approach to the pedagogy or the space in which it is practiced, a part of the institution essentially adopts a new culture that students and educators have to identify with.



Figure 4. Re-imagining interactions in a post-pandemic mobile design studio

The studio is a mix of casual, formal, expected, and unexpected interactions that ought to be measured and regardless of whether it assumes space digitally or not. Institutions must learn to shun the idea that good design work can only occur in one tangible location and realm, as some institutions are slowly pioneering. When the studio is understood as a by-product of experiences rather than a static physical space, their cultures can be scaled and translated online; securely preserved and proven to be resilient and apt for a post-pandemic world.

NOTES

¹ Wenzhi Chen, "Exploring the learning problems and resource usage of undergraduate industrial design students in design studio courses," *Int J Technol Des Educ,* (2016): 461-487, doi: 10.1007/s10798-015-9315-2.

² Ayşen Ciravoğlu, "Notes on Architectural Education: An Experimental Approach to Design Studio." *Procedia* - *Social and Behavioral Sciences*, vol. 152, (Oct. 2014), doi: 10.1016/j.sbspro.2014.09.146.

³ David Shaffer. "Portrait of the Oxford Design Studio: An Ethnography of Design Pedagogy." *WCER Working Paper*, vol. 11, 2003, pp. 7–12.

⁴ Philip Crowther, "Understanding the signature pedagogy of the design studio and the opportunities for its technological enhancement." *Journal of Learning Design*, 6 (2013).

⁵ Crowther, Understanding the Signature Pedagogy.

⁶ Michael Meyer and Don Norman, "Changing design education for the 21st century." *She Ji: The Journal of Design, Economics, and Innovation,* (March 2019), 13-39, doi: 10.1016/j.sheji.2019.12.002

⁷ Jean-Paul Carlhian, "The Ecole Des Beaux-Arts: Modes and Manners." *Journal of Architectural Education* 33 (1979), 3.

⁸ Elivio Bonollo and Lance N. Green, "Studio-based teaching, history and advantages in the teaching of design." *World Transactions on Engineering and Technology Education* 2 (2003).

⁹ Bonollo and Green, *Studio-based Teaching*.

¹⁰ Meyer and Norman, *Changing design education*.

¹¹ Meyer and Norman, *Changing design education*.

¹² Ouita Broadfoot and Rick Bennett, "Comparing traditional face-to-face Design Studio education with modern internet-based design studios." (2003).

¹³ Thomas A. Dutton and Laura L. Willenbrock, "Reviewed Work: The Design Studio: An Exploration of its traditions and potentials by Donald Schön." *Journal of Architectural Education* 43 (1989): 53-55.

¹⁴ Paul Loh, "Making as Pedagogy: Engaging Technology in Design Teaching." In Advanced Learning and Teaching Environments – Innovation, Contents and Methods (2018): 137-154. doi:10.5772/intechopen.72202
¹⁵ Shaffer, *Portrait of the Oxford Design Studio.*

¹⁶ "London Welcomes Record International Students in Decade as UK Becomes Most Popular Overseas Study Destination. London and Partners News." *London & Partners Media.* (29 Jan. 2020) www.media.londonandpartners.com/news/london-welcomes-record-international-students-in-decade-as-uk-becomes-most-popular-overseas-study-destination.

¹⁷ Joan Ockman. "Architecture School: Three Centuries of Educating Architects in North America" *MIT Press*, (2012): 29

¹⁸ Ksenia Malich, "Alvin Boyarsky and his System: The Evolution of the Pedagogical Programme in London Architectural Association in the 1960-1980s". *Vestnik of Saint Petersburg University* 8 (2018): 683-692. doi:10.21638/spbu15.2018.409.

¹⁹ Peter Buchanan and C. Davis, "Ambience and Alchemy: Alvin Boyarsky Interviewed." *Architectural Review* (*AR*), (Oct. 1983): 27-31.

²⁰ Buchanan and Davis. *Ambience and Alchemy.*

²¹ "School Buildings Produce Culture." *The Architectural Review* (2012), accessed May 10, 2020, www.architectural-review.com/today/school-buildings-produce-culture.

²² Moussavi. School Buildings Produce Culture.

²³ Moussavi. School Buildings Produce Culture.

²⁴ Igor Marjanović, et al, "Drawing Ambience: Alvin Boyarsky and the Architectural Association." *Mildred Lane Kemper Art Museum* (2014): 33

²⁵ Caroline McClatchey and Alex Murray, "Fashion Week: Why Does Central Saint Martins Produce so Many Designers?" *BBC News* (2011), Accessed May 6, 2020, www.bbc.com/news/magazine-14911987.

²⁶ "Top Universities: Art & Design 2019." QS *Quacquarelli Symonds Limited* (2019) www.topuniversities.com/university-rankings/university-subject-rankings/2019/art-design.

²⁷ Rob Sharp, "Central Saint Martins: The Art and Soul of Britain." *The Independent Digital News and Media* (2011) Accessed May 7, 2020, www.independent.co.uk/arts-entertainment/art/features/central-saint-martins-the-art-and-soul-of-britain-811786.html.

²⁸ "Campus for Central Saint Martins by Stanton Williams." Dezeen (2011),

www.dezeen.com/2011/10/18/campus-for-central-saint-martins-by-stanton-williams/.

²⁹ Jeremy Till, Head of Central Saint Martins and Pro Vice-Chancellor, in video call discussion with the author, March 2020.

³⁰ "Central Saint Martins Facilities." *Central Saint Martins*, (2020), www.arts.ac.uk/colleges/central-saint-martins/student-life-at-csm/facilities.

³¹ "Nearly A Publishing House." GCD Central Saint Martins, (2020) www.nearlyapublishinghouse.com/.

³² "As the First Set of Students Graduate from the London School of Architecture, We Catch up with Founder Will Hunter." *Archinect,* (2017) www.archinect.com/features/article/150023626/as-the-first-set-of-students-graduate-from-the-london-school-of-architecture-we-catch-up-with-founder-will-hunter.

³³ Will Hunter, and Farshid Moussavi. "Pedagogy, Profession and Planet." CHANGE – The London School of Architecture (2017): 6–11

³⁴ James Soane, Research Director of The London School of Architecture, email message to Stella Pangilinan, March 30, 2020.

³⁵ James Soane, Research Director of the LSA, email message author, March 30, 2020.

- ³⁶ James Soane, Research Director of the LSA, email message to author, March 30, 2020.
- ³⁷ Deborah Saunt, Co-founder of the LSA, in call discussion with author, March 12, 2020.
- ³⁸ Moussavi. School Buildings Produce Culture.

³⁹ Deborah Saunt, Co-founder of the LSA, in call discussion with author, March 12, 2020.

- ⁴⁰ Deborah Saunt, Co-founder of the LSA, in call discussion with author, March 12, 2020.
- ⁴¹ Jeremy Till, Head of CSM and Pro Vice-Chancellor, in video call discussion with author, March 2020.

⁴² James Soane, Research Director of the LSA, email message to author, March 30, 2020.

⁴³ Our survey was released in April 2020 sampling 100 design and architecture students from different countries. 67.8% felt that their institution's online set-up was not compatible with their education. 87.5% of respondents felt more work could be achieved in their designated physical spaces.

⁴⁴ David McClean and Neasa Hourigan, "Critical Dialogue in Architecture Studio: Peer Interaction and Feedback." Journal for Education in the Built Environment, 8, (2013): 35-57, doi: 10.11120/jebe.2013.00004

BIBLIOGRAPHY

Bonollo, Elvio and Lance N. Green. "Studio-based teaching, history and advantages in the teaching of design." World Transactions on Engineering and Technology Education 2 (2003).

- Buchanan, Peter and C. Davis. "Ambience and Alchemy: Alvin Boyarsky Interviewed." Architectural Review (AR), (Oct. 1983): 27-31.
- Broadfoot, Ouita and Rick. Bennett. "Comparing traditional face-to-face Design Studio education with modern internet-based design studios." (2003).

Carlhian, Jean-Paul. "The Ecole Des Beaux- Arts: Modes and Manners." *Journal of Architectural Education* 33 (1979), 3.

Chen, Wenzhi. "Exploring the learning problems and resource usage of undergraduate industrial design students in design studio courses," *Int J Technol Des Educ*, (2016): 461-487, doi: 10.1007/s10798-015-9315-2.

- Ciravoğlu, Ayşen. "Notes on Architectural Education: An Experimental Approach to Design Studio." *Procedia Social and Behavioral Sciences*, vol. 152, (Oct. 2014), doi: 10.1016/j.sbspro.2014.09.146.
- Crowther, Philip. "Understanding the signature pedagogy of the design studio and the opportunities for its technological enhancement." *Journal of Learning Design*, 6 (2013).
- Dutton, Thomas A., and Laura L. Willenbrock. "Reviewed Work: The Design Studio: An Exploration of its traditions and potentials by Donald Schön." *Journal of Architectural Education* 43 (1989): 53-55.
- Frearson, Amy. "Campus for Central Saint Martins by Stanton Williams." *Dezeen* (2011) Accessed May 14, 2020, www.dezeen.com/2011/10/18/campus-for-central-saint-martins-by-stanton-williams/.
- Hunter, Will, and Farshid Moussavi. "Pedagogy, Profession and Planet." CHANGE The London School of Architecture (2017): 6–11
- Loh, Paul. "Making as Pedagogy: Engaging Technology in Design Teaching." In Advanced Learning and Teaching Environments Innovation, Contents and Methods (2018): 137-154. doi:10.5772/intechopen.72202
- London & Partners. "London Welcomes Record International Students in Decade as UK Becomes Most Popular Overseas Study Destination. London and Partners News." *London & Partners Media.* (29 Jan. 2020)

www.media.londonandpartners.com/news/london-welcomes-record-international-students-in-decade-as-uk-becomes-most-popular-overseas-study-destination.

- Ockman, Joan. "Architecture School: Three Centuries of Educating Architects in North America" *MIT Press*, (2012): 29
- Malich, Ksenia. "Alvin Boyarsky and his System: The Evolution of the Pedagogical Programme in London Architectural Association in the 1960-1980s". *Vestnik of Saint Petersburg University* 8 (2018): 683-692. doi:10.21638/spbu15.2018.409.
- Marjanović, Igor, et al. "Drawing Ambience: Alvin Boyarsky and the Architectural Association." *Mildred Lane Kemper Art Museum* (2014): 33
- Mark, Laura. "As the First Set of Students Graduate from the London School of Architecture, We Catch up with Founder Will Hunter." *Archinect,* (2017), Accessed May 18, 2020. www.archinect.com/features/article/150023626/as-the-first-set-of-students-graduate-from-the-london-school-of-architecture-we-catch-up-with-founder-will-hunter.
- McClatchey, Caroline and Alex Murray, "Fashion Week: Why Does Central Saint Martins Produce so Many Designers?" *BBC News* (2011), Accessed May 6, 2020, www.bbc.com/news/magazine-14911987.
- McClean, David and Neasa Hourigan, "Critical Dialogue in Architecture Studio: Peer Interaction and Feedback." Journal for Education in the Built Environment, 8, (2013): 35-57, doi: 10.11120/jebe.2013.00004
- Meyer, Michael and Don Norman. "Changing design education for the 21st century." She Ji: The Journal of Design, Economics, and Innovation, (March 2019), 13-39, doi: 10.1016/j.sheji.2019.12.002
- Moussavi, Farshid. "School Buildings Produce Culture." The Architectural Review (2012) Accessed May 7, 2020, www.architectural-review.com/today/school-buildings-produce-culture.
- Ockman, Joan. "Architecture School: Three Centuries of Educating Architects in North America" *MIT Press*, (2012): 29
- Shaffer, David. "Portrait of the Oxford Design Studio: An Ethnography of Design Pedagogy." WCER Working Paper 11 (2003): 7–12.
- Sharp, Rob. "Central Saint Martins: The Art and Soul of Britain." *The Independent Digital News and Media* (2011) Accessed May 7, 2020, www.independent.co.uk/arts-entertainment/art/features/central-saint-martins-the-art-and-soul-of-britain-811786.html.
- Temple, Paul. "Learning Spaces in Higher Education." London Review of Education 6 (2008): 229-241.
- Wilson, Stephanie and Lisa Zamberlain. "Design Pedagogy for an Unknown Future: A View from the Expanding Field of Design Scholarship and Professional Practice." *The International Journal of Art & Design Education* (2017): 106-117. doi:10.1111/jade.12076

FOUNDED ARCHITECTURE- REFLECTIONS ON HOW INTENSIVE ONLINE WORKSHOPS COULD SHAPE A NEW PEDAGOGICAL CULTURE IN ARCHITECTURE AND URBAN ANALYSIS AND DESIGN

Author: ARIAN HEIDARI AFSHARI, ANGEL CORDERO AMPUERO

Institution:

POLITECNICO DI MILANO, ITALY; UNIVERSIDAD POLITÉCNICA DE MADRID, SPAIN

INTRODUCTION

This article critically reflects upon an experimental online international advanced architectural design workshop organized under a broader collaboration between two Architecture schools: AUIC (Politecnico di Milano) and ETSAM (Universidad Politécnica de Madrid), where students and instructors from both universities were working together in joint teams to explore significant analytical architecture and urban tools and techniques of investigation on the environmental, cultural, contemporary values of Architecture.

The first edition of the workshop was conducted in June 2020 in a fully online format. Receiving students and professors from both cities allowed us to test significant analytical experiments within virtual teams in an international collaborative learning context. For both faculties, such an intensive workshop was a novel way to explore how virtual/distance working groups could share different skills, tools, and architectonic cultures, build a convergent reading of the environment, and propose a successful integration project in an intensely short period compared to the regular semester-based architectural design studios.

The students received an introduction and primary materials in advance by their responsible professors in home universities. The workshop began with an intensive set of lectures on the selected case studybuilding, urban and historical context, and an in-depth analytic cultural background. Students then engaged in a profound reading, interpreting, and graphical analysis of the selected case study, followed by developing critical reflective projects formulated collectively by students and professors. The contextualization of students' visionary points of view was the final product of each group.

In short, the workshop accounted for investigating contemporary architecture and urban qualities and gaining advanced knowledge of architectural analysing and narrative making as well. We have been registering the first workshop results and the ongoing second edition to provide a common ground for meaningful online learning/teaching debates on existing architecture and theory in contemporary cities.

MAIN OBJECTIVES; AN INTENSIVE WORKSHOP DURING COVID-19 PANDEMIC

Founded Architecture workshop series' main intention is to inquire about students' capacity to propose novel architectonic concepts by gaining their insights from in-depth knowledge of the context. Like other intensive workshops, Founded Architecture does not have a comprehensive architectural design approach as an engaging experience for students; instead, it attempts to anchor a solid base for critical architecture and urban analysis. In this didactive initiative, students engage with the built Architectural environment, founded in its context; learning by analysing and analysing for design are the two main poles of this workshop. The primary goal has been to establish Founded Architecture as a new way for advanced teaching and learning architecture.¹

The workshop as a learning environment is not a new concept: tested in occidental architectural discourses since, at least, the beginning of the modern era. Founded Architecture workshop challenge was to engage diverse teaching traditions in an international student/teaching framework where students' diverse levels of Architectural knowledge and background had to be confronted in a few days, compelling them to team up in no more than hours and react with passion to teachers' propositions. In short, the experience could be claimed as the test of multitasking ability and teamwork, not far from professional competition attendance. Covid-19 global pandemic, nevertheless, introduced a new breaking directive: we had to make it all on-line.

These new conditions modified the critical measures of the workshop. If, before pandemic, the intellectual defiance was founding, during the pandemic, the practical priority has been engaging. Thus, pre-pandemic normal on-site gathering in classroom and site visits became the virtual encounter's main character, the first actor role replaced by supporting, both for students and professors, and a synthetic idea started to emerge; engaging by founding. When on-site reading of the context had to be avoided, in-depth knowledge could be a significant replacement, through sharp analysis and critical discussions, and the necessity of communication would fill the gap between theory and experience, positively helping to break through social distancing walls. We explicitly were cautious about a possible "over-simplistic undiscriminating outlook."²

Initial idea; the development of an international workshop concept

The 'Founded Architecture; Architecture in Context' as an international advanced architectural design workshop was born as part of a pedagogical initiative of a more comprehensive project, 'Founded Architecture, Analysis-Design,' based on a collaboration between two research groups: ARS Lab (Architecture Resources Strategies) from DAStU, Politecnico di Milano and ADFS (Analysis and Documentation of Architecture, Design, Fashion, and Society) from Universidad Politécnica de Madrid. The principal research project aims to explore effective analytical architecture and urban tools and techniques of investigation on the environmental, cultural, modern, and postmodern values of architecture, focusing mainly on Milan and Madrid cities.

In the first call of the workshop, launched in February 2020, it was organized for the students to visit the site in an opening meeting, before engaging in a profound reading, interpreting, and graphical analysis of the selected case studies. Each university's selected students and faculties were planned to meet in Madrid for a 100-hour workshop exploring an existing case study site and architecture. When the Covid-19 pandemic started, the workshop had to be redesigned online. The engaging experience of the site had to be swapped by delving into exciting in-depth knowledge of its complexity. Likewise, the mixed Madrid-Milan student workgroups had to renounce to a in person meeting, replacing it with virtual encounters.

However, during June 2020 when the workshop was conducted in a fully online mode, its primary structure remained intact: the reading, interpreting, and analysis were being followed up by students'

development of critical reflective projects intervening inside and in the context of the selected case study, within the framework of a shared visions for 2050 in which we "untangle the terms visionary and Utopia from one another."³ The visions have been formulated collectively by students and professors involved in each workshop for each site-specific case study. The contextualization of those visionary points of view into the under-investigated case study was the final product of each group.

PAST COMPETITION; THE MEDIUM OF INVESTIGATION OF THE BUILT PROPOSAL

Every architectural competition is searching for the best proposal to find the most practical ideas or build the new architecture with high anticipation of success. One can find a handful of reference competitions such as the 1970 Georges Pompidou, where the competition was the contestation of the legacies of modernism as well as the unresolved state of architectural culture of the 1970s, "when the competing alternatives to modernism were still to be fully formed, and the ambition for a civic architecture had not yet been obliterated by cynicism."⁴ Such canonical competitions where the place in which the intensity of ideas and architectural debates crystallized the paradigm shift of architectural discourse of decades ahead. Since the 1970s, like Paris, Berlin, and London, Madrid and Milan have been prosperous cities in terms of architectural competitions, with solid entries, sound proposals and successful built outcomes.

Founded Architecture workshop employed such built architectural projects as case studies for investigation and learning. In the workshop, we hoped to engage, first and foremost, students in studying the winner's proposal of the competition. That by itself, enables students to learn about the solutions/design strategies, potentials, and limits of the winner's proposal, conceptual mindset behind it, and its practical adaptations toward fundamental design factors such as site, built context and required program. Moreover, comparing the original winning proposal to the built outcome, students would investigate the practicalities, learning more about the process of realization and its impact on original ideas, maturing them to become reality.

Looking into finalists' proposals as alternatives to the winner, on the other hand, allows students, to explore the potentials and limits of the winner's proposal. Each of the finalists' project was an insight into alternative conceptual frameworks and showcases different conditioning of design factors. Moreover, comparing the original finalists' proposals to the built outcome, students could search for new potentials, imagining what the reality could have been. The potentials which never found the chance to become reality, still are reasonable to imagine the truth and projecting it to future. This is especially due to avoiding "the risk of foundering on subjective questions of taste, visual and sensory habits, which vary from one individual to the next are augmented by vast number of socio-political and cultural attitudes which are taken to represent aesthetic truth."⁵

Case study of Madrid; Prado Museum Extension, 1996-2007

Accordingly, the first workshop was focused on Madrid's Prado Museum area, a historical site highly consumed by tourism-related activities, which during 1990s urgently demanded both amenities expansion and urban re-qualifications. The city critically reviewed the historical, topographical, townscape, structure, and functional context of Prado Museum, which resulted in an announcement of the Architectural competition for expansion of Museum in 1996. In fact, the Prado area summarizes some of the main Madrid's contradictory essences as the capital. Thus, the competition called for a better understanding of the site's contextual contradictions and the landscape continuity and urban densification of ever-growing Madrid, as well as conservation and consolidation of architectural and urban resources. In the first phase of the competition, the museum's context was described as "located in an established area of the city, from the Age of Enlightenment to mid-twentieth century,"

expressing Madrid sentiment toward that area of the city. And in the final restricted call for entries – won lastly by Rafael Moneo in 1998– the city went one step further and inquired for contiguity with the existing historical structure of the context as "the extension of the Museum's main building into the area of the Jerónimos Cloister"⁷.

Founded Architecture workshop, proposed an introductory session on the competition, followed by various context analysis approaches to reflect the competition site's characteristics and issues. Those primary readings addressed the memory of the Madrid geographical features and historical landscape toward contemporary condition; the urban context and its complexity, including some insights toward structural, morphological, and typological questions; the linguistic expressions of the architecture; and, last but not least, the metamorphic process of Prado Museum itself, both as institution and building.

Students were grouped in multicultural teams as diverse as possible. The first-hand experiences of ETSAM students joined the unbiased observations of their Politecnico di Milano colleagues, based on the provided source documents and each group objective interpretations.

The next phase was to explore Rafael Moneo's project for the Prado Museum extension more in-depth to provide students with an opportunity to sharpen their analytical capacity, tools, and techniques and gain a more profound understanding of the winning proposal. The further strategic step was introducing an alternative to Moneo's competition proposal to compare and learn from. For each student group, based on its methods and criteria of analysis and their points of interest, a selected finalist proposal for the same competition was given to explore. Investigating each proposal with its unique approach, advantages, disadvantages in design, and its relation to the context and program, each group could read the proposal's strength and weaknesses through a comparative analysis.

PROPOSALS: TOOLS TO OPEN MEANINGFUL DEBATES WITH BUILT CONTEXT

"The unknown future is more real than the present and the past. It is the future that decides the sense and the durability of both past and present, but it is also a fiction that didn't happen yet and that may never happen at all".⁸

In the final phase of the workshop, the architectural analysis led to a final tentative architectural design, requiring the students to instantly shift the focus from mechanical outcomes of analysis to a dialectic process of narrative making. Nevertheless, according to the previous phases and each group's different readings of the project objectives, for the final submission, students attempted to respond to the complexity of the actual condition of Prado Museum. Thus, site and program knowledge of groups led them to achieve more environmental insight; their understanding of *genus loci* permitted them an integrated and more reliable approach to design for constructed environment; their understanding of cultural, functional, and even material context conditioned their reply; the linguistic capacity of their former phases' analysis, lastly, helped them to create their new narratives of Prado Museum and its context.

In short, students moved from retroactive excavation of information of past and present, looking forward, projecting their architectural schemes for the future of the Museum; their final design were the reflective testimony to the dialectic relationship among past, present, and future of a subtle constructed architecture such as Moneo's intervention in Prado Museum.

This highly compact final phase undertook, thus, the disciplinary boundaries between research-bydesign and design-by-research. Both approaches can operate with *genus loci* as the generative tool of the project. However, the former uses analytical experimentation to discover it, while the latter looks for it through the process of analysis. Suppose research-by-design can be sensitive to the physical and cultural context; it often manages the conditions to engage the architect's imagination. On the other hand, design-by-research 'uses to represent the workings of collective memory'⁹ reconceiving *anamnesis* for the *Theatre of the World*.

With that definition, thus, one can argue that there can be a healthy tension between culture and counterculture they represent. Even if both approaches can be innovative enough, from their initial phase, both views argue in their "quest of the Holy Grail": if one tries to explore the alternatives fanatically, the other need to endeavour in preservation – not only about the notion of *cultura* but also on the concept of *natura*. Even in sharing a great sense of responsibility toward the sustainability of our built environment, both approaches collide in the same dichotomy, alternatives versus preservation; being proactive versus retroactive. Through their main creative motivations: research-by-design founds its wonderland in the dematerialization of utopia or dystopia, while design-by-research happiness sojourns in "an art of relationship"¹⁰ that ensure the social-environmental engagement of with the art.

Analysis for design; intensive and abstract, yet engaging and effective

"In practice, architectural aesthetics is always of this type: a more or less coherent criteria which are formal and symbolic at the same time".¹¹

For the Founded Architecture workshop, the intensiveness of the teaching and learning was a keyword. We have been exploring a new teaching model and engaging with students in the conscious process of natural dialectic interplay between research-by-design and design-by-research, in comparison to standard Architectural design courses with predetermined common school rules, aims, and regulations. We were also privileged by having the possibility by the two universities to offer the workshop free of any registration or tuition fee and having a highly competitive students' selection -10 students from each university admitted to the workshop. Therefore, we had a unique opportunity to strategically establish underlying tailormade clues and insights for each group to focus its analysis and, guide it to explore as profoundly as possible in a 100-hour research schedule.

The results of this experiment were very positive; even the workshop's intense rhythm helped the workflow and raised the participants' passion, both in students and teachers. Thanks to that, a meaningful dialogue between research and design got shaped in a very short period, and raised its voice, loud enough to get remembered.

Our workshop intensive teaching/learning method focuses on a precisely defined number of objectives, starting with the context of architecture, retracking it with the sharp set of architecture and urban analysis. Thus, in each workshop, the type and number of analyses should be ruled by precise exercises proposed by teachers and tightly tutored to avoid digressions. Each case study should be examined with a straightforward suit of precise parameters, toward legitimate linguistic responses to each proposal's analytical attitude.

In contrast with a standard architectural design studio course – 12-week class – we accepted the fact that both the amplitude and dispersion of the objectives would be considerably reduced. However, during the first workshop, this unconventional approach allowed students to establish their open debates and pursue more abstractly valid responses instead of a more comprehensive and complicated standard design remedies. Of course, the method counts on the students' self and collective awareness of the limiting conditions, their confidence in design problem-solving skills, as well as active online participations and advanced knowledge of digital tools, either in design or communication.

CONCLUSION

To sum up, Founded Architecture workshop experience in a multicultural international student/teaching environment, joined students from AUIC and ETSAM, in a fresh way far away from the traditional exchanges between the two institutions. Working on a carefully selected case study and program to analyse and re-evaluate by design positively helped students and teachers combining their skills and competencies, but more importantly, enabled them to share diverse points of view during the difficult times of the Covid-19 pandemic.

Students had an opportunity to experience the two schools' different approaches in both analysis and design phases. Simultaneously, professors, guest lecturers, and final jury members were able to debate their institutional approaches, passionately, using the workshop platform.

With preoccupation about the online mode of education, especially in an intensive workshop type, all the course's critical components were successfully re-designed toward a smart working environment. Interestingly enough, the idea was well picked up by both teaching team and students. And, as a result, the workshop platform remained fully online, for much more than the initial 100 hours allocated for the workshop. The engagement was almost 24/7, which empowered teachers and students to establish a more fluid teaching/discussion and feedback environment. Sharing an intense platform with students without the formality of standard classes; liberated them from expressing themselves and engaging in the debates profoundly, which resulted in exceptionally fruitful results. And the intensity of the workshop constructively encouraged the whole process and elevated the outcomes.

Upon the success of the first edition of the workshop, the two research groups in AUIC and ETSAM organized for 2020-2021 three more workshops. Therefore, the second edition focused on the Milan and the 2001 Bocconi University expansion competition, exploring Grafton Architects' winning and alternative finalists' proposals. It is conducted with a similar method and in fully online mode during January 2021, and the third edition is set for June 2021.

NOTES

¹ Both AUIC and ETSAM offer traditional Architectural design studios, and Erasmus students' exchange semesterly and annually. Nevertheless, the amount of intensive exchange between the two schools is much less than regular ones.

² Rob Krier, *Stadtraum / Urban Space* (London, Academy Editions, 1979), 16.

³ Nathaniel Coleman, "The Problematic of Architecture and Utopia." Utopian Studies 25, no. 1 (2014): 9.

⁴ Susan Holden, "Possible Pompidous." *AA Files*, no. 70 (2015): 33.

⁵ Rob Krier, *Stadtraum / Urban Space* (London, Academy Editions, 1979), 15.

⁶ Ministerio de Cultura, "Concurso para la Ampliación del Museo del Prado: Bases." Arquitectura 308 (1996): 24.

⁷ "The Extension", Museo del Prado, accessed January 30, 2021,

https://www.museodelprado.es/museo/ampliacion-jeronimos

⁸ José Luis Pardo. "Que viene el futuro," *El País*, January 23, 2017. (translated by Moneo himself in his essay: Moneo, Rafael. "Seeking the Significance of Today's Architecture." *Log*, no. 44 (2018): 35-44. I am not sure how to cite this!

⁹ Sebastien Marot, Sub-urbanism and the Art of Memory (London: Architectural Association, 2003), xxx.

¹⁰ Gordon Cullen, *Townscape* (London: Architectural Press, 1971), 7.

¹¹ Niels Luning Prak, *The language of architecture: A contribution to architectural theory* (The Hage: Mouton, 1968), 6.

BIBLIOGRAPHY

Baldellou, Miguel Angel. "El Prado como obsesión." Arquitectura 308 (1996): 8-15.

Cullen, Gordon. Townscape. London: Architectural Press, 1971.

Lynch, Kevin. The image of the city. Cambridge, Mass.: MIT Press, 1960.

Krier, Rob. Stadtraum / Urban Space. London, Academy Editions, 1979.

Marot, Sebastien. Sub-urbanism and the Art of Memory. London: Architectural Association, 2003.

Ministerio de Cultura. "Concurso para la Ampliación del Museo del Prado: Bases." Arquitectura 308 (1996): 24-26.

Moleón, Pedro: El Museo del Prado: biografía del edificio. Madrid: Museo Nacional del Prado, 2011.

Moneo, Rafael. "Seeking the Significance of Today's Architecture." Log, no. 44 (2018): 35-44.

Museo del Prado. "The Extension." Accessed January 30, 2021,

https://www.museodelprado.es/museo/ampliacion-jeronimos.

Norberg-Schulz, Christian. Genus Loci: towards a phenomenology of architecture. New York: Rizzoli, 1979.

Pallasmaa, Juhani. The eyes of the skin: architecture and the senses. London: Academy, 1996.

Prak, Niels Luning. *The language of architecture: A contribution to architectural theory*. The Hage: Mouton, 1968. Rogers, Ernesto Nathan. *Esperienza dell'architettura*. Torino: Einaudi, 1958.

Rossi, Aldo. L'architettura della città. Padova: Marsilio, 1966.

Venturi, Robert. Complexity and contradiction in architecture. New York: The Museum of Modern Art, 1966.

SITE COMPLEXITIES AND LEARNING OUTCOMES

Authors: ANNE MARGRETHE WAGNER, BETTINA LAMM

Institution: UNIVERSITY OF COPENHAGEN, DENMARK

INTRODUCTION

Relational and site-specific engagement is a crucial pedagogical aspect of training in landscape architecture. Frameworks that bring together students, site(s), actors and materialities in collaborative settings provide valuable hands-on experience and knowledge transfer. This contribution discusses learning outcomes in a design studio. It does so by focusing specifically on the competences gained from interacting directly with the dynamics and frictions of the transitional state of sites. We deal with critical aspects related to the contextual setting (in line with the concept of congruence¹) by addressing learning outcomes, and how we frame these through course activities. We do this, firstly, by drawing on examples of students' perspectives, based on course evaluation as well as personal experience from various reactions to the activities, assessment, feedback and organisation throughout the course. Secondly, we look at the role of the contextual setting of the course in relation to its overall aims, as described in the course description, and of the study programme, as framed by the Curriculum for the MSc Programme in Landscape Architecture. We round off with two concrete examples of specific learning situations rooted in context, critical engagement with multiple site understandings and the onsite mock-up exercise. These examples point towards the transformational learning potential of related social and spatial context interactions.

The course setup

In the Urban Intervention Studio, in the context of an MSc course in landscape architecture at the University of Copenhagen, we set up studio space on site and work on and from location.² We move the teaching-learning environment outside the classroom and work from a local base – often a local workshop, a re-used building or empty office space. We stay in the area throughout the course.

The core of this approach is interaction with collective spaces in the city, their role as public spaces and meeting places, but also their ambiguous state *per se*. These sites include post-industrial areas, public or semi-public domains, and other kinds of urban landscape that provide students with the opportunity to unfold and address the relevant dynamics and potentials. The groups investigate through speculative action including both critical reflection and activation of potentialities. The students use a variety of site readings (including photography, drawing, mapping and video) to explore physical and social conditions and relations. They then examine different scenarios through spatial interventions, prototyping and performances that respond to the current spatial situation. At the same time, students critically position their projects in relation to future strategies and visions, inscribing themselves into existing trajectories or alternative futures. This multiscale approach creates an

important field of understanding and responding to urban sites and is vital for the nature of the knowledge generated and shared.

The studio has been running at UCPH since 2012. Working with a wide range of individuals, organisations and spaces over the years has given the team a great deal of experience with the onsite studio model and the 1:1 scale that to a significant degree, inform and interact with the authors' practice-based research on urban transformation, temporary use³, art practice⁴ and collaborative design.⁵

This contribution reflects on learning objectives related to the studio setting. It provides rich possibilities for exploratory approaches that are important for a reflective design practice. However, it can also create challenges from a pedagogical view, due to what are, at times, precarious and highly dynamic conditions. While live build projects are established formats, it is necessary to unfold their embedded potential continuously, as well as to reflect critically on their role in shaping meaningful exploratory frameworks for students and communities. We unfold the context-based learning spectrum through evaluation and discussion of the learning outcomes stated in the course description and curriculum. We also depict specific contextual learning situations in order to illustrate transformative dynamics and interactions of relevance for education, practice and research.

The Urban Intervention Studio course seeks to develop methods of site understanding that cut across divisions of scale, and which relate to experientially embodied aspects, as well as to overarching urban development agendas. These poles meet on site, and in dialogue with the site. This means that students encounter a variety of challenges during execution of their projects: challenges that reveal themselves in specific interventions but reflect back on larger issues such as politics, stakeholder agendas, or regulatory constraints. One important learning objective is to train the students to deal with emerging site complexities, and to navigate a complex, often paradoxical conglomeration of regulations, agendas, narratives and needs. A collective process of 'sense making'⁶ involving students and site communities is crucial to making the initial brief more specific and well defined.

The students will gain insight into the interrelationship between a given space and its underlying agendas, with training being provided in both strategic capacities and design competencies. Throughout the course, they will become familiar with context relations and site-specificity⁷, and they will learn to be attentive to different (even opposing) understandings of a site and its related logics and narratives.^{8 9} We see all of these experiences as important learning outcomes. The students gain a very hands-on experience of navigating around the issues that they are very likely to encounter in their professional lives.

Perspectives on context-based learning

The studio format gives the students (in groups of three to five) a high degree of freedom to shape their projects based on their interests and aspirations and to cultivate specific approaches (e.g. strategic urban planning, participatory approaches, performance-based interventions, or design details). The setup requires them to act independently and to make important decisions and prioritise within their group. This means that they can actually affect and customise their activities, but also – to some extent – the nature of the assessment and feedback, depending upon the type of project and their projects while engaging and coordinating with external stakeholders. It is an important learning objective that students experience navigating situations like this involving dynamic power relations, decisions and changes. One former student emphasised the contextual value of "really being able to build something on a 1:1 scale for people to use and have an interface with real stakeholders." However, this aspect often also causes seemingly unexpected frustrations for the students, since it may result in delays or

changes that diverge from their original plans and deadlines. "[In] the hands-on part – when building your own design – you become aware of just how difficult it is to plan for real life", one of student observed.

From our perspective as educators, coping with these challenges in a professional manner is an important learning outcome. Another student stated that "the project area has been a hard [one] to work in", as there were "a lot of restrictions from [a stakeholder]". In a situation like that, it can be difficult for students to see it as a useful learning situation. Later on, they often recognise its value, but sometimes they still find it challenging to consider this as part of the intended learning outcomes, rather than simply a coincidence or glitch. On the other hand, some of these situations *do* emerge because we as course organisers cannot control the context and accept, therefore, that a relatively high level of unpredictability will inevitably play a role in the course setting. Striking the right balance between ensuring an enabling setting for the students to work in, while allowing (some) productive disturbances in terms of the site conditions and stakeholders, is one of the ongoing challenges that must be taken into consideration during the nine-week course. The openness and unpredictability inherent in any course setting is important to consider, since it affects the congruence of teaching-learning activities, assessment and feedback, as well as integration with the organisational and management aspects of the course.¹⁰

As explained above, the studio we are describing embodies a contextual learning approach. As part of learning outcomes, the course description states that "the students do not only develop strategic and technical skills but more importantly sensitivity to the environments they engage in".¹¹ It further specifies that students will learn to "interact and collaborate in a complex setting consisting of students, teachers and a wide range of external stakeholders". The general competence profile of the landscape architecture curriculum also highlights the importance of gaining knowledge about how to "handle work and development situations that are complex, unpredictable and require new solution models".¹² As a result, the skills that we as educators want the students to gain (apart from mastering design methods and tools) largely emerge from engagement with the project area and people active there. By gaining insight into the different logics at play – for instance by learning and navigating the different rationales expressed, and the actions performed by, the various actors and authorities involved – students are introduced to the professional 'game'. They become familiar with different approaches to something they might previously have considered from a much more one-sided perspective. In short, they gain insight into specific practices, but they also form their own way of working.

Two specific activities and processes have been consistently important for developing the competencies highlighted throughout the years. Firstly, awareness and a critical proactive approach to site narratives is cultivated by *operating with multiple site understandings*, and by engaging with a project area from different perspectives and stakeholders, while also engaging with theoretical discussions on site understanding. Secondly, the *mid-term mock-up presentation* also creates another important learning situation. Here, the students operate in suggestive mode, and employ simple and cheap methods to make their first physical intervention by testing a specific space and theme. The magic of seeing an immediate change, reaction and response from themselves and from others, as well as collaborative work with the materials and tools available in the group, proves to be a simple but highly transformative step forward for them.

Operating with multiple site understandings

The students find themselves in dialogue with a diverse range of collaborators and stakeholders, which is highly dependent upon the location. They include both formal and informal actors, and they range from individual citizens to larger national organisations. In most cases, a principal local stakeholder functions as a host and contact person. This might be a local council, an integrated urban renewal office,¹³ or an art or cultural institution. While the initial dialogue is centred on the main stakeholder, the network of contacts the students are invited into will increase and become more specific to the group's project area and focus. These project-related networks are important for widening course participants' awareness of local thinking, needs and conflicting ideas. In this way, the complexity of different sites, and the agendas shaping them, will gradually unfold. Understanding a site as an "overlay and interplay of multiple realities operating at the same time, on the same place"¹⁴ and discovering the multiple logics at play are crucial to respectful and contributory engagement with the places and people with whom the students interact.



Figure 1. Harbour area in Elsinore, Denmark: One aerial view but many site understandings. Photo: Anne M. Wagner.)

In 2018, for instance, the studio worked with the harbour in Elsinore (Figure 1), an area heavily loaded with historic traces, new functions and various layers of meanings. The old shipyard had been transformed into a multifunctional hub, and 'culture yard'.

Enclosed by a embankment, the historic Kronborg Castle dominates the Horizon. This is the famous home of Hamlet, one of Denmark's main tourist attractions, and a UNESCO world heritage site. The Kulturhavn (Culture Harbour) brands the collective identity of what are both historic landmarks and present-day cultural institutions, merging cultures of both tradition and innovation. The area revealed interesting dilemmas and potentials, in terms of intervening in a heritage site which is in the process of transformation. Our local main host was *Catch*¹⁵, a creative and innovation-focused centre for education in the field of art and technology. However, another important stakeholder was the Agency for Culture and Palaces. This agency comes under the aegis of the Ministry of Culture. It is responsible for managing and maintaining state-owned cultural properties, among them Kronborg Castle in Elsinore. While spokespersons for the castle management were very positive about the brief for the course, they also expressed hesitancy in relation to physical interventions because of the area's

status as a UNESCO heritage site (Figure 2). There are therefore substantial underlying criteria and restrictions which need to be taken into account, not only behind the castle walls but extending to the city skyline and to adjacent areas as well.



Figure 2. Discussion with stakeholder representatives. (Photo: Anne M. Wagner.)

In their work, one of the groups embarked on a discussion of the relationship between heritage and the everyday life of cultural attractions such as Kronborg. They did so by working with one of the 'grey zones' in the castle complex. Their project '*Highlighter*'¹⁶ addressed the peripheral parts of the heritage site. It cast light on one of the overlooked everyday spaces, a popular fishing spot behind the wall and close to the main site. In this way, a discussion of heritage seen as a stable 'object', versus multifaceted and dynamic perspectives on heritage values¹⁷, became a turning point for the project: one that engaged critically with multiple understandings of the site – as a technical entrance zone, a non-place, an informal fishing spot, part of a UNESCO site and a site of national historic significance. Their close reading of the informal uses of these peripheral parts generated new perspectives on its various qualities, its role in everyday life and local appropriation of a national monument.

Their final intervention (Figure 3) highlighted the quality of the water edge and posed an open question about what activities to promote and cultivate. The project engaged both anglers and heritage specialists. It became a common ground for discussing access and the everyday life of a protected cultural site. This approach exemplifies how *operating with multiple site understandings* and a subsequent reprogramming proposal reveals new hybrid perspectives that can inspire new experiences and uses.



Figure 3. Project by the Highlighter-group: Malin Nicole Persson, Julia Hauer, Anders Hebogård Schäfer and Elin Sofía T. Vestergaard. The Highlighter puts focus on everyday practices and the rear of a heritage site (photos: Anne M. Wagner)

'Doing in space' – the first mock-up

A related, context-based learning situation – one that has proven highly transformative in a pedagogical sense – is the *on-site mock-up exercise*. Around halfway through the course, groups create a spatial prototype to test out their concept. These are presented during a collective walk-around to the project sites and can include a specific method of presentation, a performance, a participatory aspect involving the audience and the testing of an idea. The final projects are presented in a similar fashion.

The idea is to construct an actual intervention that has an important didactic goal built into it. It is obviously not always possible to build full-scale projects, and we usually need to work with drawings and other representations in landscape architecture and urban design. However, the experience (for many, the first) of placing a 1:1 physical object on a site and forming their own embodied judgement of it – along with the reaction of others to their design – can be an important 'lightbulb moment' for the students. One of the situations in which this can be identified clearly, and at an early stage, is during the mid-term mock-up presentation, when groups demonstrate and perform their concept based on a first-sketch prototype. The experience of 'doing' in space, of 'touching the site' for the first time, often becomes a transitional point in their work – due to both the reactions and impulses generated and their own work in the space. A pedagogic resonance and '*Anverwandlung*'¹⁸ can therefore be seen in this course-specific phase of the project development. The act of appropriating the physical space, or specific subject matter, not only creates an outward change, but also changes the participants.



Figure 4. The mock-up mid-term presentation. (Photos by the Highlighter-group; Malin Nicole Persson, Julia Hauer, Anders Hebogård Schäfer and Elin Sofía T. Vestergaard.)

In the case of the *Highlighter* project, the mock-up was created through the positioning of simple plastic milk crates from a store, keywords written on the ground with chalk, and a poster describing how the Highlighter-figure could be located at different transitional zones and peripheral parts of the harbour in Elsinore (Figure 4). Using the crates as a staircase, people were met by the sudden sound of the ocean, a spectacular view and the discovery of a hidden spot where they could shield from the wind. The concept presentation and keywords on past and future heritage evoked a discussion about boundaries, appropriation, and dominating narratives. Both embodied engagement with the 'rear ocean view' and on-site dialogue emerging through the mock-up, proved highly informative for the group in moving forward with their conceptualisations. It widened the spectrum of ways to think about the site, and it investigated the formal and informal aspects of the area with curiosity, challenging the logic of the initial requirement of the cultural agency to be "invisible and floating", and not to interfere with the dominant heritage narrative of a castle complex.

For *Highlighter*, the midterm mock-up worked as both an initial 'touching' of the space and as an experiential spatial investigation as well as a dialogue tool. The testing of dimensions and the distribution of elements in relation to context, as well as experimentation with materials and the exploration of construction techniques, are other relevant investigations during mock-ups.

Practised curriculum

Prototyping and full-scale design testing can provide a valuable approach to gaining knowledge about collaborative construction and production in design training.¹⁹ Apart from construction skills, design interventions can also serve as a type of inquiry that, through physical probing, makes directions tangible and debatable through what can be characterised as a 'suggestive' mode.²⁰ Addressing overlaying or conflicting site understandings and engaging directly with specific spatial situations in a propositional mode are key elements in terms of the context-related learning provided by the Urban Intervention Studio. They support learning on several levels: mastering specific tools and methods but also becoming acquainted with (and testing out) more implicit aspects of the discipline by learning "ways of thinking and practicing in a subject"²¹ through tacit, experiential learning. However, while highly rewarding in terms of the group's collective learning, and in relation to project quality, these features also exemplify the difficulty of controlling embedded dynamics. When relating to students' perspectives on the learning outcomes set out earlier, it is clearly crucial for us as educators, and as

those responsible for the course, to consider alignment in relation to the "lived experience of a curriculum". This means balancing the "curriculum as planned" with the "curriculum as implemented".²² This paper suggests that nuanced pedagogical discussions (ones which unfold transformative examples and situations in on-site teaching and learning) are important for examining the role of contextual learning overall, and in thinking through its implications for communities and for landscape architecture training.

NOTES

¹ Dai Hounsell and Jenny Hounsell, "Teaching-Learning Environments in Contemporary Mass Higher Education", *BJEP Monograph Series II, Number 4 - Student Learning and University Teaching* (British Psychological Society, 2007), 95

² Bettina Lamm and Anne Margrethe Wagner, "Urban Intervention Studio being site specific : temporary design installations in transforming urban areas" in *Teaching Landscape: The Studio Experience*, ed. Karsten Jørgensen et al. (New York, Routledge, 2020), 56-67

³ Anne Margrethe Wagner, *Permitted Exceptions: Authorised Temporary Urban Spaces between Vision and Everyday* (Frederiksberg: Department of Geosciences and Natural Resource Management, Faculty of Science, University of Copenhagen, 2016)

⁴ Bettina Lamm and Anne Margrethe Wagner, *Playable - Engaging Art and Design Installations in Public Space* (London: Routledge, forthcoming)

⁵ Anne Margrethe Wagner, Bettina Lamm and Laura Winge, "Move the Neighbourhood with children: Learning by co-designing urban environments," *Charrette—Journal of the association of architectural educators* 5 (2019), accessed January 25, 2021,

https://www.ingentaconnect.com/contentone/arched/char/2019/00000005/00000002/art00010#

⁶ Dana Cuff, Architecture: The Story of Practice (Cambridge, The MIT Press, 1992), 254

⁷ Miwon Kwon, One Place after Another -Site-Specific Art and Locational Identity. A critical history of site-specific art since the late 1960s (Cambridge/London, MIT Press, 2002)

⁸ Andrea Kahn, "Defining Urban Sites" in *Site Matters*, ed. Carol J. Burns and Andrea Kahn (New York: Routlegde, 2005), 281-296

⁹, Robert A. Beauregard, "From Place to Site: Negotiating Narrative Complexity" in *Site Matters*, ed. Carol J. Burns and Andrea Kahn (New York: Routlegde, 2005), 39-58

¹⁰ Dai Hounsell and Jenny Hounsell, "Teaching-Learning Environments in Contemporary Mass Higher Education", *BJEP Monograph Series II, Number 4 - Student Learning and University Teaching* (British Psychological Society, 2007), 101

¹¹ "NIGK15032U Urban Intervention Studio -Volume 2018/2019", University of Copenhagen, accessed January 25, 2021, https://kurser.ku.dk/course/nigk15032u/2018-2019

¹² "Programme-specific Section of the Curriculum for the MSc Programme in Landscape Architecture at the Faculty of Science, University of Copenhagen 2007 (Rev. 2020)", University of Copenhagen, accessed January 25, 2021

https://www.science.ku.dk/studerende/studieordninger/kandidat/landscape_architecture/Sto_landscape_architect ure.pdf

¹³ "Integrated Urban Renewal in Copenhagen", Technical and Environmental Administration, Urban Design Department, The City of Copenhagen, accessed January 25, 2021,

http://kk.sites.itera.dk/apps/kk_pub2/pdf/870_hHa1d53AJZ.pdf

¹⁴ Andrea Kahn, "Defining Urban Sites" in *Site Matters*, ed. Carol J. Burns and Andrea Kahn (New York: Routlegde, 2005), 286

15 https://www.catch.dk/

¹⁶ The 'Highlighter'-group consisted of Malin Nicole Persson, Julia Hauer, Anders Hebogård Schäfer and Elin Sofía T. Vestergaard.

¹⁷ Graham Fairclough, "New heritage frontiers", *Heritage and Beyond* (Strasbourg: Council of Europe Publishing, 2008), 29-43, accessed January 25, 2021, https://rm.coe.int/16806abdea

¹⁸ Hartmut Rosa and Wolfgang Endres, *Resonanzpädagogik – Wenn es im Klassenzimmer knistert* (Weinheim/ Basel, Beltz Verlag, 2016)

¹⁹ Evan Greenberg, "The value of the full-scale prototype in architectural education" in *Charrette* Volume 4, Number 1 (2017): 13, accessed January 25,

2021, https://www.ingentaconnect.com/contentone/arched/char/2017/00000004/00000001/art00004

²⁰ Joachim Halse and Laura Boffi, "Design Interventions as a Form of Inquiry" in *Design Anthropological Futures.* ed. Rachel Smith et al. (London: Bloomsbury, 2016), 89-105

²¹ Dai Hounsell and Jenny Hounsell, "Teaching-Learning Environments in Contemporary Mass Higher Education", *BJEP Monograph Series II, Number 4 - Student Learning and University Teaching* (British Psychological Society, 2007), 98 ²² Dai Hounsell and Jenny Hounsell, "Teaching-Learning Environments in Contemporary Mass Higher Education", BJEP Monograph Series II, Number 4 - Student Learning and University Teaching (British Psychological Society, 2007), 94

BIBLIOGRAPHY

Beauregard, Robert A., "From Place to Site: Negotiating Narrative Complexity" In *Site Matters*, edited by Carol J. Burns and Andrea Kahn, 39-58. New York: Routlegde, 2005

Cuff, Dana. Architecture: The Story of Practice. Cambridge: The MIT Press, 1992

Fairclough, Graham. "New heritage frontiers" In *Heritage and Beyond*, Council of Europe Publishing, 29-43, 2008. https://rm.coe.int/16806abdea

- Greenberg, Evan. "The value of the full-scale prototype in architectural education." *Charrette,* Volume 4, no.1 (2017): 27-39
- Halse Joachim, and Laura Boffi. "Design Interventions as a Form of Inquiry" In *Design Anthropological Futures,* edited by Rachel Smith et al., 89-105. London: Bloomsbury, 2016
- Horst, Sebastian, Johannsen, Bjørn Friis, Nielsen, Jan Alexis, and Camilla Østerberg Rump. "Teaching evaluation." In *University Teaching and Learning*, edited by Lotte Rienecker, Peter Stray Jørgensen, Jens Dolin and Gitte Holten Ingerslev, 409-421. Frederiksberg: Samfundslitteratur, 2015
- Hounsell, Dai and Hounsell, Jenny. "Teaching-Learning Environments in Contemporary Mass Higher Education." BJEP Monograph Series II- Student Learning and University Teaching, no. 4 (2007): 91-111
- Kahn, Andrea. "Defining Urban Sites" In *Site Matters*, edited by Carol J. Burns and Andrea Kahn, 281-296. New York: Routlegde, 2005
- Kolb, David A. *Experiential learning, experience as the source of learning and development (2nd Edition)*. Englewood Cliffs, N.J: Prentice-Hall, 2014
- Kwon, Miwon. One Place after Another -Site-Specific Art and Locational Identity. A critical history of site-specific art since the late 1960s. Cambridge/London: MIT Press, 2002
- Lamm, Bettina, and Anne Margrethe Wagner. "Urban Intervention Studio being site specific : temporary design installations in transforming urban areas" In *Teaching Landscape: The Studio Experience*, edited by Karsten Jørgensen et al., 56-67. New York: Routledge, 2020
- Lamm, Bettina, and Anne Margrethe Wagner. *Playable Engaging Art and Design Installations in Public Space*. London: Routledge, forthcoming
- Rosa, Hartmut, and Wolfgang Endres. Resonanzpädagogik Wenn es im Klassenzimmer knistert. Weinheim/ Basel: Beltz Verlag, 2016

Schön, Donald A. The Reflective Practitioner – How Professionals Think in Action. New York: Basic Books, 1983

- Sheil, Bob. "Design through making: An introduction." Architectural Design 75, Issue 4 (2005): 5-12. https://doi.org/10.1002/ad.97
- Technical and Environmental Administration, Urban Design Department, The City of Copenhagen. "Integrated Urban Renewal in Copenhagen." Accessed January 25, 2021.
 - http://kk.sites.itera.dk/apps/kk_pub2/pdf/870_hHa1d53AJZ.pdf
- University of Copenhagen. "NIGK15032U Urban Intervention Studio -Volume 2018/2019." Accessed January 25, 2021. https://kurser.ku.dk/course/nigk15032u/2018-2019.
- University of Copenhagen. "Programme-specific Section of the Curriculum for the MSc Programme in Landscape Architecture at the Faculty of Science, (Rev. 2020)." Accessed January 25, 2021. https://www.science.ku.dk/studerende/studieordninger/kandidat/landscape_architecture/Sto_landscape_archit ecture.pdf
- Wagner, Anne Margrethe. *Permitted Exceptions: Authorised Temporary Urban Spaces between Vision and Everyday.* Frederiksberg: Department of Geosciences and Natural Resource Management, Faculty of Science, University of Copenhagen, 2016
- Wagner, Anne Margrethe, Lamm, Bettina and Laura Winge. "Move the Neighbourhood with children: Learning by co-designing urban environments." *Charrette,* Volume 5, no. 2 (Autumn 2019): 136-149

MUINÍN CATALYST - TOWARDS A PLACE-BASED STEAM, DESIGN-THINKING CURRICULUM FOR TRANSITION YEAR

Authors: ANITA MCKEOWN, REBECCA WHITE

Affiliation:

ARTS SERVICES UNINCORPORATED AND GREEN SPACE EDUCATION

INTRODUCTION

The world of education and work is changing at a rapid pace. It is crucial to prepare learners with 21st century skills to prosper in a more globalised and digitalised society. We want young people to be well-rounded, articulate and confident; able to survive and actively engage in the future world they will face themselves in, with an economic, political and technological landscape that is far different than the ones that their parents grew up in. But how do we do this effectively with the current education system that focuses on academic performance, to the detriment of skills development? How do we use the local to help shape and develop their views, experience and skills as global citizens? The paper outlines the Muinín Catalyst project and its development of a Design Thinking curriculum designed for Transition Year, in Irish Education. The paper outlines the aims and key skills illustrated through an example of the key learning interventions using one of the current modules, its contribution to developing resilience, and reflections on the intervention, including next stages.

The Muinin Catalyst project builds upon EPA-funded research, <u>www.codesres.ie</u> that developed the first phase of a place-based STEAM educational toolkit for Transition Year (TY), an optional, one-year programme, positioned between Ireland's exam cycles, the third year Junior Cycle and sixth year, Senior Cycle. Implemented in 2004, Transition Year (TY) was designed around giving students life skills and incorporating a work experience program, with a mission to;

• promote the personal, social, educational and vocational development of pupils and

• to prepare them for their role as autonomous, participatory and responsible members of society. (DES, 2004)

Critiques of TY range from 'certain subject areas lacked substance and that students were not being sufficiently challenged' (Walsh, 2007) to 'doss year' (Finn, 2011) yet other reports have shown that students gain confidence, new skills and higher points in the Leaving Certificate results (NCCA, 2012). CoDesRes and currently, Muinin Catalyst, offers an opportunity to explore place-based STEAM learning interventions that align to the Sustainable Development Goals (SDGs) The SDGs face criticism for their approach, a key aspect of this has particular relevance for education; their offer of an approach to 'transforming the world without using transformative methods' (McKeown, 2020:333).

In general, criticism of sustainable development lies in the limits-to-growth (Meadows, 1972) model, recognising the Earth's finite resources (Georgescu-Roegen, 1971). Ultimately, any model that doesn't acknowledge and operate from an integrated model is doomed to collapse. The global challenges we

face demand alternative systemic approaches (Gawande, 2014) with real commitment to making equitable change, at the local and global level. With SDG 4 - Quality Education, defined as a clear goal, CoDesRes explores how this informs contemporary pedagogical approaches. CoDesRes was to date , the only place-based STEAM pedagogical approach to the SDGs and future-ready needs in Ireland.

As a legacy of EPA-funded CoDesRes, the Muinín 'Catalyst' project aims to explore learning interventions in South-West Kerry, Ireland to continue the development of a place-based STEAM curriculum for Transition Year that works with some of these critical 21st century skills; collaboration, communication, presentation, design-thinking and critical-thinking, funded by Living Iveragh and CPL PLC, Ireland's largest recruitment agency. Living Iveragh's aim is to address the problem of rural depopulation through promoting Iveragh as a place of place of Research, Learning and Enterprise, and in collaboration with CPL, supported the Muinín 'Catalyst' project to address the skills gap in the area and that CPL felt was missing for the future of work.

DEVELOPING A 21ST CENTURY CURRICULUM FOR TRANSITION YEAR

Our initial findings, in line with the National Council for Curriculum and Assessment's National Review 2016-20 shows there is interest and need for citizenship and political education; sustainability and climate change education and opportunities for interdisciplinary STEAM learning and application of knowledge. In addition, there is no defined curriculum for TY with each school offering different experiences and approaches. Many teachers, who are also teaching the standard curriculum adopt various competitions, NGOs and business programmes e.g. SEAI's One Big Idea, Young Entrepreneur, SVP's Youth for Justice, Microsoft Education modules.

These programmes offer interesting content and structure however, they are not developed for linked learning, with teachers working across disciplines. They sit within individual subject areas and do not integrate systemic thinking to encourage students to address the relationship between social, economic or environmental factors. Underpinned by a unique eco co-design methodology trialled in London, Dublin and New Mexico, (McKeown, 2015) Muinin Catalyst integrates Art and Design into the STEM learning approach, and a project-based approach insures that the learning crosses subjects and the social, economic or environmental considerations of the expression of their learning.

In STEAM education, learning occurs at the intersection of the five fields, Science, Technology, Engineering, Arts and Math (STEAM) transforming how we know and investigate the world. As a pedagogical innovation, the STEAM agenda offers an approach to teaching and learning (McKeown, 2018) 'that encourages and facilitates unorthodox methods and strategies' (Rose and Smith, 2011, 8). STEAM projects reflect contemporary interdisciplinary artistic concerns that are not bound by traditional media [or the production of objects] and utilise STEM skills and knowledge (ibid, 2018).

Introducing the Arts to the STEM subjects offers an instructional approach that introduces artistic skills and training to increase the effective application of scientific knowledge into real-world challenges beyond the scientific paradigm. Within the pilot curriculum this is embedded through concrete scaffolding and step-by-step actions within practical activities and creative in-process and incontext problem solving. These higher order skills allow learners to examine problems in a more rational manner and are essential to flourish in the world beyond schooling. As the world becomes more and more digitalised, we require individuals to utilise critical-thinking skills in their daily lives; to multi-skill, use good judgement and be solution-oriented.

The projects and their micro-modules introduce students to future growth areas; advanced manufacturing (3D printing/additive manufacturing and rapid prototyping, and SMART economies amongst others) (DES, 2015; NSS 2025). Through discussion those jobs least at risk from automation

are education, research and development, ICT, green tech and environmental and culture-led sectors. (Crowley and Doran), 2019) broaden post-primary students' understanding of STEAM opportunities.

THE IMPORTANCE OF PLACE

Within Muinin Catalyst, a place-based approach, is not specific to a geographic location indeed it provides a road map to providing learning grounded in 'local communities and contexts, that is relevant and engaging and inquiry based (White, 2020). Through local and tangible opportunities for agency and autonomy, students gain a better understanding and appreciation of the world around them (ibid, 2020), which becomes a foundation for global connections.

The underpinning methodology is a situated methodology and therefore embeds the 'fusion of self, space and time' (Casey, 1996:9) this affords embodied understandings and enables a foundation for the physical and psychological experiences that develop the situated knowledge. Place-based learning becomes an opportunity to utilise place as a realm of meaning and meaning making beyond physical geography. Within place-based approaches to education the learning is interdisciplinary, incorporating the complexity of a system of relationships, and offers a means to support and promote responsible and sustainable thinking and behavior. This offers the foundation for connections and understanding between local, regional, national and global concerns, particularly if combined with opportunities for service learning through local partnerships and organisations beyond the school environment.

Pedagogical research around place-based teaching and learning evidences the links between, learning and stewardship (Bird, 2020) citizenship, (Jatuporn and Watthanathorn, 2015) active engagement (insert reference). As a pedagogical vehicle, place-based learning is an opportunity to situate other learning models; project-based, civic, service, professional and systemic models that integrate social and cultural, emotional, deep learning and 21st century skills. This supports an ecosystem of learning opportunities, formal and informal, that through an increased attachment to place, enables students to invest locally and develop engagement that can support experiences and an ability to see links to their future and their position within their local area.

The beta toolkit for Transition Year that was initiated through the EPA funded project, CoDesRes was favourably received by students in Kerry and also other regions; Cork, Donegal, Galway and Clare. Focus groups and class-by- class evaluation documented the students' response to the approach and revealed the opportunities and obstacles to developing future-ready skills within a system that places a high value on STEM subjects and conventional testing methods. Muinín Catalyst builds on this pilot curriculum and continues to develop linked learning through place-based STEAM education and project based learning modules. It also seeks to develop innovative ethical and equitable entrepreneurial skills, that forefronts social, environmental and economic resilience.

SEEDING SUSTAINABILITY

This paper focuses on one of Muinín Catalyst's current modules, *Seeding Sustainability* (SS), which consists of seven module themes and 8 subject micro-modules, organised across three phases; Research and Development, Experimentation and Exploration and finally, Implementation. The SS module uses the unique eco-codesign methodology, the permaCultural resilience praxis (pCr), place-based STEAM and Design Thinking to work towards an overarching project. The project that acts as the focus for the students' learning and solution-focused activities to address localised concerns through a 'real-world' project.

The pCr praxis, is a unique arts-led situated approach to placemaking that has been adapted for education and leverages the momentum around the 2030 agenda. Aligning the project to the Sustainable Development Goals (SDG 2,3,4,11,12,13,14,15 and 17), engages the students with the 2030 agenda through localised actions that enable them to consider and see the consequences and

impact of their actions. The integration of social, environmental, and equitable economic concerns within place-based STEAM education combined with design thinking also develops students contributions to Ireland's SDGs targets, that acknowledges more than human needs, in tangible, local and meaningful ways.

The curriculum's backbone consists of a core Design Thinking module that through practical applied learning, teaches students the cognitive, strategic and practical processes by which design concepts are developed. At its simplest Design thinking is 'creative problem-solving' (IDEO-U, 2020) that through a 'non-linear, iterative process [can be used] to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test'. (Interaction Design, 2020).

The SS module was devised to enable teachers to elect to undertake the whole module to develop a place-based project / assessment piece or select micro-modules, and or lesson plans to suit their timetables and interests. There is also potential to adapt the focus of the project to suit the context e.g. pollinator / rewilding projects or larger scaled horticultural / biodiversity projects. In this instance, the project objective is the design and phase one, implementation of a 1KM walking trail with linked designed features that support social and environmental well-being for both the school and wider community.

Within the module the five phases of Design thinking, Empathize, Define, Ideate, Prototype and Test, have been adapted in combination with the pCr tools to support students in a scaffolded process, lesson by lesson to design the trail. Bespoke learning activities are created to lead students through the learning process developing the foundational skills and understanding that are required. Developing empathic design skills through engagement with users' needs is the first step in the process. An adaptation of Stanford University's five chairs exercise that focuses on users of the trail, students begin to think of the users' needs and begin to integrate these concepts into their design ideas for different areas and nodes for the trail. As they take their ideas from paper into 3D, creating dioramas, presentation or if preferred digital design drawings.

Working through the Design Thinking process embeds transferable skills, with future challenges being ill-defined. The lessons include outdoor learning e.g. mapping of the school grounds, surveying existing flora and environment with additional expertise from a local landscape architect and University-level environmental science researchers, as well as worksheets, discussions, hands-on design activities, and other related or supporting skills such as research skills, interviewing and media production. The step-by-step learning process develops their ability to see the themes, issues and problems as more than a theoretical lesson and something that affects them and their community. This enables the learners to connect to the learning, their place and the world, they are intrinsically motivated, kept engaged and are more invested. The module's interconnected topics across curriculum areas expands the students' knowledge and skills more creatively, within the students learning.

THE PROJECT SO FAR

Each class is evaluated using a 3-2-1 method; (three things they learnt, two things they would like to know more about, and one comment on their overall opinion of the class or improvements. The evaluations are also augmented with focus groups and teachers feedback. This enabled us to test content, activities and resources with different groups and educators and identified key aspects to expand upon and integrate additional skills and activities to address further aspects the research revealed. Feedback from teachers has been positive, with acknowledgement of the level of detail within the lesson plans, resources and outline of the SDGs within the micro-modules making it easier for staff to deliver and reach their targets on additional factors.

As the project is location-transferable, it enables educators to place the curriculum resources within their own context lens. It does not rely on proximity to specific places and increases own place attachment and investment. Teachers have reported the worksheets and activities have been wellreceived by students adding to the students timetables in a positive way and encouraging their creativity and imagination. The approach allows learners an element of risk-taking in their learning as they move through the trial-error phase of design, gain experience within their area and form connections through work experience and involvement in community initiatives. There is the opportunity for intergenerational learning; students gather information from their elders, synthesise it and share with the wider community.

Eco-anxiety is reportedly on the rise and was evident within our TY cohort (2018/19) with a high percentage (91%) of students reporting fear of what their life and environment might look like in the future, and that lack of information was not helpful to them. It was evident from our study that 66% of the students said they do not talk about environmental issues with their family or peers. They also stated that the adults around them (teachers, parents, local organisations) did not seem to be engaged in issues of climate change, adding further anxiety to their already anxious state.

Knowledge of the future of work and skills required and the impact of technological advances on the STEM disciplines was limited within the student cohort. Our classes often used blended learning which highlighted a number of challenges; students were not used to self-directed learning even when scaffolded or using digital tools. Evaluation of the beta toolkit showed that as well as content learning, aspects of technology e.g. using Microsoft Education and its tools (including attaching files, saving to shared drives, refreshing the browser) was commented upon. This is a blind spot within education, students are using mobile technology for socialising or entertainment, but their skills with technology for learning should not be assumed despite their competence with gaming or apps.

This places more emphasis on educators to bridge this skills deficit, which in itself can perpetuate the issue as teachers do not gain extensive training in ICT for learning; an issue COVID-19 has most certainly highlighted. Digital exclusion comes in numerous forms and students are subject to a number of factors; teachers' competence and confidence with using technology for learning, access to technological infrastructure e.g. broadband and devices. There have been improvements in the academic year 2020/21, with greater utilisation of Microsoft Teams, for staff and students, inevitably Covid-19 schools closure forced this issue.

NEXT STEPS

Situated in a rural area, with population decline increasing as young people look for study and work opportunities, we felt it was important for the project to promote the fact that the professional landscape looks far different to what their parents experienced and there is no longer the need to necessarily leave their place to make their future. Opportunities in Ireland, including employment sectors least at risk from Artificial Intelligence / Robotics are education, research and development, ICT, green tech and environmental and culture-led sectors. (Crowley and Doran, 2019). Advanced manufacturing (3D printing/additive manufacturing and rapid prototyping, Aqua and Agritech, the Internet Of Things, sharing and smart economies amongst others have all been identified (DES, 2015; NSS 2025) as developing sectors. Therefore, broadening students and communities' understanding of STEAM opportunities as well as an entrepreneurial approach could offer increased sustainability for rural communities, if the infrastructure e.g. broadband is present. A Future of Work seminar event for local parents and students was cancelled due to school closure in March. This event was designed to disseminate information on how the context of work has changed in today's society through a series of

talks from local people in industry and a poster exhibition. We plan on pivoting this event into a webinar series for parents and students under the Kerry ETB.

With no prescribed curriculum in Transition Year, there is strong potential to augment gaps in learning and skills-building. However, depending on the foundational base of digital literacy and 21st century skills developed in their previous three years of post-primary schooling, there may be limits to the efficacy of one academic year. With this phase of the Muinin Catalyst project due to end in June 2021, we aim to develop the work by running a one-year pilot programme externally for the 2021/22 academic year. This would involve collaboration with the Kerry Education & Training Board (ETB) to run set modular intensives for Transition Year students to apply to take part in. They would run autonomously from schools and be on offer to all TY students in Kerry. Community-based, they would encourage learners to apply 21st century thinking to local issues with measurable impact by the end of the module.

The success of a regional roll out would be a catalyst for a national plan for all Irish ETB's. Covid-19 school closures have further identified the need for structured blended learning that integrates analogue pedagogical principles with available technology as an area for development within teacher training. We would also aim to share the curriculum more broadly for delivery by teachers with support included within the toolkits and is proposed for formalised continuing professional development delivery in 2021 / 22.

BIBLIOGRAPHY

- Bird, A, "Evaluating the Impact of Burrenbeo Trust: Place-based Learning and Community Stewardship" Ireland; Irish Research Council 2020, 2008 - 2018)
- Crowley, F. and Doran, J. "Automation and Irish towns: who's most at risk?" Available at: https://www.ucc.ie/en/media/projectsandcentres/srerc/SRERCWP2019-1_upload.pdf (Accessed: 21 March 2019)
- Dept.of Education and Science, 'Rules and Programme for Secondary Schools' 2004 Available at: https://www.gov.ie/en/publication/a07bb6-rules-and-programme-for-secondary-schools/ Accessed 12th May 2021

Gawande, A. "The Century of the System, Lecture 2", The Reith Lectures, The Future of

Medicine. 2014 Available at: http://www.bbc.co.uk/programmes/b04sv1s5 Accessed: 6/12/2014

- Georgescu-Roegen, N. The Entropy Law and the Economic Process. Cambridge: Harvard University Press, 1971.
- What is Design Thinking IDEO-U Last Modified 2021: https://www.ideou.com/blogs/inspiration/what-is-design-thinking
- What is Design Thing and Why is it so Popular? Interaction Design Last modified Sept 2020 https://www.interaction-design.org/literature/article/what-is-design-thinking-and-why-is-it-so-popular
- Mckeown, A. Tracing the Evolution of an Arts-led Place-based Syllabus for STEAM: The Beautiful Midden Field School Syllabus in De la Garza, Armida and Travis, Charles (2018) The STEAM Revolution: Bridging the Divide: Transdisciplinary Approaches to Science, Technology, Engineering, Arts & Humanities, and Mathematics. Springer Cham, Switzerland: 2018
- sub-editor. McKeown, A. *Towards Developing Equitable Economies, The concept of Oikos in Placemaking* in Cara Courage, Tom Borrup, Maria Rosario Jackson, Kylie Legge, Anita McKeown, Louise Platt, Jason Schupbach. *The Placemaking Handbook* Routledge, London 2020
- McKeown, A., Hunt, L., Murphy, J., Turner, E., and White, R. "Co-Designing for Resilience in Rural Development through Peer to Peer learning networks and STEAM Place-based learning interventions Learning Interventions" Environmental Protection Agency, Ireland 2021
- Meadows, D.H., Goldsmith, E. and Meadow, P. The Limits to Growth. New York: Universe Books. (1972).
- National Council for Curriculum Assessment (NCCA) "Student, teacher and parent perspectives on senior cycle education" (ESRI, 2019) Accessed 16.Jan.2021 Available here: https://www.esri.ie/publications/student-teacher-and-parent-perspectives-on-senior-cycle-education
- Omsin, J. and Amornrat Watthanathorn, A. *Place-Based Education: The Development of Good Citizenship in Youth Based on Community Contexts, Department of Education, Faculty of Education*, Naresuan University 2015
- Walshe, J. "Schools cutting back on class time get a ticking off in report". Irish Independent. 22 June 2007 Retrieved 24 Jan 2021 Available here https://www.independent.ie/education/latest-news/schools-cuttingback-on-class-time-get-a-ticking-off-in-report-740500.html
- Walshe, J."Transition year pupils get better Leaving Cert scores" Independent.ie. 7 February 2017. Accessed 22.Jan.2021 Available here
- https://www.independent.ie/life/family/learning/be-prepared-and-set-your-goals-how-to-have-a-smooth-transition-28817455.html
- White, R "The Classroom Around Us: utilising place in language learning" ELT Ireland Accessed 2nd Dec. 2020 Available here https://www.elt-ireland.com/event-speaker-slides

STUDIO IN ISOLATION: ARCHITECTURAL EDUCATION IN THE VIRTUAL CONTEXT

Authors: VINCENT HUI, TATIANA ESTRINA, ALVIN HUANG

Institution: RYERSON UNIVERSITY, CANADA

INTRODUCTION

Within architectural pedagogy, the design studio serves as a nexus in students' academic development. The studio environment not only provides them with space for experimentation, but also serves as a venue for both formal and informal architectural discourse and education.¹ Within an informal context, students are able to share and offer feedback on each other's designs, providing them with as much learning from one another as from their instructors.² The COVID-19 pandemic has dramatically changed the way in which studios are taught worldwide, displacing faculty and students from studios and confining instruction to virtual means. For some instructors, this online transition has served as a hindrance to pedagogical delivery, while students have become very isolated and disconnected from both their peers and their institutions, often with a negative impact on their academic performance.

In order to mitigate the loss of social connection during this period, various tactics have been implemented in Canada's largest architecture program in order to maintain the studio culture so critical to learning. Although the authors do not claim to have been able to fully restore studio culture via virtual means, they outline several initiatives and interventions that were able to mitigate several of the emerging issues within the remote learning context. This paper provides six key strategies in sustaining and improving the architectural studio culture during the new online normal: platforms for multi-tiered social connectivity, accessibility through implementation of emerging technologies, provision of individualized learning opportunities, dissemination of student work, infrastructural framework for resource access, and the capitalization of the non-physical locale.

Platforms for multi-tiered social connectivity

The COVID-19 pandemic resulted in various lockdowns across the globe, enforcing rules of physical separation and in turn, putting an end to in-person social interaction and placing student groups at the forefront of student engagement, acting as agents to unite students and faculty through recreational events, online networking, and more. As virtual cocktail hours were found to increase 'zoom fatigue', the events endeavored to implement more physically based activities engaging participants in more tactile ways. For instance, students were tasked with representing architecture using objects found around their room, and in another event alumni and industry professionals collaborated with students to design humorous holiday narratives. Such opportunities ensure not only that students are able to collaborate outside of instructional hours but also allowed them to build professional connections.



Figure 1. Projects produced from social event nights connecting students with industry professionals and faculty.

While the limited interaction between classmates became the norm during social distancing conditions, interactions across peer groups had all but disappeared. It is much more difficult for students to seek others for help, as there is a dearth of familiarity and access beyond faculty. For incoming undergraduate students, it was especially imperative for the online platforms to connect the new peers and support their transition to post-secondary education. Thus, in addition to the standard orientation and introductory procedures, the department put mentorship systems in place, pairing upper- and lower-year students, to make the integration even smoother. Such pairings address academic and emotional support while serving a means to cross-pollinate knowledge. Studies have shown that students learn more in mentor-mentee relationships as they are able to apply their knowledge through teaching.³ In addition, the guidance between students breaks the formal barrier many within the classroom where the ratio of students to instructors is often diluted and is sometimes characterized as a fixed amount of instruction and assistance.



Figure 2. Mentorship program offered to support students with one-to-one peer support.

Dissemination of student work

In the typical studio environment students are accustomed to easily view and discuss one another's work, an element which is compromised when the course is delivered digitally. Students, confined to their own workspaces, are unable to wander around the studio space to view and discuss their peer's design work. Within the studio environment, various tools were implemented in order to provide a sharing platform for student work. As is typical in online architectural education, whiteboard software, such as *Miro*, was implemented to allow students to post, annotate, and comment on work being produced. To supplement these interfaces, blogs were introduced to allow students with the studio group to post work for the instructor and other students to view and comment upon outside of instruction hours. In a survey of students taking the second-year studio course, 93% of the responding students said that enjoyed working with Miro as a tool for discussion (Fig. 3). While the whiteboard platforms proved to be more effective for collaborative desk reviews, the blog platform proved to be more effective for sharing of process updates, as those are both publicly accessible to those outside of

the instructor's group and provide a much more succinct summary of students' progress. In order to disseminate student work beyond the studio group and to the rest of the department as well as the general public, other additional platforms were implemented such as a collective social media account on the Instagram platform for students to post their work. This was especially useful to maintain both academic rigor and engagement to keep abreast of what their peers are working on. Rather than filtering the content and having someone in an administrative role post the work, the account was open to all in the class to encourage the sharing of process and final work. Such an approach created a much more connected and authentic presentation of content when compared to selective curated final work presented on other similar accounts. In a survey done on the students, 100% of the survey responders stated that viewing the work of others and participating in the creation of the content on the Instagram account helped them feel more connected to their peers.



Figure 3. Blog interface used for sharing of in progress work (left) and the whiteboard interface used for markups (right).

Provision of individualized learning opportunities

The new age of virtual learning has revealed many accessible outcomes due to the nature of internet connectivity; however experiential learning is a category that needs new methods of delivery in order to reach students effectively. Typically, students have access to many extra-curricular opportunities including student organizations, sports, research, and design-build projects, however many of these opportunities were unable to translate into the virtual environment due to lockdown constraints. To reduce the disposition on the students' education; it is important to provide a varied combination of collective and individualized opportunities for learning and engagement.

During the summer months when many undergraduate students were not engaged with classwork, the faculty took it upon themselves to provide support for individual student initiatives, most individual review sessions for student's competition entries.⁴ Competitions are a hallmark of architectural education as they provide a platform for students to experiment and develop their architectural opinions without the pressure of grading or expectations.⁵ Additionally, professors began to individually contact every student outside of instructional hours to ascertain their personal situation, how they were emotionally fairing in the online environment, and if there were any additional stressors that may compromise their academic success.

Along with extra-curricular opportunities, the department provided upper-year students with the option of Directed Studies; a course that pairs each student with a faculty member based on their research interests to develop research and a relevant project within the area (Fig. 4). Typically, a variety of hands-on courses involving fabrication and collaboration, but as such courses were not able to run via online platforms students capitalized on this course, to individually explore their interests and feel more motivated to work on their research. Although the elimination of the ease of collaboration

removes numerous group learning opportunities, many more emerge through individual exploration, which is better suited to remote learning.



Figure 4. Student's exploration of alternative methods for cemeteries (left) and a student exploring 3D scanning through point clouds.

Infrastructural framework for resource access

With students separated from facilities and personnel due to the pandemic, software, hardware, and general IT issues have become a large barrier for effective learning.⁶ In order to aid students in succeeding with independent software use and modelmaking, several initiatives were put in place in the context of a virtual learning environment.

To address the lack of resources available to students remotely, the department developed a three-fold approach. First, they instituted new agreements with software companies to provide students with the required software for as low as 10% of the original price, allowing students to gain access to a much larger toolset in their own workspaces. In addition, remote operating capabilities were installed in the computer lab, giving students entry to not only the powerful computer hardware but also the multitude of software available to them. As physical modeling became very challenging to complete in a limited space such as one's home, the workshop instituted outsourcing of 3D printing and laser cutting, with the curb-side pickup model implemented for the purchase of prints and various discounted materials. This service also ensured that prices were kept reasonable with the buying power of a larger institution while also maintaining a consistency of ideal modeling making materials.

From a software perspective, students were typically expected to develop digital skillsets independently and through peer collaboration. In order to mediate the lack of connectivity among students and digital aid, the department and various student bodies implemented additional resources for students to learn software ranging from 3D modeling to image editing. Along with these typical pre-recorded basic modeling tutorial videos, 'workflow' videos demonstrating not the various uses tools but how to apply them to generate architectural imagery were provided to the students. To supplement the pre-recorded instruction, the IT department facilitated weekly synchronous tutorial videos geared towards various software packages. These videos gave students the opportunity to learn about new workflows within the programs and gave them the opportunity to ask questions during and after the session in efforts to learn as a group. In addition, numerous software sessions were hosted, with various alumni and professionals from the industry going beyond basic software usage and instead exploring best practices.

In order to retain the student's connection with various support personnel and other students, the department created not only a website interface for access to all these various digital resources, but also created daily open hours. During these hours, workshop technicians, IT support, and upper-year students are available to help students with issues pertaining to model making, computer hardware and software, as well as modeling and software questions. These conversations occur on a one-on-one

basis, allowing students to get the individual attention and help they are unable to receive with only video recordings or group sessions.

Accessibility through implementation of emerging technologies

As the primary method of teaching in a digital environment is via video conferencing, resulting in learning environments feeling 'unnatural'. In order to provide more varied avenues of communication within the digital learning environment, Canada's largest architecture program has taken steps towards emerging technologies to expand the social accessibility for faculty and students.

While lecture-based education is typical in the post-secondary academic setting, students in an online education format have become passive observers and with most finding difficulty in actively engaging with the material. With the implementation of interactive virtual field trips (iVFTs), instructors were able to give students the opportunity to experience architecture and urban settings remotely through the use of stereoscopic imagery and mobile-based headsets.⁷ Such an approach not only gives students greater insight into the content, but also gives them a significantly more interactive learning platform.⁸

Due to the ever-evolving video game-based rendering software emerging, *Enscape* has become widely used in academic and professional settings for its uses of real-time rendering to create realistic renderings within CAD programs such as *Revit* and *Rhinoceros3D*. As physical architectural models have become obsolete due to physical contact restraints, *Enscape* was integrated within the architecture program for students to create walkthroughs and animations to showcase their projects with instructors, reviewers, and peers regardless of location.⁹

Within design courses, virtual reality software used typically for social collaborations, such as *Spatial.io*, have been tested in design critique simulations between architecture students and professors to revitalize the design studio environment in the digital realm. Using the collaborative VR software, Students can virtually pin up their drawings and display current work-in-progress models which can be exported and uploaded with textures. Professors and peers can traverse around the digital studio similar to a gallery walk to markup and leave comments on different parts of a student's project. In addition, students can record their critique session from their perspective which will serve as a detailed reminder of comments and conversations from the reviews.¹⁰

Capitalizing on the non-physical locale

The city-wide lockdowns in Toronto resulted in restricted access to all networking and learning opportunities within Toronto. Instead, the department sought to adapt to the situation with digital exhibitions, podcasts, and international video lectures as an alternate method of exposing architectural content not directly related to academics. Virtual reality experiences showcased on the Department of Architectural Science Exhibition website was utilized by faculty in place of the usual exhibitions that would take place within the school. An example of a virtual exhibition, *The House of the Thief* by Colin Ripley and collaborators recreated the school's Paul H. Cocker Gallery into a VR experience with rendered panoramas that viewers can use to navigate throughout the exhibit. Professors also organized a podcast, A podcast produced by faculty was created to bring another medium to ease the students and faculty in the isolated time. Topics ranging from COVID-19 impacts on student internships to faculty interviews brought a new and intimate perspective on how the people at DAS were coping with the pandemic restrictions and empathized with students who are feeling disconnected with their peers during the lockdown. Interspersed with interviews with professionals and faculty, the podcast brought students together during a time of isolation by making a point of drawing students together to share their experiences from across the classes in the program.



Figure 5. The House of the Thief Online Exhibition Website by Colin Ripley

CONCLUSION

The expansion of remote and online education has established the territory of the new normal, changing every field's academic teaching strategies across the world. For architectural education, the adaptation has a great impact on both students and faculty, with the need for studio culture to evolve, yet retain its effectiveness in creating informal discourse. With the implementation of six key factors outlined in this paper: platforms for multi-tiered social connectivity, accessibility through implementation of emerging technologies, provision of individualized learning opportunities, dissemination of student work, infrastructural framework for resource access, and the capitalization of the non-physical locale, the digital studio environment has become an elevated platform for students to learn, flourish, and continue to push the boundaries within their creative field.
NOTES

¹ Nijholt, A, G Van der Veer, and D Vyas, "Creative practices in the design studio culture: collaboration and communication," (Cogn Tech Work Springer, 2013), 415.

² Ockman, J, and R Williamson, Architecture School Three Centuries of Educating Architects in North America (MIT Press, 2012).

³ Gilbert, Clark G., Steve Hunsaker, and Brian Schmidt, *Peer Instruction: Faculty as Architects of Peer Learning Environments* (Rexburg: BYU Idaho, 2007).

⁴ Hui, Vincent, Tatiana Estrina, and Alvin Huang, "Creative Connections: Maintaining Studio Culture in an Age of Physical Seperation." (paper presented at ICERI, Seville, Spain, 2020).

⁵ Gunagama, M. Galieh, and Yulia Pratiwi, "The Role of Architectural Competition in the Learning Process of Architecture Students." *Advances in Engineering Research* (2020): 192.

⁶ Gilbert, Clark G., Steve Hunsaker, and Brian Schmidt, *Peer Instruction: Faculty as Architects of Peer Learning Environments* (Rexburg: BYU Idaho, 2007).

⁷ Tawhai, C, *Immersive 360° video for forensic education*. (Perth, Murdoch University, 2017).

⁸ Hui, Vincent, Tatiana Estrina, Sara Lee, Gloria Zhou, and Vivian Kinuthia, "Architectural Accessibility and Pedagogy via Virtual Reality Integraation." (paper presented *at* from Hawaii University Conference on Arts, Humanities, Science and Education, Honolulu, Hawaii University Conferences, 2020).

⁹ Hui, Vincent, Tatiana Estrina, Alvin Huang, and Sadberk Algma, "Virtual Reality as a Response to Emergent Challanges in Architectural Education." (paper presented at ADVED, Istanbul, Turkey, 2020).

¹⁰ Hui, Vincent, Tatiana Estrina, Alvin Huang, and Sadberk Algma, "Virtual Reality as a Response to Emergent Challanges in Architectural Education." (paper presented at ADVED, Istanbul, Turkey, 2020).

BIBLIOGRAPHY

Gilbert, Clark G., Steve Hunsaker, and Brian Schmidt. 2007. Peer Instruction: Faculty as Architects of Peer Learning Environments. Rexburg: BYU Idaho.

- Gunagama, M. Galieh, and Yulia Pratiwi. 2020. "The Role of Architectural Competition in the Learning Process of Architecture Students." *Advances in Engineering Research* (Atlantis Press) 192.
- Hui, Vincent, Tatiana Estrina, Alvin Huang, and Sadberk Algma. 2020. "Virtual Reality as a Response to Emergent Challanges in Architectural Education." *ADVED*. Istanbul, Turkey.
- Hui, Vincent, Tatiana Estrina, and Alvin Huang. 2020. "Creative Connections: Maintaining Studio Culture in an Age of Physical Seperation." *ICERI*. Seville, Spain.
- Hui, Vincent, Tatiana Estrina, Sara Lee, Gloria Zhou, and Vivian Kinuthia. 2020. "Architectural Accessibility and Pedagogy via Virtual Reality Integraation." *Proceedings from Hawaii University Conference on Arts, Humanities, Science and Education.* Honolulu: Hawaii University Conferences.
- Lueth, Patience Lamunu Opiyo. 2008. "The architectural design studio as a learning environment: a qualitative exploration of architecture design student learning experiences in design studios from first- through fourth-year." *Retrospective Teses and Dissertations*.
- McClean, David, and Neasa Hourigan. 2013. "Critical Dialogue in Architecture Studio: Peer Interaction and Feedback." *Journal for Education in the Built Environment* (Routledge) 8 (1): 32-37. doi:10.11120/jebe.2013.00004.
- Nijholt, A, G Van der Veer, and D Vyas. 2013. "Creative practices in the design studio culture: collaboration and communication." *Cogn Tech Work* (Springer) 15: 415-443.

Ockman, J, and R Williamson. 2012. Architecture School Three Centuries of Educating Architects in North America. MIT Press.

Tawhai, C. 2017. Immersive 360° video for forensic education. Perth: Murdoch University.

MODELING COMPETENCE: PRACTICE-BASED RESEARCH BETWEEN DESIGN, ARCHITECTURE, SCIENCE HISTORY AND BIOLOGY DIDACTICS

Author: JOOSTEN MUELLER

Institution:

UNIVERSITY OF GRONINGEN, NETHERLAND; UNIVERSITY OF THE ARTS BREMEN, GERMANY

INTRODUCTION

It is difficult to think of science without models: they are part of our surrounding material culture. In fact, material models are a key part of modern research within different fields of science. Especially in university education is a great demand of assessing material models in both digital and physical materiality. Modeling competence¹ has a major impact on the level of understanding models and on the ability to push forward further research, especially regarding the highly dynamic processes in the context of model creation, hypothesising, questioning and recreation. The phenomenon of missing modeling competence in science education is on focus in the present paper.

During the author's master's studies in design he worked within a practice- and design-based research project on model and visualization concepts in virology. The project based on a cooperation of the University of the Arts Bremen and the Laboratory of Virus Research at the University Bremen.² It aimed to collect, categorize and analyse historic and contemporary (two- and three-dimensional) model approaches of icosahedral virus structures. Based on this research, a new, comprehensive, open access, 3D-printable, educational model concept was invented.³ During the development, an evaluation and assessment of the prototypes with undergraduate biology students took place.⁴ The study revealed a fundamental lack in the modeling competence of the test persons. A closer reflection of the expressed questions gave evidence of deficits in the elementary understanding of what models are. The models shown were comprising of geometrical, schematic representations of icosahedral viruses to teach fundamental but highly complex virus structures (between symmetry and assembly). Origins of the model ideas can be found in illustrations within virological textbooks; these form an integral part of today's undergraduate curriculum in biology. The students' perception seems to be blurry between the notion of projecting geometric structures on icosahedral virus capsid structures, assessing concepts of symmetry and design and the risk of getting lost between complex geometrical bodies (like the icosahedron or the convex and non-convex pentakis dodecahedron) and their symmetries.

If students are not able to grasp these academic, abstract and conceptual structures, the question about the advantages of building more precise, meaningful models for teaching arises. To develop better models, designers need to invest a lot of work to become 'specialists' on a scientific 'micro-topic' and experts on the semiotic, pictorial, visual and material language of the respective research field. The

modeling work itself can be seen as part of their individual artistic research between art-practice and practice-based research.

The phenomenon of a missing understanding of models in science education of secondary students has been studied extendedly by different authors.⁵ The study of Grosslight for example reveals that many lower secondary students believe there is a 1:1 correspondence between models and reality. Students assume that models are toys or small incomplete copies of actual objects.⁶ Even though concepts for advancing the personal 'model competence'⁷ of students does exist in biology education in Germany⁸, it is not part of the school's curriculum by now.

In the field of university education for instance in biology, biochemistry and bioinformatics, there is a great demand of assessing material molecular models in both digital and physical materiality. This is caused by their important role for modern research within this fields of science. Back in 2002, Jane Richardson addressed the challenge in teaching undergraduate (biochemistry) students' competences in understanding and working with digital on-screen protein models. Richardson detected the cause of this lack of competence in the student's prior education which tent to be concentrated on onedimensional (verbal) and two-dimensional (static pictures) information.⁹ She introduced the term of a 'molecular 3D-literacy'.¹⁰ In the recent years, the term in this field of research changed from teaching a 'molecular 3D-literacy'11 to assessing or developing a 'visual literacy'12 as part of a 'scientific literacy'¹³; the challenges in teaching still seem to be the same.¹⁴ Most of the developed course concepts try to focus on learning how to read, explore and apply these visualizations. They try to impart models as accepted and standardized research-tools, rather than questioning their origins or even going beyond by experimenting, testing or even changing them.¹⁵ Even if newer attempts try to use physical 3D-printed models as object-based teaching and learning tools, the students mostly do not get involved in the practice- and design-based modeling process¹⁶. Only a limited number of case studies in cell biology point out the potential of integrating students into the modeling process by assessing the material trough a practice-based research.¹⁷ The study on the topic of modeling competence in science education by Mei-Hung Chiu and Jing-Wen Lin shows the relevance of modeling as practice besides the ontology, epistemology and methodology as well as the metacognitive knowledge of models and modeling.¹⁸ We are living in a world surrounded by material objects, which are equally involved in our teaching, learning and researching environments between classroom, museum and laboratory. It is difficult to think of science without models as part of our surrounding material culture¹⁹. For this reason, it seems to be clear that not only a visual literacy should be part of a comprehensive scientific literacy but also a material literacy.²⁰ These two need to be defined and implied within the concept of modeling competence for science education. This leads to the question how designers as specialists within design- and practice-based research tools can implement their knowledge into classroom workshops with pupils and students to help them assessing a sufficient material literacy and a better modeling competence. How can a designer broaden the learner's perspectives on research outside laboratory research tools? How can the history of science contribute to the material- and object-based learning environment? Are students aware of the chances practice-based modeling-approaches offer? Do they know that these modeling approaches let to fundamental findings in the history of different fields of science, carried out by researchers with children's toys, paper, glue and scissors?

HISTORY OF SCIENCE MEETS ARCHITECTURAL MODELING

The theoretical research within the history of molecular science reveals a significant impact of practice-based modeling research in the discovery of the structure of virus capsids in the late 1950s and beginning 1960s. An interdisciplinary cooperation between the scientists Donald Caspar and

Aaron Klug with the architect and designer Richard Buckminster Fuller enabled the development of fundamental hypotheses of spherical virus structures.²¹

In 1956 Donald Caspar discovered a 5-fold rotational symmetry in the structure of spherical virus capsids.²² This revealing advanced Francis Crick and James Watsons finding of a 2- and 3-fold symmetry. Based on this discovery, they set up the hypothesis that spherical virus structures seem to follow the icosahedral (or the dodecahedral) symmetry.²³ At this time, Watson and Crick as well as Caspar and Klug assumed that the virus is not able to produce a closed shell with only one or two gigantic macromolecules to protect its genetic material. The hypothesis that the shell is built by a "regular aggregation of smaller asymmetrical building bricks"²⁴ was rather simple and efficient.²⁵ The key problem of this hypothesis was rather a geometrical than a molecular one: They wondered how to build up a closed sphere with exclusively equivalently formed building bricks. The initiator of the transdisciplinary cooperation between Donald Caspar, Aaron Klug and Richard Buckminster Fuller was the artist John McHale.²⁶ In 1960, McHale recognized a remarkable similarity between early polio virus models he had seen in a newspaper article and Buckminster Fuller's geodesic domes.²⁷ Caspar and Klug started engaging in the work of Fuller: Caspar visited lectures of Fuller at Harvard University and started an actively ongoing discussion, which became the fundament of his view on virus architectures.²⁸ At the same time, Klug studied the (unpublished) book "Energetic Synergetic Geometry"²⁹ by Buckminster Fuller and started building domes with plug-in module toys provided by his children.³⁰ In Caspar and Klug's 1962 published final article "Physical Principles in the Construction of Regular Viruses"31 they state: "The solution we have found was, in fact, inspired by the geometrical principles applied by Buckminster Fuller in the construction of geodesic domes(...)".³² More precise, the cause of their solution approach was an incidental misinterpretation of one of Buckminster Fuller's spherical tensegrity models (as seen in figure 1.).³³ Donald Caspar was confronted with a 270-strut Tensegrity sphere and assumed by mistake that it was built from equal modules. He assumed that the modules were able to form hexagonal as well as pentagonal elements to close the sphere. His explanation was that some of the elements had to be able to stretch and bend over to form a pentagonal element.³⁴ Actually, the model was built by five slightly different elements³⁵ (see figure 2.). Caspar and Klug's modeling process and their argumentation with building bricks can be seen in the documented experiment with toys in figure 3. The bricks slightly deform, for this reason, they are not equivalent but "quasi-equivalent" to each other. The phenomenon was outlined by the allegory of geodesic domes, which are built from almost equal but slightly different elements.³⁶ As an allegory for the issue of virus assembly, Caspar and Klug's approach should open a fundamental new way of thinking and experimenting with models.



Figure 1. 270-strut Tensegrity, University of Minnesota, 1953.37



Figure 2. Two elements used to form a 270-strut Tensegrity sphere.³⁸



Figure 3. Modeling experiments with plug-in module toys.³⁹

PRACTICE-BASED RESEARCH IN CLASS: MODELING WITH BIOLOGY STUDENTS

An approach on the laid-out questions about how designers can contribute with their design-practice to science education was applied within an experimental, practice-based workshop. The workshop in the structure of an introductory virology course took place with undergraduate biology students at the University of Bremen. Special thanks at this point to Prof. Dr. Andreas Dotzauer (Head of the Laboratory of Virus Research at the University Bremen), who was significantly engaged in the ongoing development process and provided the participation of his students for the case study. Furthermore, thanks to Prof. Dr. Doris Elster (Head of the Department of Biology Education at the University Bremen) for mentoring the didactic aspects and providing the support of her PhD candidates for testing the modeling workshop in advance.

Participants, Setting and Introduction

A first testing was conducted with a group of ten PhD researchers (Department of Biology Education), working in groups of two. On basis of the verbal response and the observed performances the concept got reviewed and adjusted. The final workshop was applied within an introductory course in virology with 36 students, working in groups of three. The workshop replaced a part of the regular lesson on the topic of virus structure and was completed within two sessions, a week apart of each other. The first session got introduced by Prof. Andreas Dotzauer on the structure of helical virus structures, followed by a model guided introduction of the icosahedron and its symmetry from the perspective of design,

geometry and architecture. Conceiving basic rules of symmetry within geometric bodies, the focus of the introduction was on the icosahedron, its symmetry and architecture in nature. The question why viruses are built according to an icosahedral symmetry between natures economy of means⁴⁰ and statics was demonstrated by platonic solid models, similar to "pipe and string" models Richard Buckminster Fuller used to teach successful strategies of triangulation in nature⁴¹ (in contrast to cubic statics; see figure 4.).⁴²



Figure 4. Collapsing cube model from Fuller's picture book "Tetrascroll".43

Materials and Methodology

The modeling kits provided for each group of students contained a 3D printed model of an icosahedron, puzzle bricks (representing virus building modules), a couple of copied triangulation grids and a skeletal icosahedron model (a 3D printed icosahedral base with rod like extensions, originated from each of the twelve points of intersection) (see Figure 5)⁴⁴. Furthermore, every group got a worksheet and a variety of crafting tools (pens, markers, rulers, scissors and adhesive tape).

The methodology follows practice- and design-based research attempts between scientific questioning, hypothesising and material as well as model investigation using hands-on model exploration and modeling experiments like sketching, designing, (re-)constructing, combining, modifying and assembling. The students were advised to use all provided materials and tools to solve the worksheet's questions. They were encouraged to "tinker" and "play around", to draw, cut, bend and tape as design practice. The experiments enabled the students to develop own hypotheses, to determine the models in relation to their hypotheses and to progress by starting the modeling all over again.



Figure 5. Workshop materials: Worksheet, models, puzzle bricks, grid.45

Activities and Findings

The workshop was characterized by four main activities defined within the corresponding working sheet. Every question was introduced, a processing time was announced, and the individual processes were monitored (and if necessary supported) by the tutors.

Exercise 1:

The first exercise was designed as a hands-on entry: the students were asked to retrace the previously introduced rotational symmetry of an icosahedron within a diagram and to transfer the learned from the two-dimensional illustration to a material model. After the transformation, the students were asked to locate and count the number of the 5-fold rotational symmetry points. As simple as it sounds, the understanding of an icosahedron between 2D and 3D model and the definition of its symmetry was the most challenging task for the students. Without grasping this knowledge, all following exercises could not be executed sufficiently. During the workshop, the students of one of the twelve groups were (even with the tutor's assistance) not able to understand the concept of rotational symmetry.

Exercise 2:

The second exercise was a combinatorial task with puzzle bricks which led to a first modeling approach. In accordance to a brief introduction of the concept of icosahedral viruses between rotational symmetry and the modularity of a "regular aggregation of smaller asymmetrical building bricks"⁴⁶, the students were asked to create possible ways of "assembling", keeping the complexity of equivalency in forces and bonding in mind. The groups majority quickly came up with an arrangement of six bricks forming a rosette (see solution approach figure 6.). A few groups started building highly complex structures, correct in terms of equivalency, but as model hypothesis no longer sustainable in relation to the second step: To find a way to transfer the modeling solution on a hexagonal grid by drawing (to form a lattice). Under these circumstances, the mentioned groups started all over again with their modeling process to develop a suitable solution for the given form. Finally, all groups started with the same status quo to the next exercise.



Figure 6. Solution approach: From module to lattice, further to a closed shell.⁴⁷

Exercise 3:

The third exercise tried to combine the developed models and their related learning outcome from the preceding tasks. The students were asked to localize the 5-fold symmetry within the drawn hexagonal grid. All twelve groups concluded, referring to their models, that a (pentagonal) 5-fold symmetry is

not possible and cannot exist within a hexagonal arranged structure. This outcome indeed falsified the first model and started the debate on a much greater question, which refers to exercise 4.

Exercise 4:

Why is the model not working, despite all building bricks are arranged in accordance to the given parameters? How is it possible to form a closed shell with icosahedral symmetry out of a hexagonal, flat lattice? Starting from this, the task was to design a model that responds to the placed questions and, in addition, to set up a hypothesis to state the model evidence. Within the case study, the students worked independently on the issue with different strategies and came up with different model solutions: Some cut out hexagonal elements, built them up to pyramids and started assembling them to larger structures, others cut into hexagonal grids, bent over the paper, fixed it in another position and repeated the practice (see figure 6.). The wide plethora of modeling attempts got examined within a discourse of all participants, emerged questions were taken in, hypotheses were discussed, and models were compared in idea and design to each other. In this way, a temporary hypothesis could be posed, which involved all outcomes, created through practice- and design-based research attempts. How close these methods (as well the evolved hypotheses of the workshop) were related to the modeling research of Donald Caspar and Aaron Klug got presented within the following class session.

CONCLUSION

The presented concept of an experimental modeling workshop is a first attempt to point out the positive effects on learning and modeling capabilities of students by involving design-based modeling and research processes into teaching. The development process of the course between scientist (Prof. Andreas Dotzauer) and designer (author) revealed great possibilities for science education. These chances do not only constitute in a participation of design in natural sciences, but rather in the fruitful contribution of both fields within a transdisciplinary interchange. The case study demonstrates a way to help students getting started with the invention of own models and to encourage them to use modeling as a practice-based research tool. The objective is to teach an artistic research methodology to work on scientific issues by experimenting, hypothesizing, modeling, questioning and reconsidering models and hypotheses in a number of iterations. In contrast to the common use of static models in classroom demonstrations, it is an unconventional concept to involve students within dynamic modeling and design processes. The aim of the presented workshop concept is to help students to obtain a material literacy, leading to an enhanced modeling competence through the processes of assessing material by practice.

NOTES

¹ Term referring to: Mei-Hung Chiu and Jing-Wen Lin, "Modeling competence in science education," *Disciplinary and Interdisciplinary Science Education Research 1:12* (2019).

² Published under the original title: Joosten Mueller, *Picornaviridae. Zum Gestalten von Modell und Visualisierungskonzepten in der Virologie* (Berlin: Humboldt University of Berlin, 2019).

³ The open access 3D-printable models are available from Sketchfab (https://sketchfab.com/joostenmueller).

⁴ Invited lecture within the undergraduate introductory course "Virology" (Prof. Dr. A. Dotzauer), 01.2016.

⁵ See: Allan G. Harrison and David F. Treagust, "A typology of school science models," *International Journal of Science Education* (2000); Ulrike Trier and Annette Upmeier zu Belzen, "Schülervorstellungen zu Modellen," *Erkenntnisweg Biologiedidaktik 8* (2009); Annette Upmeier zu Belzen and Dirk Krüger, "Modellkompetenz im Biologeunterricht / Model competence in biology teaching," *Zeitschrift für Didaktik der Naturwissenschaften Jg. 16* (2010); Lorraine Grosslight et al. "Understanding models and their use in science: Conceptions of middle and high school students and experts," *Journal of Research in Science Teaching Volume 28, Issue 9* (1991).

⁶ See: Lorraine Grosslight et al. "Understanding models and their use in science: Conceptions of middle and high school students and experts," *Journal of Research in Science Teaching volume 28, issue 9* (1991).

⁷ Term referring to: Annette Upmeier zu Belzen and Dirk Krüger, "Modellkompetenz im Biologeunterricht / Model competence in biology teaching," *Zeitschrift für Didaktik der Naturwissenschaften Jg. 16* (2010).

⁸ See: Annette Upmeier zu Belzen and Dirk Krüger, "Modellkompetenz im Biologeunterricht / Model competence in biology teaching," *Zeitschrift für Didaktik der Naturwissenschaften Jg. 16* (2010)

⁹ See: Jane S. Richardson, "Teaching Molecular 3-D Literacy," *Biochemistry and Molecular Biology Education Vol. 30, No. 1* (2002): 21.

¹⁰ Term referring to: Robert C. Bateman et al. "Teaching and Assessing Three-Dimensional Molecular Literacy in Undergraduate Biochemistry," *Journal of Chemical Education Vol. 79 No. 5* (2002); Jane S. Richardson, "Teaching Molecular 3-D Literacy," *Biochemistry and Molecular Biology Education Vol. 30, No. 1* (2002); Jaqueline R. Roberts et al. "Physical Models Enhance Molecular Three-dimensional Literacy in an Introductory Biochemistry Course," *Biochemistry and Molecular Biology Education Vol. 33, No. 2* (2005).

¹¹ See: Robert C. Bateman et al. "Teaching and Assessing Three-Dimensional Molecular Literacy in Undergraduate Biochemistry," Journal of Chemical Education Vol. 79 No. 5 (2002); Jane S. Richardson, "Teaching Molecular 3-D Literacy," *Biochemistry and Molecular Biology Education Vol. 30, No. 1* (2002); Jaqueline R. Roberts et al. "Physical Models Enhance Molecular Three-dimensional Literacy in an Introductory Biochemistry Course," *Biochemistry and Molecular Biology Education Vol. 33, No. 2* (2005).

¹² See: A. Kat Cooper and M. T. Oliver-Hoyo, "Creating 3D Physical Models to Probe Student Understanding of Macromolecular Structure," *Biochemistry and Molecular Biology Education Volume 45, Number 6* (2017); Lindelani Mnguni," Visual Literacy Skills Amoungst Molecular Biology Students," *Proceedings: To-wards Effective Teaching and Meaningful Learning in Mathematics, Science and Technology. ISTE International Conference on Mathematics, Science and Technology Education* (2016); Konrad J. Schönborn and Trevor R. Anderson, "Bridging the Educational Research-Teaching Practice Gap. Foundations for Assessing and Developing Biochemistry Students Visual Literacy," *Biochemistry and Molecular Biology Education Vol. 38, No. 5* (2010);

Konrad J. Schönborn and Trevor R. Anderson, "The importance of Visual Literacy in the Education of Biochemists," *Biochemistry and Molecular Biology Education Vol. 34, No. 2* (2006).

¹³ See: M. Van Eijck and W. Roth, "Theorizing scientific literacy in the wild," *Educational research review 5* (2010).
¹⁴ Compare: Robert C. Bateman et al. "Teaching and Assessing Three-Dimensional Molecular Literacy in Undergraduate Biochemistry," *Journal of Chemical Education Vol. 79 No. 5* (2002); A. Kat Cooper and M. T. Oliver-Hoyo, "Creating 3D Physical Models to Probe Student Understanding of Macromolecular Structure," Biochemistry and Molecular Biology Education Volume 45, Number 6 (2017); Lindelani Mnguni," Visual Literacy Skills Amongst Molecular Biology Students," Proceedings: To-wards Effective Teaching and Meaningful Learning in Mathematics, Science and Technology. ISTE International Conference on Mathematics, Science and Technology Education Vol. 30, No. 1 (2002); Jaqueline R. Roberts et al. "Physical Models Enhance Molecular Three-dimensional Literacy in an Introductory Biochemistry Course," Biochemistry and Molecular Biology Education Vol. 33, No. 2 (2005); Konrad J. Schönborn and Trevor R. Anderson, "Bridging the Educational Research-Teaching Practice Gap. Foundations for Assessing and Developing Biochemistry Students Visual Literacy," Biochemistry and Molecular Biology Education Vol. 38, No. 5 (2010); Konrad J. Schönborn and Trevor

R. Anderson, "The importance of Visual Literacy in the Education of Biochemists," *Biochemistry and Molecular Biology Education Vol. 34, No. 2* (2006).

¹⁵ See: Ibid.

¹⁶ See: Jodi Davenport et al. "A Self-Assisting Protein Folding Model for Teaching Structural Molecular Biology," *Structure 25* (2017); Alexandria L. Hansen et al. "Exploring the Potential of 3D-printing in Biological Education: A Review of the Literature," *Integrative and Comparative Biology Volume 60, Issue 4* (2020); Michelle E. Howell et al. "Visualizing the Invisible: A Guide to Designing, Printing, and Incorporating Dynamic 3D Molecular Models to Teach Structure-Function Relationships," *Journal of Microbiology & Biology Education Volume 19, Number 3* (2018).

¹⁷ See: Ingrid Augusto et al. "Visual Reconstruction and Three-Dimensional Printing of Blood Cells as Tool in Cell Biology Education," *Plos One* (2016); James R. Bagley and Andrew J. Galpin, "Three-Dimensional Printing of Human Skeletal Muscle Cells: An Interdisciplinary Approach for Studying Biological Systems," *Biochemistry and Molecular Biology Education Volume 43, Number 6* (2015).

¹⁸ Mei-Hung Chiu and Jing-Wen Lin, "Modeling competence in science education," *Disciplinary and Interdisciplinary Science Education Research 1:12 (*2019): 3.

¹⁹ M. R. Matthews, "Models in Science and Science Education: An Introduction," *Science and Education 16* (2007).

²⁰ The term "material literacy" is referring to terminology attempts of material culture studies and art history. See: Christian Becker, "Bildungsziel: Kompetente Alltagsakteure. Textile Sachkultur als Basis schulischer Kompetenzentwicklung," ...*textil...Vol. 2* (2005); Christian Becker, "Material Literacy – Eine Perspektive für den Textilunterricht," BÖKWE No. 1 (2007); Christian Becker, "Textile Dingwelten erschließen," *in Technik und Design Grundlagen*, ed. Thomas Stuber (Bern: hep Verlag, 2006); Ann-Sophie Lehmann," Material Literacy," *Bauhaus Zeitschrift Nr. 9 "Substance", (*2017).

²¹ See: Donald L. D. Caspar and Aaron Klug, "Physical Principles in the Construction of Regular Viruses," *Cold Spring Harbor Symposia on Quantitative Biology Vol.* 27 (1962).

²² See: Donald L. D. Caspar, "Structure of Bushy Stunt Virus," Nature 177 (1956).

²³ See: James D. Watson and Francis H. C. Crick, "Structure of Small Viruses," *Nature Journal Vol.* 177 (1956).

²⁴ James D. Watson and Francis H. C. Crick, "Structure of Small Viruses," *Nature Journal Vol.* 177 (1956): 474.

²⁵ See: Donald L. D. Caspar and Aaron Klug, "Physical Principles in the Construction of Regular Viruses," *Cold Spring Harbor Symposia on Quantitative Biology Vol. 27* (1962); James D. Watson and Francis H. C. Crick, "Structure of Small Viruses," *Nature Journal Vol. 177* (1956).

²⁶See: Gregory J. Morgan, "Early Theories of Virus Structure," in: *Conformational Proteomics of Macromolecular Architecture*, eds. R. Holland Cheng and Lena Hammar (Singapore: World Scientific Publishing Company, 2004), 17.

²⁷ See: Ibid:17.

²⁸ See: Gregory J. Morgan, "Early Theories of Virus Structure," in: *Conformational Proteomics of Macromolecular Architecture*, eds. R. Holland Cheng and Lena Hammar (Singapore: World Scientific Publishing Company, 2004), 27.

²⁹ See: Richard Buckminster Fuller, The Energetic-Synergetic Geometry of R. Buckminster Fuller (New York: Macmillan Publishers, 1962).

³⁰ See: Gregory J. Morgan, "Early Theories of Virus Structure," in: *Conformational Proteomics of Macromolecular Architecture*, eds. R. Holland Cheng and Lena Hammar (Singapore: World Scientific Publishing Company, 2004), 27.

³¹ See: Donald L. D. Caspar and Aaron Klug, "Physical Principles in the Construction of Regular Viruses," *Cold Spring Harbor Symposia on Quantitative Biology Vol.* 27 (1962).

³² Donald L. D. Caspar and Aaron Klug, "Physical Principles in the Construction of Regular Viruses," *Cold Spring Harbor Symposia on Quantitative Biology Vol.* 27 (1962): 10.

³³ See: Donald L. D. Caspar and Aaron Klug, "Physical Principles in the Construction of Regular Viruses," *Cold Spring Harbor Symposia on Quantitative Biology Vol.* 27 (1962): 9.

³⁴ See: Gregory J. Morgan, "Virus Design. 1955-1962: Science Meets Art," *Phytopathology Vol. 96* (2006): 1289.

³⁵ See: Gregory J. Morgan, "Virus Design. 1955-1962: Science Meets Art," *Phytopathology Vol. 96* (2006): 1290.

³⁶ Refer to chapter "Quasi-equivalence theory" in: Donald L. D. Caspar and Aaron Klug, "Physical Principles in the Construction of Regular Viruses," *Cold Spring Harbor Symposia on Quantitative Biology Vol.* 27 (1962).

³⁷ Robert W. Marks, *The Dymaxion World of Buckminster Fuller* (New York: Reinhold Publishing Corp., 1960): 162.

³⁸ Richard Buckminster Fuller, *Synergetics. Explorations in the Geometry of Thinking* (New York: Macmillan Publishing Co. Inc.): Fig. 717.01.

³⁹ Donald L.D. Caspar, "Movement and Self-Control in Protein Assemblies – Quasi-Equivalence Revisited," *The Biophysical Journal Issue 32* (1980): 111.

⁴⁰ See: Joosten Mueller, *Picornaviridae. Zum Gestalten von Modell und Visualisierungskonzepten in der Virologie* (Berlin: Humboldt University of Berlin, 2019): 70-71.

⁴¹ See: Joachim Krausse, "Buckminster Fullers Modellierung der Natur," *Arch+ Zeitschrift für Architektur und Städtebau 159/160,* (2002): 40-41.

⁴² Further information on the used models are available at: Mueller, Joosten. "Picornaviridae. Struktur und Geometrie von Ikosaedrischen Viren," (Master's thesis): 63-65. Available at Researchgate (https://www.researchgate.net/publication/334225248_PICORNA_VIRIDAE_-_STRUKTUR_UND_GEOMETRIE_VON_IKOSAEDRISCHEN_VIREN.

⁴³ Richard Buckminster Fuller, *Tetrascroll* (New York: Universal Limited Art Editions, 1977): 5.

⁴⁴ By interest of the used open access teaching material (templates and 3D printable files), please feel free to contact: j.mueller@rug.nl.

⁴⁵ Photograph: Joosten Mueller (2019).

⁴⁶ James D. Watson and Francis H. C. Crick, "Structure of Small Viruses," *Nature Journal Vol.* 177 (1956): 474.

⁴⁷ Photograph: Joosten Mueller (2019).

BIBLIOGRAPHY

Augusto, Ingrid et al. "Visual Reconstruction and Three-Dimensional Printing of Blood Cells as Tool in Cell Biology Education." *Plos One* (2016): 1-13.

Bagley, James R. and Galpin, Andrew J. "Three-Dimensional Printing of Human Skeletal Muscle Cells: An Interdisciplinary Approach for Studying Biological Systems." *Biochemistry and Molecular Biology Education Volume 43, Number* 6 (2015): 403-7.

Bateman, Robert C. et al. "Teaching and Assessing Three-Dimensional Molecular Literacy in Undergraduate Biochemistry." *Journal of Chemical Education Vol. 79 No. 5* (2002): 551-2.

Becker, Christian, "Bildungsziel: Kompetente Alltagsakteure. Textile Sachkultur als Basis schulischer Kompetenzentwicklung." ...textil....Vol. 2 (2005): 7-16.

Becker, Christian, "Material Literacy – Eine Perspektive für den Textilunterricht." BÖKWE No. 1 (2007): 129-39.

- Becker, Christian, "Textile Dingwelten erschließen." In *Technik und Design Grundlagen*, edited by Thomas Stuber, 269-75. Bern: hep Verlag, 2006.
- Buckminster Fuller, Richard. The Energetic-Synergetic Geometry of R. Buckminster Fuller. New York: Macmillan Publishers, 1962.
- Buckminster Fuller, Richard. Synergetics. Explorations in the Geometry of Thinking. New York: Macmillan Publishing Co. Inc., 1975.

Buckminster Fuller, Richard. Tetrascroll. New York: Universal Limited Art Editions, 1977.

Caspar, Donald L. D. "Structure of Bushy Stunt Virus." Nature 177 (1956): 475-6.

- Caspar, Donald L.D., "Movement and Self-Control in Protein Assemblies Quasi-Equivalence Revisited." *The Biophysical Journal Issue 32* (1980): 103-35.
- Caspar, Donald L. D. and Klug, Aaron, "Physical Principles in the Construction of Regular Viruses." Cold Spring Harbor Symposia on Quantitative Biology Vol. 27 (1962): 1-24.
- Chiu, Mei-Hung and Lin Jing-Wen, "Modeling competence in science education." *Disciplinary and Interdisciplinary Science Education Research 1:12* (2019): 1-11.
- Cooper, A. Kat and Oliver-Hoyo, M. T. "Creating 3D Physical Models to Probe Student Understanding of Macromolecular Structure." *Biochemistry and Molecular Biology Education Volume 45, Number 6* (2017): 491-500.
- Davenport, Jodi et al. "A Self-Assisting Protein Folding Model for Teaching Structural Molecular Biology." *Structure 25* (2017): 671-78.
- Grosslight, Lorraine et al. "Understanding models and their use in science: Conceptions of middle and high school students and experts." *Journal of Research in Science Teaching Volume 28, Issue 9* (1991): 799-822.

- Hansen, Alexandria L. et al. "Exploring the Potential of 3D-printing in Biological Education: A Review of the Literature." *Integrative and Comparative Biology Volume 60, Issue 4* (2020): 1-27.
- Harrison, Allan G. and Treagust, David F. "A typology of school science models." *International Journal of Science Education* (2000):1011-26.
- Howell, Michelle E. et al. "Visualizing the Invisible: A Guide to Designing, Printing, and Incorporating Dynamic 3D Molecular Models to Teach Structure-Function Relationships." *Journal of Microbiology & Biology Education Volume 19, Number 3* (2018): 1-3.
- Krausse, Joachim, "Buckminster Fullers Modellierung der Natur." Arch+ Zeitschrift für Architektur und Städtebau 159/160 (2002): 40-9.

Lehmann, Ann-Sophie," Material Literacy." Bauhaus Zeitschrift Nr. 9 "Substance", (2017): 20-7.

- Matthews, Michael R. "Models in Science and Science Education: An Introduction." Science and Education 16 (2007): 647-52.
- Robert W. Marks. The Dymaxion World of Buckminster Fuller. New York: Reinhold Publishing Corp., 1960.
- Mnguni, Lindelani, "Visual Literacy Skills Amoungst Molecular Biology Students." *Proceedings: To-wards Effective Teaching and Meaningful Learning in Mathematics, Science and Technology. ISTE International Conference on Mathematics, Science and Technology Education* (2016): 421-30.
- Morgan, Gregory J. "Early Theories of Virus Structure." In *Conformational Proteomics of Macromolecular Architecture*, edited by Cheng, R. Holland and Hammar, Lena, 3-40. Singapore: World Scientific Publishing Company, 2004.
- Morgan, Gregory J. "Virus Design. 1955-1962: Science Meets Art." Phytopathology Vol. 96 (2006): 1287-91.
- Mueller, Joosten. "Picornaviridae. Struktur und Geometrie von Ikosaedrischen Viren" (Master's thesis). Available from Researchgate (https://www.researchgate.net/publication/334225248_PICORNA_VIRIDAE_____STRUKTUR_UND_GEOMETRIE_VON_IKOSAEDRISCHEN_VIREN).
- Mueller, Joosten. *Picornaviridae. Zum Gestalten von Modell und Visualisierungskonzepten in der Virologie.* Berlin: Humboldt University of Berlin, 2019.
- Richardson, Jane S. "Teaching Molecular 3-D Literacy." *Biochemistry and Molecular Biology Education Vol. 30, No. 1* (2002): 21-6.
- Roberts, Jaqueline R. et al. "Physical Models Enhance Molecular Three-dimensional Literacy in an Introductory Biochemistry Course." *Biochemistry and Molecular Biology Education Vol. 33, No. 2* (2005): 105-10.
- Schönborn, Konrad J. and Anderson, Trevor R. "Bridging the Educational Research-Teaching Practice Gap. Foundations for Assessing and Developing Biochemistry Students Visual Literacy." *Biochemistry and Molecular Biology Education Vol. 38, No. 5* (2010): 347-54.
- Schönborn, Konrad J. and Anderson, Trevor R. "The importance of Visual Literacy in the Education of Biochemists." *Biochemistry and Molecular Biology Education Vol. 34, No. 2* (2006): 94-102.
- Trier, Ulrike and Upmeier zu Belzen, Annette, "Schülervorstellungen zu Modellen." *Erkenntnisweg Biologiedidaktik 8* (2009): 23-37.
- Upmeier zu Belzen, Annette and Krüger, Dirk, "Modellkompetenz im Biologieunterricht / Model competence in biology teaching." Zeitschrift für Didaktik der Naturwissenschaften Jg. 16 (2010): 41-57.
- Van Eijck, Michiel and Roth, Wolff-Michael, "Theorizing scientific literacy in the wild." *Educational research review* 5 (2010): 184-94.
- Watson, James D. and Crick, Francis H. C. "Structure of Small Viruses." Nature Journal Vol. 177 (1956): 473-5.

FROM THE ACADEMY TO THE PRACTICE. TWO STEPS BACKWARD, ONE STEP FORWARD – TOWARDS A PERIPATETIC HYPOTHESIS

Author: JOÃO SOARES

Institution: ÉVORA UNIVERSITY, PORTUGAL

INTRODUCTION

It is considered pertinent, in the scope of the encounter of "Teaching-Learning-Research: Design and Environments," to reflect articulating a more ideal dimension about teaching/learning, triggered by and from within direct experience.

The present considerations stem from a teaching-researching experience of about seventeen years, with direct responsibility on coordination and the very design of curricula. Inherently the reflections run on an almost existentialist level, that is on the search for the understanding of the meaning of a school where architecture research and teaching are practiced simultaneously. Versatility and flexibility in the learning-teaching processes is defended. The horizon of reflection combines academic and professional practice, in the scope of Architecture.

The binomial versatility/flexibility indicates a changeable, plastic nature. It refers to an apparatus of models for learning/teaching and research experience.

My concern is not about finding an ideal model, but on the coexistence of different models, even eventually contradictory, converging for the same purpose. This is self-evident when dealing with architecture and the growing debate on "research by design" and "practice-based" approaches proves it. Examples of academic and non-academic complementarity could be described in:

a) "Deepening" refers to classical academic teaching, so to say, occurs in the medium-long term: one semester to five years. The duration of the studies allows for the slow and careful sedimentation of knowledge aimed at architectural culture in a functional perspective of collecting relevant states of the art. Mainly individual work, even if developed in the collective space of the architecture atelier. In short, this type corresponds to classes;

b) "Intensity" promotes the ability to react projectually on subjects in a very short time. Precise time circumscription workshops promote immersion that encourages direct, less mental, and more impulsive approaches. Experimental work feeds heterodox results in an empirical basis. Mainly collective work, in which the experience of exchange – of ideas, and of established functions – leads to results less conditioned by pre-conceived thinking. Likewise, the fading of the hierarchical sense in the position of student/teacher (most characteristic of the "pure" academic space) will not be indifferent. Basically, this corresponds to the workshops, which usually articulate extra-academic

local/regional entities capable of posing questions with a sense of "reality," as opposed to the more strictly academic sense¹.

The conclusive moment of the academic experience is also worth mentioning: the final course work². The thesis work is presented in a later different register and will be the first moment that constrains the synthesis of areas usually distinct. It does so through a retroactive process that puts in the foreground a certain sense of responsibility that is not only disciplinary, but, I would even say, civil.

For a peripatetic integration

It is in the oscillation between the academy and the "external" space that progressive attempts to improve training are tuned. Emphasis is placed on the direction of travel – back and forth – from one space to another. The pathway takes on a metaphorical relevance, but it is also, in itself, a method proposal for a peripatetic integration. Examples framed by the notion of Jacques Gubler are considered: "Véhicule du corps."³

On the matter of interchangeability, Günther Vogt's reflection on tools for teaching and for learning will be appropriate, namely in the section: "Anyone can change the model with just a single stroke of the hand."⁴, As well as when the author states that "[d]esign can only be discussed between people on an equal footing. Designing, debating, cooking and travelling" implying the terms footing and travelling, precisely the value of one of the central aspects considered in this essay, the fertility of walking within the scope of architectural practice and thinking. Thus, I am proposing in this essay to consider aspects related to walking as a process capable of being used as instrumental apparatus, in a research logic, most notably in architecture.⁵ In this sense, feet and legs will be the instruments in which this apparatus is constituted – therefore the reference is within the scope of a sense of corporeality as complementary to rationality.⁶ The corporeal dimension is, therefore, that of the body in space, of the walking body – in the minimum measure of the short step, as well as in the great dimension of the journey.

On the importance of travel in learning processes, the history of culture shows us exemplary cases, from the most initiatory dimension of the Greek epics to the Romantic period in the different arts. In architecture, among the countless figures who founded their artistic and professional identity, it will be fair to mention Le Corbusier – if for nothing else, due to the systematic approach he took on his own travel records. In *Le Corbusier, Homme de Lettres*, M. Christine Boyer writes: "Travel, has it will throughout his life, supplies him with food for thought and with valuable spare time to put pen to paper. He uses time on trains to keep up an extensive correspondence, seclusion on steamships to assemble notes into a book. Rides in airplane provide moments of revelation, quickly jotted down."⁷

Given a certain effect, what machine is capable of producing it? And given a certain machine, what can it be used for $?^8$

If we consider this statement assuming walking (more than, singularly, the feet or the legs) as a machine, the whole set of reflections that has been practiced here acquires a clearer interpretative possibility: it is because I walk on the ground, discovering aspects such as consistency or humidity index, or wind, or the presence of odours – that I can add deeper levels of relevant information to a conventional topographic survey⁹.

On the other hand, if you ask yourself: What can my feet do for me?, a whole set of possibilities opens up, not necessarily known *a priori*, while opening up the possibility of assuming aspects of serendipity as potentially valid in the investigation (later on I will come back to this point).

This leads me to the issues of the definition of technology, as well as that of human condition (philosophical anthropology has long been studying those relations. Technology, more than having been invented by man, would be the same definition of its humanity – resulting rather to the other way

around: to have been technology to "invent" man¹⁰). It is interesting to put things in this perspective bearing in mind the hypothesis that offers the interpretation of the body as machine (as seen above, or technology, in this context).

Mens sana in corpore sano is the Greek motto that materializes the idea of balance – an idea cast aside in Western tradition – by the hegemonic predominance that the Enlightenment best represents, in such a way that what concerns the issues of corporality appears in the antipodes of a notion of correctness – of objectivity. In Plato, this is called accidents.

However, these dynamics are the foundation of alternative ways of investigating and of looking for results. Neurologist António Damásio states that "It is nonsense for people to convince themselves that intelligence comes from the brain"¹¹. In the same line of thought we find the reunion of essays on the legacy of Alison and Peter Smithson "Architecture is not made with the brain"¹², a fitting description of the unique work – on experimenting, as well as writing and thinking architecture produced by the English couple.

Research in architecture will always have to deal – even when embarking on the paths of theory and criticism – with doing, with the idea, in potential, of construction and the definition of space. Operating through attempts that involve, in an idiosyncratic way, action and thought. The relationship between these two domains will never be linear or necessarily of cause and effect. Otherwise "How can I tell what I think till I see what I make and do?"¹³

On mental/manual dichotomy Peter Korn's contribution can be helpful, namely the chapter "Heart, Head, and Hand" of the book *Why we make things, and why it matters. The education of a craftsman*¹⁴: "My father had opined that woodworking would leave me intellectually unfulfilled. But I found that even so simple an operation as cutting a mortise harmonizes intellect, manual skill, and character in a way that underscores the artificiality of the Cartesian divide between mind and body." (idem).

Waste, not to waste. Or, on the virtues of wasting actions

In the "learning by doing" processes, the notions of waste, of error ¹⁵ (and attempt), of redundancy, are inseparable parts of the path to a solution, even if positivist ideas refer to a notion of effectiveness and of optimizing efforts for the best results¹⁶. It is Korn again who speaks to us of a perfectly done action (made for a specific scope) coming from the consciousness of a work done without any waste of gestures: "Whatever it was, for long periods of time my ordinary consciousness was subsumed in a dance of making where not a motion was wasted" (idem, ibidem). Such reflection follows the idea of the importance of constant practice of elementary working gestures, on routines, its importance in a kind of body consciousness – as opposed to brain (or rational) consciousness. Continuing: "This is not to say I wasn't thinking – just that I had become far more adept at making decisions. Mind, hand, and body were reading from the same page, they worked together seamlessly."

Laboratory work (where handwork and thought are interrelated) is strongly structured based on experimentation, where hypotheses are tested and submitted to the validation test; different hypotheses are tested again, in a sequence in which one of the determining aspects is the realization of continuous actions, at a pace fast enough to allow confrontations and comparisons that lead to an informed choice – to the decision to take a path, or, on the contrary, to not proceed.

In this type of process, a "waste" principle is implied, but a waste that builds a territory of possibilities which will make decisions more solid. One could speak of "necessary waste." Moreover, the "dance" to which Korn refers is achieved through routines based on work of trial and error, processes well described in the Beckettian moto "Ever tried. Ever failed. No matter. Try again. Fail again. Fail better."

On the same idea of accumulating "unnecessary" gestures, and about the importance of waste, and regarding the curatorship of Philip Ursprung (and their own work) Herzog & de Meuron, on the essay "Just Waste," write: "We are exhibiting an archive, that is, a physical accumulation of the documents that we have produced in order to initiate and accelerate mental processes or, on the contrary, to arrest and propel them in another direction. (...) These archived objects are therefore nothing but waste products, since the immaterial, mental processes of understanding, learning, and developing always have priority."¹⁷

The same way it helped to hear the words of a carpenter talking about his way of working with wood, so can the words of another type of builder – a writer – now speak of this labour, writing: "Evan Connell said once that he knew he was finished with a short story when he found himself going through it and taking out commas and then going through the story again and putting commas back in the same places. I like that way of working on something. I respect that kind of care for what is being done. That's all we have, finally, the words, and they had better be the right ones, with the punctuation in the right places so that they can best say what they are meant to say."¹⁸ It is about a certain dance that we are still talking about, walking forwards and backwards – wasting steps, losing steps, to gain clarity. We would be able to easily consider both cases as valid descriptions of the process of drawing in architecture, inquiring in search of the right shape.

Serendipity

The steps of the path, the body and the experience of doing are resumed, recognizing the importance of redundancy (where one can inscribe what I call, unfairly – it seems clear now to say it – error or waste). In this trail it will be necessary to mention the dimension of (apparent) chance in what we consider search, discovery, revelation.

The urban thinker Jane Jacobs spoked of urban serendipity¹⁹ as a fundamental act of re-establishing contact with the "street," as opposed to the distance that resulted from planning in its vertigo of data and objectivity. Duchamp'ss "objets trouvés" or Le Corbusier'ss "objets à réaction poétique" may also intertwine within the scope of the serendipity, situated somewhere between the magical, the banal (as it exists in everyday life) and the chosen – the fact that transforming them gives them meaning. The surrealists, through the hand of Andrè Breton, developed the notion of "objective chance," resulting from the practices of urban drift. "Objective chance seeks to explain via a relation between natural or external necessity and human or internal necessity the occurrence of coincidences so startling that they seem as if they must reveal something."²⁰

Try walking in my shoes

Finally, the power of walking, putting on shoes and walking, becomes clear. Effective gesture is as well a subtle metaphor that leads to yet another: putting oneself in the shoes of others. This action is necessary in the relations between people in society, but also necessary for an awareness of the relationship with the other entities with which we share the planet – hence the consciousness of the Anthropocene. Heather Davis and Etienne Turpin coordinated a publication that sets art in confrontation with the Anthropocene²¹. In it, they offer a pertinent general framework enriched by a set of relevant essays, by presenting a perspective that does not place the view considered from the notion of the human being at the centre; rather, elegantly resorting to the rhetorical figure of personification, they propose the exercise of reading the world from the other's perceptual effort. the same can be seen in *History According to Cattle*, a project by Terike Haapoja & Laura Gustafsson²², in which a cow's voice is heard. This means that, as readers, we are subjected to the need to reconsider frameworks and the very paradigms (of space, of resources) that we usually have to decode and relate

to the world. This is the exercise for which the architect is called, in his/her social function. What he/she aspires to, however, is to make belonging to his own individual quest – that of his creative expression – that of the other. Not necessarily through dialogue (perhaps overvalued and containing too many misunderstandings) but through a listening trail.

NOTES

¹ Among a significant number of workshop participations, I find pertinent and allow myself to mention an interesting one that took place in Lisbon, within the 4th edition of the Lisbon Architecture Triennale. It was called "The Power of Experiment," since the main issue treated was the very range of learning-experimenting possibilities in the context of architecture and construction. For the occasion, and as a testimony, I wrote the essay "Try Thinking Like a Tree," eventually published in *The Power of Experiment* (Alberto Altés, Ana Jara and Lucinda Correia, eds., see list of references).

² Since the beginning of the doctoral programme, the final assignment has relied on an approach mainly based on the concept of *research by design*. That aspect is indeed foundational to the whole programme: this was the first PhD approved in Portugal with that modality.

³ Jacques Gubler, Motion, Émotions. Thèmes d'Histoire et d'Architecture. Golion: Infolio éditions, 2003: 17.

⁴ Günther Vogt, Rebecca Bornhauser and Thomas Kissling (eds.). *Landscape as a Cabinet of Curiosities. In Search of a Position.* Zürich: Lars Müller Publishers, 2015, 91 and 171.

⁵ As is proposed by the KABK (Royal Academy of Art The Hague) Lectorate Design in their initiative Walking as a Research Method, begun in December, 2020.

⁶ Generically, the hegemony of positivism and determinism is temporally and ideologically located in the concepts of René Descartes. The idea of "enlightened" reason led to a progressive universal appreciation of objectivity (from the mental over the corporeal – the material), and therefore in a process of devaluation and invisibility, or negation, of bodily/material aspects. There is also a long tradition that values a broader – holistic – view, in which body and mind are mutually related. Closer in time, after the Renaissance, we find Johann Wolfgang von Goethe or Rudolf Steiner, to name only two relevant figures, before entering a century when everything was brought into question, opening the doors of subjectivity – and which would find the best expression in the theory of relativity (paradoxically born from the lucid and objective mind of a scientist). It was upon the legacy of this long tradition, always lurking in the shade, that an objective subjectivity was built that could be recognized in the contemporary work of neurologists António Damásio (*Descartes Error*) or Oliver Sacks who, looking – literally – into the brain, – managed to reveal its non-linear and elastic complexity and, thence, the very sense of humanity. Thus, such autonomous and apparently paradoxical aspects can be found in the corporeal dimension, where attributes normally exclusive to reason are revealed in the body: the memory of the body; the intelligence of the hand, embodied knowledge, etc.. Important contributions have been made on this subject by the architect Juhani Pallasmaa or the sociologist Richard Sennett.

⁷ Christine M. Boyer, *Le Corbusier, Homme de Lettres*. New York: Princeton Architectural Press, 2011: 51.

⁸ Andrew Ballantyne, *Deleuze and Guattari for Architects*. Abingdon: Routledge, 2007: 20.

⁹ Vincent Javet points at "cross references," as a necessary redundance strategy in topographical representation. Cf. Vincent Javet, zoom presentation: "Digital Topographies: Remote Online Spot Elevation Surveying as a Learning Method," *in Teaching-Learning-Research. Design and Environments*, Zoom Presentations, Amps Manchester School of Architecture, *Teaching & Technology* group, 04.12.2020.

¹⁰ "The human becomes human in seeing itself in the things it makes, or seeing its possibility in those things. So the human doesn't simply invent tools. Tools invent the human," (Beatriz Colomina and Mark Wigley, *Are we Human? Notes on an Archaeology of Design.* Zürich: Lars Müller Publishers, 2018: 51.)

¹¹ António Damásio interviewed by João Céu e Silva, in *Diário de Notícias*, 05-12-2020.

¹² Mohsen Mostafavi *et al* (eds.). Architecture is not made with the brain: The Labour of Alison and Peter Smithson. London: Architectural Association, 2005.

¹³ When seeing things in Frayling's perspective, the question of applied research vs. pure research vanishes. The issue becomes the involvement in what is being made, which leads us to the notion of the safety of doing things carefully, for the sake of doing them well. Christopher Frayling, *Research in Art and Design*(Royal College of Art Research Papers, Vol 1, No 1, 1993/4). London: Royal College of Art, 1994: 5.

¹⁴ Peter Korn, *Why we Make Things and Why it Matters. The education of a Craftsman*. London: Vintage Penguin Random House, 2017: 51.

¹⁵ Reference literature on this subject already exists, namely the studies by Mhairi McVicar, Francesca Hughes, or Caitlin DeSilvey.

¹⁶ Returning to one of the aspects identified at the beginning of this essay, which sets the positivist drift of Western culture in perspective – and the idea of losing what is outside, from what is, so to speak, "enlightened,"

David Leatherbarrow, in his preface to McVicar's book suggests: "Perhaps it is only the steadily increasing desire for control that accompanies hyper-rationalised methods of design and construction that has made the advent of unexpected developments in project realisation seem so problematic." (2019: xvii)

¹⁷ Philip Ursprung, *Herzog & De Meuron. Natural History*. Montréal, Baden: Canadian Center for Architecture: Lars Müller Publishers, 2002: 74.

¹⁸ Raymond Carver, "On Writing," in *The Story and its Writer: An Introduction to Short Fiction*," Boston: Bedford/St. Martin's, 6th ed., Ed. Ann Charters, 2003: 1608.

¹⁹ "You've got to get out and walk. Walk, and you will see that many of the assumptions on

which the projects depend are visibly wrong (...) by a simple old-fashioned observation we can see what they are," (Jane Jacobs *in* Max Allen (Coord.), *Ideas That Matter. The Worlds of Jane Jacobs*. Ontario and Washington: The Ginger Press and Island Press, 2011: 41-42.

²⁰ Lori Waxman, *Keep Walking Intently, The Ambulatory Art of the Surrealists, the Situationist International, and Fluxus.* Berlin: Sternberg Press, 2014: 42.

²¹ Heather Davis and Etienne Turpin (eds.). *Art in the Anthropocene. Encounters Among Aesthetics, Politics, Environments and Epistemologies.* London: Open Humanities Press, 2015.

²² Davis and Turpin, 2015: 293-298.

BIBLIOGRAPHY

- Altés, Alberto, Ana Jara and Lucinda Correia (eds.). The Power of Experiment ou Novos Caminhos para o Ensino da Arquitetura. Lisboa: Edition Artéria Humanizing Architecture, 2016.
- Allen, Max (ed.). Ideas That Matter: The Worlds of Jane Jacobs. Ontario and Washington: The Ginger Press and Island Press, 2011.
- Ballantyne, Andrew. Deleuze & Guattari for Architects, col. Thinkers for Architects 01. Abingdon: Routledge, 2007.
- Boyer, M. Christine. Le Corbusier, Homme de Lettres. New York: Princeton Architectural Press, 2011.
- Carver, Raymond. "On Writing," in The Story and its Writer: An Introduction to Short Fiction, 6th ed. Boston: Ed. Ann Charters, 2003.
- Colomina, Beatriz and Mark Wigley. Are we Human? Notes on an Archaeology of Design. Zürich: Lars Müller Publishers, 2017.
- Damásio, António. Interviewed by João Céu Silva. In *Diário de Notícias*. 05-12-2020, last accessed January 26th, 2021, https://www.dn.pt/edicao-do-dia/05-dez-2020/e-um-disparate-as-pessoas-convencerem-se-de-que-a-inteligencia-vem-do-cerebro-13104356.html.
- DeSilvey, Caitlin. Curated Decay. Heritage Beyond Saving. Minneapolis: University of Minnesota Press, 2017.
- Frayling, Christopher. Research in Art and Design, Royal College of Art Research Papers, Vol 1, No 1, 1993/4. London: Royal College of Art, 1994.
- Gubler, Jacques. Motion, Émotions. Thèmes d'Histoire et d'Architecture. Golion: Infolio éditions, 2003.
- Davis, Heather and Etienne Turpin (eds.). Art in the Anthropocene. Encounters Among Aesthetics, Politics, Environments and Epistemologies. London: Open Humanities Press, 2015.
- Hughes, Francesca. The Architecture of Error, Matter, Measure, and the Misadventures of Precision. Cambridge: The MIT Press, 2014.
- Korn, Peter. Why we Make Things and Why it Matters. The education of a Craftsman. London: Vintage Penguin Random House, 2017.
- McVicar, Mhairi. Precision in Architecture. Certainty, Ambiguity and Deviation. New York: Routledge, 2019.
- Mostafavi, Mohsen and Pamela Johnston, Rosa Ainley and Clare Barrett (eds.). Architecture is not made with the brain: The Labour of Alison and Peter Smithson. London: Architectural Association, 2005.
- Ursprung, Philip. Herzog & De Meuron. Natural History. Montréal and Baden: Canadian Center for Architecture and Lars Müller Publishers, 2002.
- Vogt, Günther, Rebecca Bornhauser and Thomas Kissling (eds.). Landscape as a Cabinet of Curiosities. In Search of a Position. Zürich: Lars Müller Publishers, 2015.
- Waxman, Lori. Keep Walking Intently. The Ambulatory Art of the Surrealists, the Situationist International, and Fluxus. Berlin: Sternberg Press, 2014.

RE-INVENTING A HYBRID PROFESSION

Author: HELEN O'CONNOR, KIRSTY MACARI, REBECCA FOY

Affiliation: UNIVERSITY OF DUNDEE, UK

INTRODUCTION

As Rittel first suggested in the last century, planning problems are complex, indeterminate, lack clear boundaries and outcomes, and might therefore be described as 'wicked'¹. We might go on to describe the contemporary condition is one of super-complexity, uncertainty and rapid change. Campbell, writing on urbanism more recently suggested that 'no segmented group or individual can possess the complete view needed for working with complexity^{c2}. In this context there is a role for a 'hybrid' professional graduate, architect and planner, able to practice collaboratively across disciplinary boundaries.

While several existing postgraduate courses enable students to work with parallel disciplines, since 2016 we have been teaching a hybrid qualification which enables architecture students, within the final two years of their accredited course, to follow a pathway taught alongside postgraduate urban planning, and to qualify with an award which leads to either, or both professions. The students work together, within local communities engaging with live urban problems to develop design research projects which cross disciplinary and institutional boundaries. The development and implementation of this course has clarified the anticipated overlaps in knowledge within the two professions, but also revealed significant differences in approach, priorities and method. It has also led us to question if we are shaping better qualified architects, better qualified planners, or a new kind of professional for which we do not yet have a distinct name.

Now that this course is maturing and our graduates are pursuing their varied careers, we are able to reflect on their, and our experience; to understand what particular skills and insight might be gained from working in the space between disciplines – not simply additional, but potentially richer skills - and how this approach might benefit future practice.

THE ORIGINS, RATIONALE, AND AMBITIONS OF MARCH WITH URBAN PLANNING

When we developed the joint course, we did so with the ambition to equip graduates with:

'the skills and confidence to meet the challenges of future society and the contemporary workplace, as innovative, effective and responsible individuals within increasingly complex and diverse professional contexts'

We envisaged graduate architects with a better understanding of the way that planning legislation worked, but beyond this a more holistic understanding of the factors which influence the design and development places and spaces - social, economic and political, and would therefore be in a better

position to creatively engage those levers. We also saw the potential for those graduates choosing to become chartered planners to bring an innate understanding of the process and practice of design - be skilled problem formers and problem solvers - and a detailed understanding of the ways that buildings were procured and constructed. In short, better planners and better architects – through having a broad background knowledge and a more empathetic understanding of the position of the other.

What we found in developing the course, and in mapping it simultaneously against each professional body's criteria, were significant areas of overlap in what graduates were expected to know and understand, their skills, and in their approach as professionals. There is nothing in the planning curriculum followed by our students, which cannot be linked to the current UK ARB/RIBA criteria for architecture, but the course does change the conventional (for architecture) emphasis. Having studied in significant depth the economics and politics of cities, their social structures and networks, students are more aware of the fundamental complexities inherent in this context and are less inclined to see construction as the default answer and the handover of a building to a client as a closed end point.

In addressing design problems architects and planners commonly draw upon a wide range of knowledge seemingly beyond their disciplinary boundaries to understand the context in which, and the problem on which they are working ³. Indeed, as Heckhausen notes, all disciplines which are related to professional fields and practices tend to be 'eclectic rather than purist in their epistemological concepts of themselves'⁴. But this does not necessarily make a project interdisciplinary the problem is still approached by an architect, and from an architectural perspective.

Inter, and *trans*disciplinarity are potentially slippery (and overused) terms – how we define them here is therefore worth briefly re-iterating. Bruce, et al. distinguish the two terms thus:

• Interdisciplinary study 'approaches an issue from a range of disciplinary perspectives' their individual contribution is not differentiated, but integrated.

• transdisciplinary study however, organises knowledge around 'complex heterogeneous domains' rather than disciplines, and 'attempts to devise approaches which are tailored specifically to the problem context' and in doing so may also draw on knowledge and expertise *beyond* the academic context Not only working in the space between disciplinary boundaries, but *across* them⁵.

Given that this definition might be written to apply to urban questions and problems, arising from a specific physical and social context, perhaps a synthesis of architecture and urban planning is the ideal opportunity for interdisciplinary teaching and research? Writing in 1972 Heckhausen described city planning as an 'interdiscipline in waiting' involving so many, and so diverse a range of subjects, that it manifests as a 'jigsaw puzzle-like composition of adjacent material fields' all held together by the need to address complex, compound problems which transcend disciplinary boundaries.

What is a *hybrid profession* – and is this in any way different from an interdiscipline? Klein, writing on academic interdisciplinarity, identifies two significant processes which characterize these interactions between and across disciplines – *'bridge building'* between two or more established disciplines, and *'restructuring'* in which specialist areas of study effectively detach from their several parent disciplines to form a new coherent whole⁶. While our current collaboration arises from the pragmatic need to build bridges between Architecture and Urban Planning – it perhaps has the potential to lead to the formation of new interdisciplinary 'hybrid' domain around specific problems or concerns, which has, in turn, the potential lead to the formation of a new discipline - restructuring.

In actuality, despite our initial claims for the MArch with Urban Planning as an 'interdisciplinary hybrid', it would have been more accurately described as multi-disciplinary programme, students studied modules from different disciplines in parallel each retaining a clearly defined disciplinary

remit and identity. It has taken five years of gradual evolution to begin to uncover the potential of a transdisciplinary approach.

THE EVOLUTION OF THE COURSE

The course has not changed its structure since it was introduced five years ago. Students opt to follow this pathway having completed four years of architectural education, in their final year they study three modules in parallel with MSc Planning students, and complete one major design project which draws together both disciplines. What has evolved, is the way we deliver the programme, and the way that the students interact between the two disciplines. and with the city beyond the university.



Figure 1. Course Diagram

From its inception, the course has been structured around real contexts and real problems set by external partners. This agenda had already been set by one of the existing urban planning modules which considered the legislative planning context through development of coherent urban strategies. Unlike the *urban strategies* more commonly developed within architecture programmes (including our own UG course) here any physical interventions exist only as part of a more holistic proposal which includes policy levers and delivery mechanisms, addressing networks, processes and wider impacts.

Outcomes over the last five years have demonstrated the value and potential of this approach to staff, students, professional bodies and practitioners – allowing us to be more innovative in teaching methods and the students to be more ambitious in framing design outcomes, and this is perhaps also reflected in the routes our graduates are now taking.

This evolution has manifested first in how the students work with each other across disciplines: from a position where disciplines attended lectures together and were assessed via the same criteria on work they produced addressing different contexts, to working on the same context but in separate groups, to in 2018 forming (voluntarily) our first cross-disciplinary team and thereby exponentially increasing the opportunities for peer learning. A team formed only of MArch students, or only of MSc students, has now become an anomaly. The students have themselves become aware that they risk disadvantage as they lack the full spectrum of useful skills. From distrust, even antipathy, we've arrived at a position where the students approach the opportunity to collaborate still with some uncertainty, but with a clear recognition of the value of the process and an openness to learning from their peers. Choosing to form an interdisciplinary team enables a balance which maximises the skills of those within the team and allows for the development of others as required.

The *urban strategy* has become the core around which both the MArch with Urban Planning, and the standalone MSc Spatial Planning revolve, meaning that students are less likely to view themselves as in competition with each other, or with other teams. All the strategies produced by the class are subsequently overlaid to form the context for individual MArch design research projects and for MSc urban design projects, and the ideas explored potentially framing the themes around which major MSc research studies are generated.



Figure 2. Miln Street: bringing together four individual projects; Rebecca Foy 2019.

Secondly, we have extended how we, and our students, engage with external partners in the community. The students are briefed not by us, but by conversations with planning officers in the first instance. They develop more specialist and detailed understanding of the specific issues they chose to focus on through conversations with other stakeholders – developers, community organisations and representatives, presenting their ideas back through informal dialogue and critique. This inclusive approach generates significant interest from communities (perhaps the ultimate expert of their own place) both visualising possible options for future change and suggesting ways those communities might become involved in planning processes. In parallel the students gain a valuable new perspective on their work. The partnership between education and practice presents a rare opportunity for critical reflection and development, benefitting the students by using 'live' scenarios which enable them to extend and demonstrate their capabilities whilst creating reflective space for those already tasked with delivering place-based changes.



Figure 3. Miln Street model, MArch with Urban Planning Studio, 2019.

'Live' projects in architecture schools are not that unusual, but this one perhaps represents a further step - in addition to engaging more than one disciplinary cohort, it has become a more significant

partnership between city and university, enabling the students to situate themselves outside the institution and engage directly with the messiness of real places and problems. The design outcomes generated have similarly become less abstracted and more responsive, the focus shifts as does, potentially the 'measure of success'⁷ – from what might be valued by the academy, disciplinary and/or professional bodies, to what might be valuable to a place or community, and support its future, sustainable development.

A STUDENT EXPERIENCE

To illustrate, we will briefly recount the experience of one recent graduate as a case study, Rebecca Foy, who graduated in June 2019.

Rebecca was a talented architecture student, who had completed her undergraduate studies with a first class honours degree before opting to follow the MArch with Urban Planning pathway in her final year. The context we considered in 2018-19 was one in the city of Dundee, where the imminent opening of the V&A museum and the designation as a UNESCO city of design seemed to present huge opportunities. The individual project Rebecca developed over her final year grew from an urban strategy which aimed to build the economic potential of creative industries within a semi-derelict, post-industrial area. This led to her to find and engage with a network of makers and designers in the city, an active creative community of which she'd to that point been largely unaware, despite the architecture school being situated in an Art College. Her project departed from the safety of a single building design as an outcome, and instead proposed a series of strategies both physical and digital, which enabled this creative community to connect with the city in a more tangible way, and to shape the way their neighbourhood evolved. Rebecca subsequently described the opportunity to engage with stakeholders as 'life-changing'. Not only was she inspired by individuals she met, she also described this way of working as a necessary 'reality check' which has continued to shape her approach to her professional career. The work she was doing had the potential to make real change, the people she engaged with were real and she felt a responsibility to them.



Figure 4. Activity and Events on Miln Street, Rebecca Foy 2019.

Unsure, based on her prior experience of architectural practice, if this was now a route she wanted to follow, on graduation Rebecca initially decided to pursue a career in planning. However, while her analytical and graphic skills were valued by her employers, planning consultancy also did not prove

the correct 'fit'. She didn't want to limit herself to architectural practice, neither did she want to stay within the boundaries of a conventional planning career – she knew there was a role for her, but that this role didn't have a specific name, or a professional body.

As a direct result of the work Rebecca had done in Dundee during her course, she was then offered the opportunity to work directly with the Scottish government to develop the pilot 'local place plan' – an initiative designed to enable communities to contribute to future planning policy for their neighborhoods. Having completed this, she has now taken up a role in interdisciplinary design studio which considers urban projects from the city scale down to that of streets or squares. Rebecca deliberately sought out this context, a creative environment which would allow her to work across disciplines. Even within this context she struggles to articulate precisely what she does as an urban designer, but she is now surrounded by colleagues with similarly imprecise role descriptions.

As Staff, we describe ourselves as architects, and as planners, but in actuality we also fulfil professional roles beyond those described by our respective professional bodies, as teachers. Rebecca's experience has clarified an opportunity we'd not appreciated in the course as it was initially envisaged, that of nurturing 'authentic' professional identities; an approach to critically reflective practice based on the graduates own understanding of their responsibilities to their own professional development, their profession(s) and as citizens⁸.

WHAT ARE HYBRID SKILLS?

To approach a city, or even a city neighbourhood, as if it were a larger architectural problem, capable of being given order by converting it into a disciplined work of art, is to make the mistake of attempting to substitute art for life. The results of such profound confusion between art and life are neither art nor life. They are taxidermy.⁹

While we were seeking to form better architects, and better planners, we have perhaps created a third opportunity – better urbanists – possessing a rare combination of skills. What students gain by occupying this boundary space between architecture and planning is perhaps revealed by examining what separates the disciplines as they are currently taught.

While, as indicated above, the knowledge each must evidence to satisfy their professional bodies overlaps, the way that the two disciplines are currently taught and assessed leads the students to communicate, evidence and structure their ideas very differently. Since the 1950s planning has increasingly been aligned with social sciences in an academic context, adopteding teaching and research methods common in those disciplines¹⁰. Students of planning are more likely to hold an undergraduate qualification in geography than in architecture. They are adept in data analysis and in constructing well-evidenced written arguments. MArch students in contrast have been trained to express themselves and their ideas visually, to go through an iterative, cyclical process of experimentation and reflection, often working intuitively - post-rationalizing an underpinning logic - and to accept that there is no one 'correct' answer. This disjunct creates a boundary space, a location for Rebecca's dilemma (and strength): she approaches what are essentially planning problems, with an understanding of the planning context, but with a designer's process, and perhaps also with the confidence that she does not have to fit herself into any pre-prescribed disciplinary pigeon-hole.

CONCLUSION

We're interested in an understanding of transdiciplinary urbanism articulated by Doucet and Jansenn which suggests that knowledge production turns around 3 major elements:

• The integration of discipline and profession or theory and practice – an approach common to both architecture and planning education,

- *Designerly* modes of enquiry,
- And an ethical dimension¹¹.

This 'ethical dimension' is highlighted for M.Arch students by the shift in focus required when working with (and as) planning students. Their primary concerns must extend beyond that of a client, to that of wider, and future, society. They must consider how and when a proposal might be implemented, by and for whom, and what impact it might have over longer timescales, at both a local and global level. It is this which perhaps has most potential to impact on students understanding of, and approach to their future professional practice. Working across disciplines, and with communities beyond the academic studio equips them with tools, and with sensitivities, which would otherwise be unavailable to them.

We are not suggesting that specialist disciplinary knowledge is not valuable; it is necessary to have this expertise in order to work in an interdisciplinary way. Nor that the roles of planner, or of architect are no longer relevant; of our now approximately 30 graduates, we are aware of around 10% who have moved into planning practice, the vast majority going on to become architects (albeit often in multidisciplinary practices which particularly value their skills in urban design and planning) and only one, Rebecca, who has gone on to forge her own, hybrid path.

What we are suggesting is that professional roles are becoming more fluid, that the careers our graduates may follow will not always fit neat disciplinary descriptions we can anticipate, and that we need therefore to support them in understanding how to position and value their skills within a complex professional landscape, and an increasingly complex world; to have a more nuanced understanding of their professional identity than that offered by simply describing themselves in terms of their academic discipline.

NOTES

¹ H.W.J. Rittel and M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences*, no. 4 (1973).

² Kelvin Campbell, *Making massive small change : building the urban society we want* (White River Junction, Vermont : Chelsea Green Publishing, 2018).

³ D. lossifova, C. Doll, and A. Gasparatos, *Defining the urban: interdisciplinary and professional perspectives* (New York: Routledge, 2018).

⁴ H. Heckhausen, "Discipline and Interdisciplinarity," in *Interdisciplinarity: problems of teaching and research in universities*, ed. L. Apostel, G. Berger, and A. Briggs (Paris: Organisation for Economic Cooperation and Development: Centre for Educational Research and Innovation, 1972).

⁵ A. Bruce et al., "Interdisciplinary integration in Europe: the case of the Fifth Framework programme," *Futures* 36 (2004).

⁶ J.T. Klein, "Typologies of Interdisciplinarity: the boundary work of definition," in *The Oxford Handbook of Interdisciplinarity*, ed. Robert. Frodeman (Oxford: Oxford University Press, 2010).

⁷ Tatjana Schneider, Alastair Parvin, and Sam Brown, *Architecture Schools should be dissolved!* Unless they* (2011).

⁸ C. Kreber, *Educating for civic-mindedness: Nurturing authentic professional identities through transformative higher education* (Routledge, 2016).

⁹ Jane Jacobs, The death and life of great American cities (New York: New York : Random House, 1961).

¹⁰ Simin Davoudi and John Pendlebury, "Centenary paper: The evolution of planning as an academic discipline," *Town Planning Review* 81, no. 6 (2010).

¹¹ Isabelle Doucet and Nel Janssens, *Transdisciplinary Knowledge Production in Architecture and Urbanism Towards Hybrid Modes of Inquiry*, 1st ed. 2011. ed. (Dordrecht : Springer Netherlands : Imprint: Springer, 2011).

BIBLIOGRAPHY

Bruce, A, C. Lyall, J.Tait and R.Williams. "Interdisciplinary Integration in Europe: The Case of the Fifth Framework Programme." *Futures* 36 (2004): 457-70

- Campbell, Kelvin. *Making Massive Small Change: Building the Urban Society We Want.* White River Junction, Vermont: Chelsea Green Publishing, 2018.
- Davoudi, Simin, and John Pendelbury. "Centenary Paper: The Evolution of Planning as an Academic Discipline." *Town Planning Review* 81, no 6 (2010): 613-46.
- Doucet, Isabelle, and Nel Janssens. *Transdisciplinary Knowledge Production in Architecture and Urbanism Towards Hybrid Modes of Inquiry*. 1st ed. 2011.:Dordrecht: Springer Netherlands: Imprint: Springer, 2011.
- Heckhausen, H. "Discipline and Interdisciplinarity." In Interdisciplinarity: Problems of Teaching and Research in Universities, edited by L. Aspotel, G. Berger and A. Briggs. Paris: Organisation for Economic Cooperation and Development: Centre for Educational Research and Innovation, 1972.
- lossifova, D., C. Doll and A. Gasparatos. *Defining the Urban: Interdisciplinary and Professional Perspectives*. New York: Routledge, 2018.

Jacobs, Jane. The Death and Life of Great American Cities. New York: New York: Random House 1961.

- Klein, J.T. 'Typologies of Interdisciplinarity: The Boundary Work of Definition." In *The Oxford Handbook of Interdisciplinarity*, edited by Robert Frodeman. Oxford: Oxford University Press, 2010.
- Kreber, C. Educating for Civic-Mindedness: Nurturing Authentic Professional Identities through Transformative Higher Education. Routledge, 2016.
- Rittel, H.W.J., and M. Webber. "Dilemmas in a General Theory of Planning. "*Policy Sciences,* no. 4 (1973): 155-69.
- Schneider, Tajana, Alastair Parvin, and Sam Brown. *Architecture Schools Should be Dissolved!** Unless They. 2011. Doi: 10.13140/RG.2.1.4381.7842.

DESIGN THINKING DIAGRAM: A TOOL FOR DECISION-MAKING

Authors:

GRAHAM LIVESEY, ENRICA DALL'ARA, FABIAN NEUHAUS, SANDRA ABEGGLEN, MARY-ELLEN TYLER

Institution: UNIVERSITY OF CALGARY, CANADA

INTRODUCTION

Humans are fundamentally designers – humans create artifacts, shelters, communities, and landscapes. Design is a complicated process and involves conceiving, representing, and executing constructions across a wide range of scales. Various methods and approaches to design have been theorized over the last several decades resulting in a wide range of design process diagrams and strategies.¹ The task outlined here was to develop a tool to help structure the ongoing decision-making that is part of any design process, to present a comprehensive range of topics that designers should consider as they evolve a scheme. To this end we are introducing the Diagram as a working tool that frames a broad range of spatial, ecological, cultural, and material factors; it is designed to play a key role as a teaching tool primarily within design studios.

CONTEXT

The Diagram was first conceived of during the summer 2018 as we were discussing the course outline for an interdisciplinary urban design situated in Portland, Oregon. As the three instructors (Livesey, Dall'Ara, and Neuhaus) developed the course it was determined that it would be helpful to produce a tool that would require the students (Master's students in architecture, landscape architecture, and planning) to address a broad set of questions, beyond those typically asked in a studio; it was provisionally termed the Design Studio Matrix. An initial version of the Diagram arrayed a set of terms in a "circle," or "sunburst," diagram format. This was used at various points throughout the semester by the student teams to shape discussions and to evaluate the relative importance of various factors during research and analysis, design conception, and design development. Students were asked to develop the Diagram as a "spider" or "radar" diagram, showing the relative weighting of the various terms; this was done at several points in the term. Overall, the tool was a useful mechanism to help students shape their schemes – this was supported by student course evaluations. A second opportunity to use the Diagram was afforded in a Planning studio directed by Neuhaus in the Winter 2019 semester.

Research into the use of the Diagram as a teaching tool was formalized when the group received a grant from the Taylor Institute for Teaching and Learning at the University of Calgary. This provided funding to have a researcher embedded in subsequent studio courses to observe student team

discussions and to conduct surveys with participating students. At this point Tyler (advisor to the project) and Abegglen (researcher) joined the team, an advisory group was implemented, and ethics approval was secured.

During the summer 2019, the research group focused on developing the Diagram further strengthening its conceptual structure and defining a precise set of terms to go with the sunburst diagram format. In parallel, a new interdisciplinary urban design studio for Fall 2019 was devised by Livesey and Neuhaus that addressed a large development project being planned for by the Tsuut'ina First Nation on the edge of Calgary, Alberta. A member of the First Nation, Hal Eagletail, was enlisted as part of the teaching team.

The revised version of the Diagram was used at various stages during the Fall 2019 semester to structure assignments. Rather than spider diagrams, the student teams produced "diagram" maps/drawings (Figure 2). They also undertook individual assignments that more focused on specific terms of the Diagram. Further, the Diagram was used in the final stage to help present and explain the designs. Abegglen, whose background is in the Social Sciences and Education, was embedded in the course as a researcher, to observe student team discussions and to conduct surveys with participating students. The revised version of the Diagram has also been used in various subsequent architecture and planning studios.

METHODOLOGY

The Diagram is conceived in part by using Gilles Deleuze and Félix Guattari's concept of the "assemblage."² Deleuze and Guattari identify that there is a vertical and a horizontal axis associated with assemblages. The vertical axis deals with those forces that make and unmake territories; the horizontal axis deals with "bodies, actions and passions" and "of acts and statements, of incorporeal transformations of bodies."³ In other words, the horizontal axis brings together what can be termed content and expression. Assemblages, as conceived of by Deleuze and Guattari, are complex constellations of objects, bodies, expressions, languages, qualities, and territories that come together for varying periods of time to ideally create innovative and productive ways of functioning; an assemblage transpires as a set of forces coalesces together. Assemblages occur as a result of a productive entity that can be diagrammed. Effectively, a "diagram" is the code or arrangement by which an assemblage operates, it is a map of the function of an assemblage.

Using this formulation led to the development of the circular Diagram divided into four equal quadrants: Territoriality, Flows, Content, and Expression. Each of the four "family" terms are further broken down into three sub-categories. Beyond the influence of assemblage theory on the Diagram organization, there is also reference to a wide range of literature embedded in the structure, notably from the disciplines of landscape ecology, cultural theory, contemporary philosophy, and urban design theory (see outline Glossary below). The Diagram is as follows: the vertical axis of the Diagram is defined by Territoriality (Patches, Lines, and Composition) and Flows (Ecology, Bodies, and Exchange). The horizontal axis is defined by Content (Material, Technology, and Form) and Expression (Cultural, Social, and Agency). The four category quadrants of the circle address spatial structure and ecology, temporality and motion, material culture and process, representation and cultural practices – thus enabling a comprehensive approach, inclusive of material axis focuses on factors typically addressed in site analysis, while the horizontal axis deals with technological and cultural factors.



Figure 1. Design Thinking Diagram

It is intended that each of these twelve concept terms has scope to be shaped by the specifics of a project, and a project team. It is also understood that each of the twelve concept terms would be translated into visual "diagrams" that can be part of site analysis, design conceptualization, and project development. Diagramming is also a key aspect of the Design Thinking Diagram as a tool; a diagram is a drawing that explains rather than represents, and shows arrangement and relations.⁴ Diagrams are important tools in design. The words on the outer ring of the Diagram act as prompts (or qualifying words) for defining the concept terms. For example, if a design team is considering the word "social" they may opt to make this a primary aspect of their design project, or not. As the team works its way through the terms in the diagram, they make decisions about the relative value of each topic and provide precise definitions. The Glossary provides guidance to the design teams as they address topics, issues, and questions at various stages in the design process, and indicates various bodies of literature that a design team could pursue; it is a kind of brief design dictionary. The following is an abbreviated version of the Glossary, which is a key aspect of the Diagram.

GLOSSARY

Vertical Axis – Territoriality

Patches

(Shape/Size, Spatiality, Topography)

A patch is a space or territory marked out from the rest by a particular characteristic based on size, shape, adjacencies, and defining characteristics. It is different in some way from the area that surrounds it.⁵ The term implies the existence of a broader system to which the patch belongs as a distinguishable part. A characteristic urban tissue of a neighborhood, distinctive architectural features (type, materials) of a cluster of buildings, a grove within meadows, a peculiar topography, may be examples of elements that define patches. Borrowing concepts from landscape

ecology, the shape and location of patches, as well as their spatial composition, are essential in determining their interaction with the surroundings.⁶

Lines

(Boundary/Filter; Path/Node; Source/Sink)

In geometry, a line is defined as a line of points that extends infinitely in two directions. It has one single dimension, length. Nevertheless, the concept of line expands to involve other meanings and functions, acquiring – both physically and symbolically – more complex dimensions: edges or boundaries,⁷ limits or frontiers,⁸ barriers or filters,⁹ diaphragms, paths.¹⁰ In such meanings, lines might include nodes (as part of a network),¹¹ gates, and different degrees of porosity. Lines may also function as corridors.¹² "Width and connectivity are the primary controls on the five major functions of corridors, i.e. habitat, conduit, filter, source, and sink."¹³ Besides, lines play a key role in landscape perception¹⁴ and representation; therefore, their investigation involves visual languages. Topology, which is the study of lines that correspond to linear continua, or curves, includes identifying different line shapes in the plane or three dimensionally.¹⁵

Composition

(Pattern/Mosaic, Scale, Biotic/Abiotic)

Composition refers to something intrinsically comprehensive of multiple elements that are interrelated to each other. In landscape architecture and landscape ecology, it is vital to define the overall complex structure of a landscape (the mosaic), determined by both natural and anthropogenic factors.¹⁶ Indeed, a landscape is not characterized by its single elements but by the functional and visual relationships among its components. The focus is "more on the relationships among objects than on the objects themselves."¹⁷ "The overall structural and functional integrity of a landscape can be understood and evaluated in terms of both pattern and scale."¹⁸ Biotic and abiotic components of the environment, through their interactions, define patterns. "Patterns are everywhere, and it is by recognizing them that we orient ourselves, try to make sense of the world and predict the way that certain actions might occur...Patterns are evident at a very wide range of scale from the molecular structure of DNA, at the microscopical level, to the spirals of galaxies in the universe."¹⁹

Vertical Axis – Flows

Ecology

(Water/Air, Energy, Nutrients/Waste)

Natural resources (water, air, etc.) and energy flows dynamically are dependent on and affect an architectural, landscape, or urban system.²⁰ Multiple life cycles interact with the environment, including those of food and waste. This involves both natural and anthropogenic processes. Water and air are essential environmental components, which affect ecosystems and communities. "Within the hierarchical structure, there is a degree of vertical integration with feedback between levels and connections and between individual landscape mosaics and their constituent elements, by means of energy flows (direct in the case of heat or indirect in animal or human activities). These flows are dependent on and, in turn, affect the patterns of the mosaics; thus, they change over time and at different rates."²¹

Bodies

(Humans, Animals, Machines)

Bodies refers to humans, other animals, and machines that move within and across space through spontaneous or defined tracks. The bodies' movement is generated from needs, functions, and interactions with the environment and other bodies. Everything in the social and natural world exists inconstantly shifting networks and relationships.²² With regard to human movement, Hägerstrand identified three categories of limitations or constraints: capability, coupling, and authority.²³ Location and duration of stops, to engage with places and other bodies, are key aspects of movement patterns. These patterns are affected by conditions and functions of the environment. At the same time, bodies' movement may creatively shape places and make them dynamic and changing during the day and across seasons.²⁴

Exchange

(Capital, Commodities, Information)

Exchange is commonly thought to be the act of giving something to someone and them giving you back something else.²⁵ It is the basis of both economy and information. Exchange is intertwined with production, distribution, and consumption of goods and services. Human settlements, and cities as the maximum expression, are the place of exchange of capital and commodities.²⁶ Barter has also characterized the economy of various cultures. Information is another fundamental form of exchange. We can refer to how and where people share information, to informatic systems embedded in city-shaping, and to ways inhabitants and visitors are informed within the city. Access to information implies knowledge and ability to make decisions, and substantially contributes to democracy and equality.

Horizontal Axis – Content

Material

(Performance, Density, Properties)

Material is a physical substance that things can be made from.²⁷ A material possesses specific structure, density, properties, and possibilities of performance. Material systems have a double life, actual (depending on their properties) and virtual (depending on their capacities). Both actual properties and virtual capacities are real characteristics of an object. "To explain the creative behavior of any material system we normally need both a description of a mechanism that explains how the system was produced, and a description of the structure of its possibility space that accounts for its preferred stable states, as well as its transitions from quantitative to qualitative change."²⁸ DeLanda highlights that matter possesses morphogenetic powers, projecting fascinating implications for architectural design and urban design.²⁹

Technology

(Functions/Needs, Process, Effects)

We can frame technology as the practical, especially industrial, use of scientific discoveries.³⁰ Lewis Mumford, in his book *Art and Technics*, stated "we ordinarily use the word technology to describe both the field of practical arts and the systematic study of their operations and products."³¹ However, he preferred to use the term "technics" to describe "the part human activity wherein, by an energetic organization of the process of work, man controls and directs the forces of nature for his own purposes."³² Humans employ a wide range of technologies in response to human needs. Often

technologies involve processes of making, or manufacture. Technologies have the capability to be positively effective, or negatively destructive.

Form

(Appearance, Arrangement, Structure)

Form refers to the shape or appearance of something, and how that thing or organism was shaped. There is the sense that form is a response to function based on theories of evolution. The development of a particular form is based on many complex factors, including environment, and both human and non-human determinants. Form may refer to the result (as a noun) or to the process (as a verb) of morphogenesis, conceived not only strictly as a biology concept but broadly meant as origin (and development) of morphological characteristics (e.g., the formation of landforms, the conception of a building's form, and city form³³). The notion of form is often associated with the concept of *beauty*, which is related to the structural nature of form. "There is no arbitrary law of proportion, no unbending model of form...The law of adaptation is the fundamental law of nature in all structure."³⁴ The relationship between form and structure is inherent in the term arrangement, especially when it comes to design. "Instead of forcing the functions of every sort of building into one general form...let us begin from the heart of the structure as the nucleus, and work outward."³⁵

Horizontal Axis – Expression

Cultural

(Language, Codes, Perception/Affects)

Culture is a complex concept which may be defined in different ways. In a more recent anthropological definition, Stuart Hall writes that "the word culture is used to whatever is distinctive about the 'way of life' of a people, community, nation or social group." Further, emphasizing the role of perception, affects and thought, he states "Culture is about feelings, attachments and emotions as well as concepts and ideas", and "Culture is about 'shared meanings."³⁶ Hall adds, it is "not so much *a set of things…*as a process, a set of *practices*". "Meanings can only be shared through our common access to language." Language "operates as a *representational system*." Representation is "one of the central practices which produce culture."³⁷

Social

(Class/Politics, Gender, Ethnicity)

The term social embraces aspects such as class, gender, and ethnicity/race. Gender is "the behavioral, cultural or psychological traits typically associated with one sex."³⁸ Most cultures use a gender binary although recently discussions about more diverse gender identities have emerged. Social class is the hierarchical arrangements of individuals in society, usually defined by wealth and occupation; "A group sharing the same economic or social status."³⁹ Karl Marx argues that class is defined by one's relationship to the means of production. Max Weber, however, argued that class emerges from an interplay between class, status, and power. Michel Foucault has reflected on the relationship between power and knowledge and how they are used as a form of social control through societal institutions.⁴⁰ Ethnicity is defined as "Individuals who consider themselves, or are considered by others, to share common characteristics that differentiate them from the other collectivities in a society from which they developed their distinctive cultural behavior..."⁴¹

Agency

(Rituals/Practices, Narratives, Habits)

Action, power, or operation are terms related to agency.⁴² Agency implies an organization providing a specific service, the capacity, condition, or state of acting or of exerting power.⁴³ In sociology, an agent is an individual engaging with the social environment. De Certeau focuses on everyday practices as "ways of operating" or doing things.⁴⁴ Practice may be defined as something that is usually or regularly done, often as a habit, tradition, or custom.⁴⁵ Conceived as "a set of fixed actions and sometimes words performed regularly, especially as part of a ceremony,"⁴⁶ rituals are a special form of practice. Practices relate to myths.⁴⁷ "In premodern societies, myths were narratives that were conventionally sung, danced, acted out, or recited in the form of poetry. Their function was to encapsulate and express the collective consciousness of a particular social group..."⁴⁸

CONCLUSION

Now that the Diagram has been developed in its structure and terminology through several iterations and has been tested in a preliminary way in several studio courses, there is the opportunity to disseminate it more widely. It is intended to be an open access tool available to both professional designers and course instructors to use as they see fit. With reference to the pedagogical aspects related to the Diagram, and based on a number of studios, the ongoing research will be further developed into papers, presentations, and publications that will analyze and present the data and student work produced. A critical objective of the research project is to evaluate and discuss the potential of the Diagram to beneficially and effectively support the teaching and learning process within design courses.



Figure 2. Diagram maps. Urban Design Studio, Fall 2019.Students: Mark Popel, Cong Su, Norika Yue (courtesy of).

Page 277

ACKNOWLEDGMENTS

Funding for this project was generously provided for by the grants program of the Taylor Institute for Teaching

and Learning at the University of Calgary, and specifically by a 2019-20 University of Calgary Teaching and Learning Grant.

The authors would like to thank the project's Advisory Committee consisted of (in alphabetical order): Dr. Anne-Marie Dorland, Assistant Professor, Bissett School of Business, Mount Royal University; Patti Dyjur, Academic Lead Learning Technology and Design, Taylor Institute for Teaching and Learning, University of Calgary; Dr. Marian Eggermont, Teaching Professor, Schulich School of Engineering, University of Calgary. A special thanks goes to all those design studio course students in the School of Architecture, Planning and Landscape, University of Calgary, who have participated in this study. Without their willingness to discuss and share their experiences the development of this project would not have been possible.

NOTES

¹ See, for example: Peter Rowe, *Design Thinking* (Cambridge, Mass.: MIT Press, 1987); Nigel Cross, *Designerly Ways of Knowing* (London: Springer London, 2006); Richard Buchanan, "Wicked Problems in Design Thinking," *Design Issues*, Vol. 8, No. 2 (Spring 1992); Geoffrey Broadbent, *Design in Architecture: Architecture and the Human Sciences* (London: David Fulton Pub., 1988); Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983).

² See Graham Livesey, "Assemblage," in Adrian Parr, ed., *The Deleuze Dictionary* (Edinburgh; Edinburgh University Press, 2010); J. Macgregor Wise, "Assemblage," in Charles Stivale, ed., *Gilles Deleuze: Key Concepts* (Montreal, MQUP, 2011).

³ Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 1987), 88.

⁴ "Diagram," Miriam-Webster Dictionary, accessed June 12, 2020,

https://www.merriam-webster.com/dictionary/diagram.

⁵ "Patch," Cambridge Dictionary, accessed June 11, 2020,

https://dictionary.cambridge.org/dictionary/english/patch. See also Richard T.T. Forman, Land Mosaics: The Ecology of Landscapes and Regions (Cambridge: Cambridge University Press, 1995).

⁶ Wenche E. Dramstad, James D. Olson, and Richard T.T. Forman, *Landscape Ecology Principles in Landscape Architecture and Land-use Planning* (Cambridge: Harvard University Graduate School of Design, 1996), 19-25, 31-32.

⁷ See: Kevin Lynch, *The Image of the City* (Cambridge, Mass.: MIT Press, 1960); Simon Bell, *Landscape: pattern, perception, and process* (New York: E & FN Spon., 1999), 31-32; Michel Corajoud, "Aux étudiants des écoles de Paysage," ; accessed June 11, 2020, http://corajoudmichel.nerim.net/10-textes/elements-des-9-conduites/00neuf-cond-vignettes.html; Dramstad, Olson, and Forman, *Landscape Ecology Principles.*

⁸ See Piero Zanini, Significati del confine: I limiti naturali, storici, mentali (Milan: Mondadori, 2002).

⁹ Dramstad, Olson, and Forman, *Landscape Ecology Principles*, 35.

¹⁰ See Lynch, *The Image of the City*.

¹¹ Ibid.

¹² Dramstad, Olson, and Forman, *Landscape Ecology Principles*, 35-40; Bell, *Landscape*, 34.

¹³ Dramstad, Olson, and Forman, *Landscape Ecology Principles*, 36. See also Richard T.T. Forman, *Land Mosaics: The Ecology of Landscapes and Regions* (Cambridge: Cambridge University Press, 1995).

¹⁴ Bell, Landscape, 19.

¹⁵ Ibid.

¹⁶ See Forman, *Land Mosaics*.

¹⁷ See Sébastien Marot, "The Reclaiming of Sites" in James Corner, ed., *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999), 45-57.

¹⁸ See Dramstad, Olson, and Forman, *Landscape Ecology Principle*.

¹⁹ Bell, Landscape, 1.

²⁰ See Bell, *Landscape*.

²¹ Ibid., 31.

²² See Bruno Latour, *Reassembling the Social. An Introduction to Actor-Network-Theory* (New York: Oxford University Press, 2005).

²³ See Torsten Hägerstrand, "What About People in Regional Science?" *Papers in Regional Science*, 24, 1 (1970): 7–24.

²⁴ See Lawrence Halprin, *The RSVP Cycle. Creative Process in the Human Environment* (George Braziller: New York, 1969).

²⁵ "Exchange," Cambridge Dictionary, accessed June 11, 2020,

https://dictionary.cambridge.org/dictionary/english/exchange.

²⁶ See Karl Marx, Capital. A Critique of Political Economy (Moscow: Progress Publishers, 1887).

²⁷ "Material," Cambridge Dictionary, accessed June 11, 2020,

https://dictionary.cambridge.org/dictionary/english/material.

²⁸ See Manuel DeLanda, "The New Materiality", *Architectural Design*, 85, 5 (2015): 16-21, https://doi.org/10.1002/ad.1948.

²⁹ Ibid.
³⁰ "Technology," *Cambridge Dictionary*, accessed June 11, 2020,

https://dictionary.cambridge.org/dictionary/english/technology.

³¹ Lewis Mumford, Art and the Technics (New York: Columbia University Press, 1952), 15.

32 Ibid.

³³ See Kevin Lynch, Good City Form (Cambridge, Mass.: MIT Press, 1981).

³⁴ Horatio Greenough, *Form and Function. Remarks on Art, Design, and Architecture* (Berkeley: University of California Press, 1966), 57-58.

³⁵ Ibid., 61-62.

³⁶ Stuart Hall, "Introduction," in *Representation: Cultural Representations and Signifying Practices* (London: Sage, 1997), 1-11.

³⁷ Ibid.

³⁸ "Gender," *Merriam-Webster Dictionary*, accessed June 11, 2020,

https://www.merriam-webster.com/dictionary/gender.

³⁹ "Class," Merriam-Webster Dictionary, accessed June 11, 2020,

https://www.merriam-webster.com/dictionary/class.

⁴⁰ See Michel Foucault *Ästhetik der Existenz. Schriften zur Lebenskunst* (Frankfurt am Main: Suhrkamp, 2007).

⁴¹ John Scott and Gordon Marshall, eds., "Ethnicity (ethnic group)," A Dictionary of Sociology, accessed June 11,

2020, https://www.oxfordreference.com/view/10.1093/acref/9780199533008.001.0001/acref-9780199533008-e-752?rskey=XTRgvz&result=1.

⁴² "Agency," Collins Dictionary, accessed June 11, 2020,

https://www.collinsdictionary.com/dictionary/english/agency.

⁴³ "Agency," *Merriam-Webster Dictionary*, accessed June 11, 2020,

https://www.merriam-webster.com/dictionary/agency.

⁴⁴ See Michel De Certeau, The Practice of Everyday Life (Berkeley: University of California Press, 1988).

⁴⁵ "Practice," *Cambridge Dictionary*, accessed June 11, 2020,

https://dictionary.cambridge.org/dictionary/english/practice.

⁴⁶ "Ritual," *Cambridge Dictionary*, accessed June 11, 2020,

https://dictionary.cambridge.org/dictionary/english/ritual.

⁴⁷ See Roland Barthes, *Mythologies* (Paris: Éditions du Seuil, 1957).

⁴⁸ See D.J. Huppatz, "Roland Barthes, Mythologies", *Design and Culture*, 3, 1 (2011): 85-100, https://doi.org/10.2752/175470810X12863771378833.

BIBLIOGRAPHY

Barthes, Roland. Mythologies. Paris: Éditions du Seuil, 1957.

Bell, Simon. Landscape: pattern, perception, and process. New York: E & FN Spon, 1999.

Bourdieu, Pierre. The Logic of Practice. Palo Alto: Stanford University Press, 1999.

De Certeau, Michel. The Practice of Everyday Life. Berkeley: University of California Press, 1988.

DeLanda, Manuel. "The New Materiality", *Architectural Design*, 85, 5 (2015): 16-21, https://doi.org/10.1002/ad.1948.

Deleuze, Gilles and Félix Guattari. A Thousand Plateaus: Capitalism and Schizophrenia. Minneapolis: University of Minnesota Press.

Dramstad, Wench E., James D. Olson, and Richard T.T. Forman. *Landscape Ecology Principles in Landscape Architecture and Land-use Planning*. Cambridge: Harvard University Graduate School of Design, 1996.

Forman, Richard T.T. Land Mosaics: The Ecology of Landscapes and Regions. Cambridge: Cambridge University Press, 1995.

Forester, John. Planning in the Face of Power. Berkeley: University of California Press, 1988.

Hall, Stuart. Representation: cultural representations and signifying practices. London: Sage, 1997.

Halprin, Lawrence. *The RSVP Cycle. Creative Process in the Human Environment.* George Braziller: New York, 1969.

Latour, Bruno. *Reassembling the Social. An Introduction to Actor-Network-Theory*. New York: Oxford University Press, 2005.

Lynch, Kevin. *The Image of the City*. Cambridge, Mass.: MIT Press, 1964. Lynch, Kevin. *Good City Form*. Cambridge, Mass.: MIT Press, 1981. Marx, Karl. *Capital: A Critique of Political Economy*. Moscow: Progress Publishers, 1887. Mumford, Lewis. *Art and the Technics*. New York: Columbia University Press, 1952.

STUDENT AS SITE: EMBODIED LANDSCAPE RESEARCH

Author: EMILY WETTSTEIN

Institution: HARVARD UNIVERSITY, USA

INTRODUCTION

In pursuit of bringing the two halves of academia into a closer dialogue, there are at least two different ways to connect design research to teaching. The first concerns content: making the subject matter of our research the subject matter of the courses that we teach, building the knowledge of our students alongside the knowledge of our discipline. The second concerns method: employing research concepts and practices to structure the pedagogy itself, designing a way of teaching that is built out of the insights and approaches of the discipline. By developing a pedagogy that embodies research in both content and method we enable an even greater synergy between teaching and research, enriching and expanding both.

As an example of this approach, this article describes my application of landscape architecture's deep engagement with site and sitedness to both the content and method of a Landscape Architecture Representation course that I teach at the Harvard Graduate School of Design. Building on my initial call to action, published in the Journal of Architectural Education as *SITE* • *ED*: A Student-as-Site *Pedagogy*,¹ I will first frame an expanded landscape-based conception of site by incorporating interdisciplinary theories of sitedness. I will then apply this expanded notion of site to design education, developing a student-as-site pedagogy that approaches students as landscape architecture approaches sites. After describing some of the manifestations of this sitedness in both the content and method of the representation course, I will conclude by speculating upon the potential of this strategy to further advance research and teaching through this newly framed reflexive relationship.

SITED

The notion of site has long underpinned the spatial design disciplines, but understanding its complexity is an emerging topic of focus. In *Site Matters*, Carol Burns and Andrea Kahn delineate the general sphere of each spatial design field's relationships to and understandings of 'site,' developing a typology in which the disciplines are almost defined by those relationships. They assert that while architecture focuses on the lot and its immediate site adjacencies, urban planning engages the social, economic, and political context as site, and landscape architecture's emphasis is on the material conditions of site.² As they describe, each of these approaches to site is highly generative of design, shaping the directions in which designers will intervene.

This generative agency of site is particularly salient in landscape architecture, for which sitedness is a foundational and continuously evolving concept. As Elizabeth Meyer describes, "[s]ite-reading and editing were central to establishing landscape architecture as a discipline separate from architecture,

engineering, and horticulture."³ As a discipline whose work is primarily a shaping of the site itself, landscape architecture often embraces each site's particularities as generators of design, building outward from a site's existing conditions and character.⁴

These disciplinary foundations continue to resonate as landscape architects critically engage a broad range of site analysis and mapping practices to uncover design potentialities. These studies extend far beyond site materiality and into the larger systems within which sites operate, from the sociopolitical to the ecological, blurring Burns' and Kahn's disciplinary boundaries. Recent movements in landscape architecture have pushed the discipline's relationship to site in two divergent but complementary directions. One is an expansion into the scale of urbanism and infrastructure,⁵ positioning the site as a node of expansive flows, systems, and power relations, often employing process-oriented and openended design strategies. The second is a renewed desire to ground territory and process through direct phenomenological experience of site, returning the vast and complex site to and through the body. These twin pulls into the systemic and the embodied stretch the discipline's notion of site, which can be expanded even further by looking to the ways in which parallel disciplines engage with what it means to be sited.⁶

Site-specific art has shared the conception of sitedness as being grounded in the body. Miwon Kwon describes the development of the movement, in which the viewer's presence is often seen as required for the completion of the work, in rejection of the quick distance of the "disembodied eye."⁷ For an artwork to be site-specific implied that the piece was not only designed to be installed in a specific place, but also to be experienced first-hand by someone within the site. This sitedness thus introduces a pair of specificities: the site and the viewing subject. Crucially, the viewing subject brings into the site their own relationship to a complex of institutional and social forces, requiring a commitment to "insist[ing] on the social matrix of the class, race, gender, and sexuality of the viewing subject."⁸ Implicit in this embrace of sitedness is a critique of the *tabula rasa*, as the space of art became a "real place," a physical, cultural, political, and institutional space,⁹ at the intersection of the contextualised human being and the physical site.

SITUATED

This embodied perspective brings into dialogue site's sibling concept, "situation," or one's position or perspective relative to others as the result of being sited. The idea that a subject's specificity represents a form of sitedness is examined by postmodern feminist and decolonial theories. Donna Haraway, for example, critiques a false objectivity in which vision has "long been used to signify a leap out of the marked body and into a conquering gaze from nowhere" that is hardly neutral, but in fact "signifies the un-marked positions of Man and White."¹⁰ When this naturalised perspective is deemed universal–unmarked, unlocatable, and un-sited–it becomes unaccountable and irresponsible.¹¹ A clear implication is that any effort to overcome the dominance of one set of perspectives over others cannot resort to color- or gender-blindness, which too easily default to an unacknowledged whiteness and maleness.¹² Rather, Haraway calls for a "situated knowledge" that pays active attention to race, class, gender, and sexuality, and insists upon the specificity and subjectivity of all persons, recognising both individual positionality and the multiplicity of subjects and positions.¹³

This situated epistemology applies not only to the viewing subject of a site, but also to the viewing subject of a design work. Jane Rendell's "Site-Writing" translates these concepts to design critique by applying sitedness, or the spatial positioning of situation, to the practice of art criticism. She draws upon postmodern and critical theory's use of spatial terms to define what she calls "situated criticism," which explores the relationship between "identity and place," summarised in the maxim that "[w]here I am makes a difference to who I can be and what I can know."¹⁴ Attentive to "the multiplicity of

voice and the variation of standpoint," this situated criticism "challenges criticism as a form of knowledge with a singular and static point of view located in the here and now."¹⁵ She offers instead, a practice of Site-Writing: "an active writing that constructs as well as traces the sites between critic and writer, artist and artwork, viewer and reader."¹⁶ We are beyond the identification of a single individual and their situated perspective encountering an artwork, and into the realm of an identity-conscious embrace of multiple centers, spread across time and space.

These calls for more situated approaches to epistemology and criticism apply smoothly to pedagogical practices and are echoed in Paolo Freire's critical pedagogy and bell hooks' engaged pedagogy, in which they advocate for a more identity-conscious teaching and learning practice that is sited in the student, instructor, and classroom itself. Freire critiques the pervasive "banking model" of education in which students are approached as empty vessels to be filled with knowledge from the instructor and advocates instead for a dialogue in which "the teacher-of-the-students and the students-of-the-teacher cease to exist and a new term emerges: teacher-student with students-teachers."¹⁷ Hooks continues this interrogation through her articulation of an "engaged pedagogy," insisting that "no education is politically neutral" and imploring educators to ask "Who speaks? Who listens? And why?"¹⁸ These pedagogies approach teaching and learning as active fields of knowledge generation in which both student and instructor's background, position, and identities are fully engaged as the rich site material or ground upon which learning is designed and knowledge emerges.

CASE STUDY

Having expanded the notions of site and sitedness via our tour from landscape architecture to critical pedagogy, we can now apply it to the practice of teaching landscape. The remainder of this article describes an initial attempt at that application in the Landscape Architecture Representation I course that I teach to first semester MLA-I students at the Harvard Graduate School of Design, where the course *content* is structured around the agency of site as revealed through representation, and the teaching *method* is a student-as-site pedagogy.

Content

Landscape Representation I: Landscape and Spatialization Processes introduces first semester landscape architecture students to the generative power of representation through the subject matter of site and sitedness, grounding them in both the discipline and in representation. The course first introduces *site* as critical construction through its various forms of representation, and then turns to representation as framing for multiple perspectives through different *site agents*. Throughout the semester students employ nuanced readings of existing site conditions, iterating between different modes of translation and abstraction to understand both site and site agents as imagined, created, and ultimately designed through their various representations.

To begin the semester, each student uncovers their own unique spatial sites with a Situationist Dérive¹⁹-the embodied experience of their everyday environments through an interpretive wandering²⁰-documented only in writing produced after the fact. The dériving students are unaware that their unplanned path will establish the site within which they will continue to work throughout the semester. This begins of a sequence in which each exercise drives the next, building from the initial subjective experience that is responsive to each site's unique qualities. In this way, the class emphasises a multiplicity of sites, each defined by the unique interaction between an individual student and their situation, and each bearing equal importance, value, and potential.

The proceeding course sequence engages multiple ways of knowing site. Students translate their site through the development of a *Non-Site*,²¹ layer its history and many identities into a *Palimpsest*, isolate

specific lenses through a *Notational Analysis*, and recenter the experiential as it unfolds over time in a *Sequential Score*. This range of student-generated data is subsequently spatialised in both digital and analog drawings and models which continually shift between the subjective and the analytical through study in a range of material, spatial, and temporal scales. Students are asked to understand their sites as embedded within larger systems, consider forces that extend beyond the discrete site, and understand sites as continuous processes not knowable in a fixed moment or in spatial isolation.

In the second half of the semester the course moves to the identification and exploration of "site agents" that exist within each student's dérive site. These may be a plant or animal species, climatic phenomena, or material, shifting the focus from the spatial site to the situated subject. The exercise sequence approaches this agent from multiple perspectives: how it is represented and thus framed in a variety of disciplines in *Ways of Seeing*, how it is directly experienced through a *Phenomenological Study*, and how it functions in an *Operative Drawing*. The sequence concludes with the *Agent Umwelt*, returning to the embodied experience of the spatial site from the speculative perspective of the agent. This work is enriched by landscape theory discussions on site as it relates to situation and situated knowledges.

This process of site reading and rereading inculcates an empathy for site that embraces identity and difference as drivers of design, with mappings disclosing the site's embedded potentials: not merely describing what it is, but what it can become. We next shift to the application of this empathy to students themselves, turning from course content to the teaching method.

Method

Our expanded notion of sitedness allows us to draw a parallel between the spatial design site and the situated student in order to frame a student-as-site pedagogy that applies landscape methodologies of site to the students themselves. This requires the development of critical mapping practices for students that parallel our practices for sites, to actively reveal them as thickened grounds of potentiality to be engaged in the co-construction of their own design education.²²

To uncover these "sites," the course begins with an exercise titled *Personal Representation History*, that asks students to identify past representations from their personal or professional lives that embody their interests, skills, and intuitions. This exploration and acknowledgment of each student's unique history and position reveals the essential sustaining material for ongoing engagement and pedagogical design, sending a clear message that the course will seek continuity and not separation from their past selves, experiences, and contexts. In other words, they are being approached as a sensitive landscape architect would approach a site.

This lesson is reinforced by the first in-class exercise, titled *Skillshare*, in which students share their *Personal Representation Histories* with their classmates and, working in small groups, propose a project, in any form or media, that incorporates and embraces each of their skills. Immediately, students are looking to find design potential within their own work and skills, and those of their classmates, with the conviction that each has something unique, and vital, to offer to the collective. By embracing this diversity of experience, histories, and passions within the class, students begin to see each other as collaborators and co-instructors, not as competitors pursuing one right way of being or designing.

This immediate and active acknowledgement of the value of each individual student's voice and presence helps establish multiple centers, decentralising power from the instructor and distributing it across the plural sites that are the students. I attempt to further this decentering, empowering all students with agency to shape the class with their situated knowledges, by situating myself as a facilitator as much as an instructor, and utilising a range of active learning strategies to guide the class

through a series of discussions. For example, we collectively define even the most central terms of the course, such as "landscape" and "representation," and students lead weekly small group discussions of each week's exercises through which they learn the language of the discipline through empathic peer-to-peer critique. However, our application of Haraway, Rendell, and hooks teaches us that sitedness means attention to the specificity of the individual as situated within their broader context. Thus, it is not sufficient to simply create opportunities for peer learning, only to see students bearing traditionally privileged identities dominate discussion, while others lack the confidence or comfort to engage on equal terms. We can only achieve broad-based co-construction of knowledge by addressing the inherent biases of our education system towards the privileged identities by whom and for whom it was created.

A course designed to reach all students must explicitly acknowledge that we are all operating within power structures and systems that continuously shape our identities and affect which students feel empowered to take space in the classroom and in what ways. No classroom can be insulated from these forces, but a range of inclusive teaching and learning tactics can attempt to create a truly supportive space built upon a foundation of mutual respect and empathy established by class norms. This requires teaching the full student and not just their isolated identity as a designer, giving care to their mental health, confidence, and lives outside of the classroom. I attempt to model this by bringing my own situated position and perspective to every class, sharing personal narratives and being open and forthcoming about my experiences and insecurities, allowing students to see me in my various identities. Resisting the pretense of an all-knowing instructor encourages students to also bring their full selves as complex, many-layered sites to be engaged in their education.

Recognising the agency of each student-their unique skills, experience, situation, and capacities for action-forms the foundation for a collaborative environment that builds students' confidence to embrace the often messy and nonlinear process of learning. By starting with each student's unique site conditions, as uncovered in their *Personal Representation Histories*, students are encouraged to develop their own voices and not seek a singular established "right way" of making. The exercises are carefully framed and sequenced to alternate between prescriptive exercises that explicitly introduce a new skill or technique, and more open-ended, interpretive opportunities for students to develop their own tools, techniques, and methods that build on their existing skills and interests. This combination allows students to weave together new skills with existing ones, developing their own intuitive way of working and making guided by their interests. The method requires unself-conscious testing and a willingness to fail, so the course emphasises process over final deliverables and encourages students to share exercises that show the operation of thinking and making, including incomplete and failed attempts. The entire approach both requires and reinforces the steps described above to create a space that empowers *all* students and teaches a sensitivity to themselves, their peers, and their sites.

This collaborative process, driven by each student's unique spatial and situated sites, reminds us that all sites are in relationship to one another, aligning with landscape architecture's focus on systems, flows, and interactions between sites. Thus, in contrast with the standard review format, the final exercise and exhibit emphasises the unique contribution of each individual to the collective. This time, rather than the small group speculative design ideas of the Skillshare, the full class designs and creates a single collective project, titled *Collective Non-Site*, ²³ that reflects upon their collective learning and makes its process legible. This completely self-organised and open-ended project builds upon the supportive foundation laid throughout the semester to engage both course content and method, viewing the course as having produced a collective site for which they are now to create the non-site. Each project demonstrates the enormous potential of a group of confident students empowered to contribute to, and reflect upon, their collective, diverse, and interlocking learning processes.²⁴

FURTHER POTENTIAL

By developing a pedagogy that embodies our research, we create a reflexive relationship that has the potential to advance and enrich both. Our pedagogy may achieve a better fit between substance and form, content and method, exemplifying the ethos and approaches we seek to inculcate in our students. And our research may benefit from its application in a new context. In my own application of concepts of site and sitedness to my teaching of landscape representation, my hope and preliminary experience is that students absorb these approaches and apply them to their sites and subjects, becoming empathetic designers, truer to themselves, their peers, and their discipline. Simultaneously, my application of sitedness to students has enriched my own conception of site, layering in the human context and infinite complexity I see in my students.

NOTES

¹ Emily Wettstein, "SITE • ED: A Student as Site Pedagogy," *The Journal of Architectural Education* 74, no. 2 (2020): 182-183.

² Carol J. Burns and Andrea Kahn, "Why Site Matters," in *Site Matters*, eds. Carol J. Burns and Andrea Kahn (London: Routledge, 2005): viii.

³ Elizabeth Meyer, "Site Citations: The Grounds of Modern Landscape Architecture," in *Site Matters*, eds. Andrea Kahn and Carol Burns (London: Routledge, 2005): 94.

⁴ Ibid, 102.

⁵ See Charles Waldheim, *Landscape as Urbanism: A General Theory*, (Princeton: Princeton University Press, 2016) and Pierre Bélanger, *Landscape as Infrastructure: A Base Primer*, (New York: Routledge, 2016)

⁶ For more on these twin pulls, see Anita Berrizbeitia, "Re-Placing Process," in *Large Parks*, eds. Julia Czeriak and George Hargreaves (Princeton: Princeton University Press, 2007): 174-197.

⁷ Miwon Kwon, *One Place after Another: Site-Specific Art and Locational Identity* (Cambridge: The MIT Press, 2003): 11.

⁸ Ibid, 13.

⁹ Ibid, 13.

¹⁰ Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies 14*, no. 3 (Autumn 1988): 581.

¹¹ Ibid, 583.

¹² Kimberlé Williams Crenshaw, Luke Charles Harris, Daniel Martinez HoSang, and George Lipsitz, eds., *Seeing Race Again: Countering Colorblindness across the Disciplines* (Oakland: University of California Press, 2019).
¹³ Haraway, "Situated Knowledges," 581.

¹⁴ Jane Rendell, "Architecture-Writing," *The Journal of Architecture* 30, no. 3 (2005): 256.

¹⁵ Ibid. 258.

¹⁶ Ibid, 258.

¹⁷ Paulo Freire, *Pedagogy of the Oppressed* (New York: The Continuum International Publishing Group, 1970): 80.

¹⁸ bell hooks, *Teaching to Transgress: Education as the Practice of Freedom* (New York: Routledge, 1994): 40.

¹⁹ See Guy Debord, "Theory of the Dérive," *Les Lèvres Nues,* no. 9 (Paris: November 1956). Reprinted in *Internationale Situationniste,* no. 2 (Paris: December 1958). Translated by Ken Knabb.

²⁰ While I have used this exercise for the past few years, it gained extra prominence this year as our students were spread across the world during a fully virtual semester due to the COVID-19 pandemic.

²¹ See Robert Smithson, "A Provisional Theory of Non-Sites," in *Robert Smithson: The Collected Writings,* ed. Jack Flam (Berkeley and Los Angeles: University of California Press, 1996): 364.

²² See "SITE • ED: A Student as Site Pedagogy."

²³ See Smithson, "A Provisional Theory of Non-Sites."

²⁴ See "SITE • ED: A Student as Site Pedagogy."

BIBLIOGRAPHY

- Bélanger, Pierre. Landscape as Infrastructure: A Base Primer. New York: Routledge, 2016. Berrizbeitia, Anita. "Re-Placing Process," in Large Parks, edited by Julia Czeriak and George Hargreaves, 174-197. Princeton: Princeton University Press, 2007.
- Burns, Carol J. and Andrea Kahn. "Why Site Matters," in *Site Matters*, edited by Carol J. Burns and Andrea Kahn, vii-xxix. London: Routledge, 2005.

Crenshaw, Kimberlé Williams, Luke Charles Harris, Daniel Martinez HoSang, and George Lipsitz, editors. *Seeing Race Again: Countering Colorblindness across the Disciplines.* Oakland: University of California Press, 2019.

Debord, Guy. "Theory of the Dérive." *Les Lèvres Nues,* no. 9 (Paris: November 1956). Reprinted in *Internationale Situationniste,* no. 2 (Paris: December 1958). Translated by Ken Knabb.

Freire, Paulo. Pedagogy of the Oppressed. New York: The Continuum International Publishing Group, 1970.

Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies 14*, no. 3 (Autumn 1988): 575-599.

hooks, bell. Teaching to Transgress: Education as the Practice of Freedom. New York: Routledge, 1994.

Kwon, Miwon. One Place after Another: Site-Specific Art and Locational Identity. Cambridge: The MIT Press, 2003.

Meyer, Elizabeth. "Site Citations: The Grounds of Modern Landscape Architecture," in *Site Matters*, edited by Andrea Kahn and Carol Burns, 92-129. London: Routledge, 2005.

Rendell, Jane. "Architecture-Writing." The Journal of Architecture 30, no. 3 (2005): 255-264.

Smithson, Robert. "A Provisional Theory of Non-Sites," in *Robert Smithson: The Collected Writings,* edited by Jack Flam, 364. Berkeley and Los Angeles: University of California Press, 1996.

Waldheim, Charles. Landscape as Urbanism: A General Theory. Princeton: Princeton University Press, 2016.

Wettstein, Emily. "SITE • ED: A Student as Site Pedagogy." *The Journal of Architectural Education* 74, no. 2 (2020): 182-183.

FROM DESIGN STUDIO TO RESEARCH LABORATORY: AN INTERIOR DESIGN CONTRIBUTION TO URBAN REGENERATION STUDIES

Author: SADIYAH GEYER, ANDREW GILL

Affiliation: UNIVERSITY OF JOHANNESBURG, SOUTH AFRICA

INTRODUCTION

The intention of this paper is to describe the process of transforming the interior design studio into a research laboratory, to contribute to built-environment knowledge. Borrowing concepts of metaanalysis and systemic review, a methodology is developed to analyse a decade's worth of design studies, completed as part of an interior design Honours programme. The programme is positioned in the Faculty of Art, Design and Architecture (FADA) at the University of Johannesburg (UJ) in South Africa. This initiative is supported by the growing understanding of interior design's contribution towards urban regenerative strategies. This pilot study is conducted on a sample of 15 students' design studies completed between 2010 and 2020, to develop an appropriate methodology using a metaanalysis approach to draw wider conclusion from quantitative and qualitative, design-led research and establish a cumulative data base. The findings have potential value in: making the design studio function as a research laboratory, establishing databases for incoming students, and for: entrepreneurs, urban planners and developers, policy makers, researchers, and academics in the built-environment field.

Interior design and urban regeneration

Recent studies and literature are increasingly recognising interior design as an important contributor to the urban regeneration process,¹ and its potential for architectural heritage conservation and revitalization in inner cities.² Habraken,³ established the interrelationship between the urban plan, the architecture and the infill levels in the urban design. Several regeneration strategies occur predominantly at the infill or interior level through adaptive reuse or retrofitting, identifying interior design as a key contributing factor. Interior design when concerned with the adaptation and reuse of existing buildings and spaces, allows the discipline to align with several urban regeneration strategies, such as adaptive reuse, rehabilitation, conservation, and renewal.⁴ There is increasing awareness of the ability of interior design to address the inside of buildings and existing conditions, in relation to environmental sustainability and the reuse of buildings, rendering this practise a key contributor to urban regeneration.⁵ The successful adaptive reuse of existing buildings and structures in the inner city, demonstrates significant characteristics and elements that speak specifically to the interior design process. However, until recently, interior design has not been identified or acknowledged for its

contribution to urban regeneration. These fields of knowledge and practise are generally associated with disciplines such as urban design, architecture, and landscaping. There are however, both overlaps with, and aspects unique to interior design. A deeper understanding of the specific contributions can expand the field of knowledge of interior regeneration strategies. This broader understanding is also enabling interior designers to expand their focus, design thinking, and execution beyond the interior environment.⁶

Interior designers endeavour to address identified problems in the city pragmatically, to create distinct experiential spaces.⁷ This design process necessitates the knowledge of the context in which the designing takes place.⁸ The process involves using historic contexts as frameworks, and perspectives that have influenced the evolution of designed spaces. Furthermore, this process considers what influences these strategies have on the design solutions in contemporary society.⁹ The development of a creative solution is "transformation focused" making use of an inductive reasoning processes where the problem and the solution continuously inform each other, with more focus on asking better questions rather than simply arriving at a solution.¹⁰ The interior design process is able to transform spaces into places that are presented as original and creative, and with which the community can identify. These spaces, created through considered design elements, can potentially draw in the community and promote feeling of identity and comfort, which consequentially promotes urban regeneration.¹¹

Johannesburg like many post-industrial cities globally experienced urban decline towards the end of the twentieth century. The decline of the inner city of Johannesburg was due to a number of complex influences, dating back to the discovery of gold in 1886. Johannesburg, also known as the City of Gold, began as a chaotic conception of a gold-rush mining village. Due to its rapid development and growth, short-term and narrow-minded city planning and management, approaches were implemented, which contributed significantly to the eventual decline of the inner city.¹² Although apartheid¹³ policies were strongly enforced, the white-owned economy expanded and Johannesburg was almost completely rebuilt during the 1960s and 1970s. It seemed that the city of Johannesburg was developing towards global stature, but at the height of the decentralization process during the 1980s many buildings stood abandoned and neglected. Many large retailers, corporate businesses and hotels relocated from the inner city of Johannesburg in favour of the less congested and rapidly developing commercial centres in the northern suburbs. The decline of much of the inner city into a state of extreme urban decay was also fuelled by socio-political change. The entire fabric of its society was transformed, as the beginning of democracy in South Africa took reign over the discriminatory apartheid system, resulting in the flight from the city being further motivated by the political uncertainty of that period.¹⁴ Johannesburg is presently a city still struggling with the after-effects of decades of apartheid city planning,¹⁵ and more recent decentralization trends.

This understanding of the resultant spatial condition of the inner city has had a significant impact on the development of, and the direction taken in the current Interior Honours programme offered at the University of Johannesburg and also supports the institutions vison and mission.

THE EDUCATIONAL CONTEXT, RESEARCH PARADIGM AND OUTCOMES

The Interior Design Honours degree programme is structured around independent research and an associated practical project. Students are encouraged to position their studies within the urban milieu of Johannesburg. The learning outcomes of the programme requires students to identify spatial, socio-economic and environmental issues confronting users of the city and propose how interior design can

be used to address these problems. A "solution" to the problem is presented in the form of a design proposal aimed at improving the lives of the urban inhabitants.

Despite the name and structure of the programme changing over the years, most recently converting from a Bachelor of Technology degree to a Bachelor of Arts Honours degree the fundamental learning outcomes have remained similar. Design is central to the programme, and in this educational scenario design is considered as a "problem-solution". Students identify a design problem and the research conducted informs and validates the design solution presented. Due to the "wicked" nature of many of the (social) problems that designers seek to resolve, they are often misinterpreted, "as what can appear to be the problem may actually be a result of a higher level problem."¹⁶ It therefore becomes imperative for the students to clearly define and research the design-related aspect of the identified problem, and equally not naively believe that design alone can solve all problems. The introduction of the Honours degree necessitated a more appropriate research paradigm to be developed and more rigorous research methods to be implemented to address these concerns. Currently a "pragmatic worldview" methodological approach is adopted. Aspects of "pragmatism" which influence this approach, are described by Creswell¹⁷ as being: "concerned with solutions to problems, which arise out of actions, situations and consequences", "research always occurs in a specific context" and "[R]esearchers emphasise the research problem and use all approaches available to understand the problem." Pragmatism therefore "is not committed to any one system of philosophy", implying that researchers have "freedom of choice".

Context analysis is a primary research method used, as "[T]he plan or programme is discovered within the analysis of the place."¹⁸ Within our context students are required to extend the analysis of place to include, spatial, demographic, ecological and socio-economic challenges to understand the "current contextual transformation", because "[A] complex and widespread set of symptoms and effects, mark these processes in the spatial and social environment of people," and are therefore critical to determine.¹⁹

The majority of design interventions proposed by the students entails the adaptive-reuse of existing buildings or structures, with less proposing upgrades to existing functions. Adaptive reuse implies the practice of "wholeheartedly altering" an existing building where "the function is the most obvious change," and incudes alterations and the introduction of new materials and components.²⁰ Adaptive reuse is also a useful strategy for heritage conservation,²¹ and revitalisation advocating for a building to function as "part of society" by "expanding or extending a building's social functions."²² A significant number of sites identified by the students have heritage status, either as national or provincial protected sites, or due to the fact that they are older than sixty years.²³ Many of the sites are chosen because they are currently under-utilized, abandoned, and in a state of neglect and decay. Students are required to ideate ways, through interior design, to revitalize these sites and in turn contribute to broader urban regeneration initiatives.

The students compile a research report containing: the problem statement aims and objectives of the study, a detailed context analysis, precedent studies of similar architectural or interior typologies, and qualitative interviews or purposive samplings with potential end users. The research findings are translated into design criteria and used to develop design proposals. The proposed design solution is presented in the form of plans, elevations, 3D renders, scale models, and construction detail drawings. For final submission student submit a document containing the research report and the practical design "problem-solution". These documents form the data corpus to be used for the meta-analysis. On average approximately ten students per year successfully complete their studies.

METHODOLOGY

The purpose of this pilot study is to develop appropriate methods for data collection and analysis in order to conduct a meta-analysis of ten years' worth of interior design studies in order to determine interior design students' responses to identified spatial, economic and social problems in the city. Initially a random sample of 15 students' scripts produced between 2010 and 2020 are used as the data corpus for this pilot study.

Statistical data are extracted relating to the geographical location, name of the building and/or physical street address. These data are mapped and plotted on a digital map interface, as can be seen in the example presented in Figure 1. It includes:

- A location marker presenting the above statistical data,
- a supporting "information popup" comprising:
- the assigned case study identification tag,
- a photograph of the building,
- the author name and date of study
- the heritage status of the selected building,
- the aim of the study,
- the interior strategy used to resolve the identified problem, and
- the urban themes addressed in the proposed design solution.



Figure 1. Example of digital interactive map location marker and information popup

Data relating to the existing building typology, heritage status and current occupancy of the identified building are analyzed and quantified according to the following predetermined categories and sub categories as indicated in Table 1 below. The categories may be amended as the study develops.

1. EXISTING BUILDING TYPOLOGY						
Commercial	Industrial	Public	Utilitarian	Temporary structure		
Retail	Factory	Government Service	Transport hub	Mobile		
Corporate	Warehouse	Museum/gallery	Fire station	Permanent		
Hospitality	Infrastructure	Library	Hospital/clinic			
Residential	Vehicle depots i.e. parking lots/ arcades	Recreational (including community centre)	Other			
Other		Other				
2. HERITAGE STATUS						
Yes	No					
60 years	No heritage status					
Provincial						
National						
Unsure						
3. OCCUPANCY AT TIME OF STUDY						
Occupied	Vacant					
Serving original function	Under reconstruction					
Serving new function	Dysfunctional					
	Abandoned					

Table 1. Classification of building typology, heritage status and occupancy

Data relating to the interior response, proposed strategy and interior typology, are analyzed and quantified according to the following predetermined categories and sub categories indicated in Table 2 below.

4. PROPOSED INTERIOR STRATEGY						
Adaptive Reuse /change	Upgrade to existing	New installation				
of function	function					
5. PROPOSED INTERIOR TYPOLOGY						
Single function	Multi-functional	Multi-purpose				
Retail	Retail	Pre-determined				
Corporate	Corporate	Determined by user				
Hospitality	Hospitality					
Residential	Residential					
Health and wellness	Health and wellness					
Education	Education					
Public service	Public service					
Exhibition	Exhibition					
Gallery	Gallery					
Utilitarian	Utilitarian					

Table 2. Classification of interior response, strategy and typology

Data required to establish the themes addressed (by the students), are analysed according to the nature of the problems identified and the associated interior responses. These are determined according to the "problem statement" and "the aim of the study". The problem and aim should speak directly to each other due to the established problem-solution relationship of each study. The themes are not be predetermined but allowed to develop as the study progresses, and categorised and quantified at the end of the data analysis process. Findings are presented as pie charts illustrating the percentages of occurrences of each theme.

FINDINGS

The contents of fifteen documents were analysed for the pilot study in order to establish the existing building typology, heritage status, occupancy, proposed interior strategy and typology. For each category, a data collection sheet was completed to generate a percentage pie chart and multi-category clustered column chart. We present examples below, illustrating the findings from the categories of "the existing building typology" as can be seen in Table 3 and Figures 2 and 3 and "themes" as can be seen in Figure 4.

1.EXISTING BUILDING TYPOLOGY			TOTAL
Commercial	Retail	0	0
	Corporate	0	
	Hospitality	0	
	Residential	0	
	Other	0	
Industrial	Factory	4	7
	Warehouse	2	
	Infrastructure e.g. Turbine Hall	1	
	Vehicle depots i.e. parking lots/		
	arcades	0	
Public	Government service	3	5
	Museum/ Gallery	0	
	Library	1	
	Recreational (including		
	community centre)	1	
	Other	0	
Utilitarian	Transport hub	2	2
	Fire station	0	
	Hospital/ clinic	0	
	Other	0	
Temporary structure	Mobile	1	1
	Permanent	0	

Table 3. Existing building typology data collection sheet



Figure 2. Percentage pie chart indicating number of incidents of each main existing building typology



Figure 3. Multi-category clustered column chart indicating existing building typology sub-categories



Figure 4. Percentage pie chart indicating the emerging themes according to the nature of the problems addressed

DISCUSSION

The theme of the conference "Teaching-Learning-Research: Design and Environments" motivated us to reconsider the value of the vast collections of interior design students' research documents, produced for the degree programmes that have accumulated over many years, and which are currently collecting dust.

The intention of this pilot study was to develop appropriate methods of data collection and analysis that could be later used for the meta-analysis of a much larger data source (approximately 100 books/studies) that document interior student's responses to socio-economic and spatial problems evident in the urban fabric of the city. It provided an opportunity to refine and evaluate our methods and determine their suitability for the study. The methods developed so far have proved adequate for their intended purpose, but may be refined as the study continues.

The findings will be used to create a cumulative data-base that could reflect both historical trends and be consistently updated to include future findings and interior response. The research methods used in the pilot study where mostly conducted manually. We however intend to investigate and develop far more sophisticated digital applications (with the help of IT specialists) that could be used for this

purpose. We envisage the final data base to be web-based and interactive and made accessible to a wider audience.

The value of such a database could be to provide a foundation for further research development at other levels, and provide a lens with which to look more holistically at interior design's response to urban problems and solutions. Furthermore, it may create opportunities of interdisciplinary collaboration within the university and possible external role-players. Most significantly this presents an opportunity to transform the interior design studio into a research laboratory.

CONCLUSION

Notwithstanding the paper-based nature of the "problem-solutions" produced by the students, our initial findings reveal that there is no shortage of creative ideas that, in varying degrees of feasibility, could possibly contribute to urban regeneration initiatives. Students address each site in a unique way and produce original "solutions" to the spatial problems they have identified. Students in general, liberated from the negative connotations associated with the inner city, approach their sites as rich, interesting, and captivating spaces, with the aim of regeneration and social upliftment. Many of the sites present ideal opportunities for the implementation of adaptive reuse or remodeling as an interior approach to architectural conservation and revitalization. Students use new digital technologies to communicate the possibilities to transform these spaces and make them contextually relevant. The visualization imagery produced can be used to open up debate with the different stakeholders involved in projects of adaptive-reuse and urban regeneration, such as regional or local administrations, heritage societies, future owners and users, people living or working in the neighborhood, and others, depending on the particular situation or building type.

NOTES

¹ Christian M. Rogerson and Jayne M. Rogerson. "Johannesburg 2030: the economic contours of a linking global city". *American Behavioural Scientist* 3 (2015): 360-368.

² Steven Miles and Ronan Paddison. "Introduction: the rise and rise of culture-led urban regeneration". *Urban Studies 42* (2005): 837-839.

³ N. John Habraken. "The use of levels". Open House International 2 (2002): 2-16.

⁴ Brooker Graeme and Lois Weinthal, "Interior terrains," in *The Handbook of Interior Architecture and Design*, eds. Graeme Brooker and Lois Weinthal (New Delhi: Bloomsbury Publishing, 2013), 10.

⁵ Suzie Attiwill, "Practices of interiorization: an inter-story," in *Meanings of Designed Spaces*, eds. Tiiu Vaikla-Poldma (New York: Bloomsbury Publishing, 2013), 180-182.

⁶ Sadiyah Geyer, "Johannesburg inner-city regeneration: A reciprocal relationship between selected interior commercial spaces and the creative sense of place in the Maboneng Precinct." (Masters diss., University of Johannesburg, 2020), 92-106.

⁷ Bruce Archer. "Design as a discipline". *Design Studies 1* (1979): 18-20.

⁸ Justin Wilwerding, "Meanings of design and space: a metaphysical groundwork," in *Meanings of Designed Spaces,* eds. Tiiu Vaikla-Poldma (New York: Bloomsbury Publishing, 2013), 42-43.

⁹ Tiiu. Vaikla-Poldma, *Meanings of designed spaces* (New York: Bloomsbury Publishing, 2013), xii.

¹⁰ Thomas Matyók and Hannah Rose Mendoza, "We are not alone: when the number of exceptions to a rule exceeds its usefulness as a construct, it is time for a change," in *Meanings of Designed Spaces*, eds. Tiiu Vaikla-Poldma (New York: Bloomsbury Publishing, 2013), 52-53.

¹¹ Geyer, "Johannesburg inner-city regeneration," 95-100.

¹² Gerald Garner, *Johannesburg: ten ahead. A decade of inner-city regeneration* (Johannesburg: Double G Media, 2011), 4-5.

¹³ Apartheid originated as an Afrikaans word referring to a legislated system of racial discrimination and segregation. It was characterised by a political culture of white authority that existed in South Africa between 1948 and the early 1990s.

¹⁴ Garner, *Johannesburg: ten ahead*, 8-13.

¹⁵ Martin J. Murray, *City of extremes: the spatial politics of Johannesburg* (Durham: Duke University Press, 2011), 25-42.

¹⁶ Horst W. J. Rittel and Melvin M. Webber. "Dilemmas in a General Theory of Planning". *Policy Sciences 4* (1973): 155-169.

¹⁷ John W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Thousand Oaks, California: SAGE Publications, 2014), 10-11.

¹⁸ Graeme Brooker and Sally Stone, *Rereadings: Interior Architecture and the Design Principles of Remodelling Existing Buildings* (London: RIBA Enterprises, 2004), 19.

¹⁹ Karen Lens and Koenraad Van Cleempoel, "Design-Based Research for Valuable Programs in the Process of Adaptive Reuse" (paper presented at the 11th European Academy of Design Conference: The Value of Design Research, Paris April 22–24, 2015).

²⁰ Brooker and Stone, *Rereadings: Interior Architecture*, 11.

²¹ Bie Plevoets and Koenraad Van Cleempoel, "Adaptive Reuse as a Strategy towards Conservation of Cultural Heritage: A Literature Review," in *Structural Studies, Repairs and Maintenance of Heritage Architecture XII,* eds. C.A. Brebbia and Luigia Binda (South Hampton: Wit Press, 2011), 155–164.

²² "Conservation and Revitalization of Historic Buildings," Hong Kong Institute of Architects, accessed May 15, 2018, https://www.scribd.com/document/367480447/LS08-Conservation-and-Revitalization-of-Historic-Buildings-Teaching-notes-pdf.

²³ South Africa. *National Heritage Resources Act 1999, Act No. 25 of 1999.* Cape Town: Government Printers, 1999. 58

BIBLIOGRAPHY

Archer, Bruce. "Design as a discipline". Design Studies 1 (1979): 17-20.

- Attiwill Suzie. "Practices of interiorization: an inter-story." In *Meanings of Designed Spaces*, edited by Tiiu Vaikla-Poldma, 175-184. New York: Bloomsbury Publishing, 2013.
- Brooker, Graeme and Sally Stone. *Rereadings: Interior Architecture and the Design Principles of Remodelling Existing Buildings.* London: RIBA Enterprises, 2004.
- Brooker, Graeme and Lois Weinthal. "Interior terrains." In *The Handbook of Interior Architecture and Design,* edited by Graeme Brooker and Lois Weinthal, 9–12. New Delhi: Bloomsbury Publishing, 2013.
- Creswell, John W. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Thousand Oaks, California: SAGE Publications. 2014.
- Garner, Gerald. Johannesburg: ten ahead. A decade of inner-city regeneration. Johannesburg: Double G Media. 2011.
- Geyer, Sadiyah. "Johannesburg inner-city regeneration: A reciprocal relationship between selected interior commercial spaces and the creative sense of place in the Maboneng Precinct." Masters diss., University of Johannesburg, 2020.
- Habraken, N. John. "The use of levels". Open House International 2 (2002): 1-17.
- Hong Kong Institute of Architects. "Conservation and Revitalization of Historic Buildings." Accessed 15, May 2018. https://www.scribd.com/document/367480447/LS08-Conservation-and-Revitalization-of-Historic-Buildings-Teaching-notes-pdf
- Lens, Karen, and Koenraad Van Cleempoel. "Design Based Research for Valuable Programs in the Process of Adaptive Reuse." Paper presented at the 11th European Academy of Design Conference: The Value of Design Research, Paris April 22–24, 2015.
- Matyók, Thomas and Hannah Rose Mendoza. "We are not alone: when the number of exceptions to a rule exceeds its usefulness as a construct, it is time for a change." In *Meanings of Designed Spaces,* edited by Tiiu Vaikla-Poldma, 47-58. New York: Bloomsbury Publishing, 2013.
- Miles, Steven and Ronan Paddison. "Introduction: the rise and rise of culture-led urban regeneration". Urban Studies 42 (2005): 833-839.
- Murray, Martin J. City of extremes: the spatial politics of Johannesburg. Durham: Duke University Press. 2011.
- Plevoets, Bie and Koenraad Van Cleempoel. "Adaptive Reuse as a Strategy Towards Conservation of Cultural Heritage: A Literature Review." In *Structural Studies, Repairs and Maintenance of Heritage Architecture XII,* edited by C.A. Brebbia and Luigia Binda, 155–164. South Hampton: Wit Press, 2011.
- Rittel, Horst and Melvin M. Webber. "Dilemmas in a General Theory of Planning". *Policy Sciences 4* (1973): 155-169.
- Rogerson, Christian and Jayne M. Rogerson. "Johannesburg 2030: the economic contours of a linking global city". *American Behavioural Scientist* 3 (2015): 347-368.
- South Africa. *National Heritage Resources Act 1999, Act No. 25 of 1999.* Cape Town: Government Printers, 1999. Vaikla-Poldma, Tiiu. *Meanings of designed spaces.* New York: Bloomsbury Publishing. 2013.
- Wilwerding, Justin. "Meanings of design and space: a metaphysical groundwork." In *Meanings of Designed Spaces*, edited by Tiiu Vaikla-Poldma, 33-45. New York: Bloomsbury Publishing, 2013.

MERGING TEACHING & RESEARCH IN FOUNDATION COURSES FOR A NEW INTERDISCIPLINARY DESIGN EDUCATION PROGRAM

Authors: MIRKO DANELUZZO, CARLOS MONTANA-HOYOS

Institution: DUBAI INSTITUTE OF DESIGN AND INNOVATION

INTRODUCTION: A NEW DESIGN SCHOOL IN DUBAI

The Dubai Institute of Design and Innovation (DIDI) launched the first specialized design program in the United Arab Emirates in August 2018. The philosophy behind the curriculum development is that contemporary Design is inherently multi, inter, and cross-disciplinary. The goal is to offer design students an interdisciplinary education experience, beyond traditional disciplinary silos. To achieve this, DIDI is implementing an experimental and combinatory education program to foster systemic and wholistic thinking in a four-year Bachelor in Design. The Foundation year is designed to introduce students to design and innovation methodologies, technical skills, and intellectual tools. The curriculum is structured with two lectures, a workshop, and one studio per academic semester. Established with curricula from MIT and Parsons the New School, the program follows the American model, with a fall term starting in September, and a Spring term starting in February. After foundation year, students must select two of the four disciplines: Product Design, Fashion Design, Strategic Design Management and Multimedia Design. These four disciplines offer six combinations, which we name cross-concentrations, for example Fashion and Product. DIDI's vision is to promote serendipitous creative opportunities through interdisciplinarity, to prepare students for non-existing design careers of the future, supported by an emphasis in innovation and entrepreneurship. Our goal is to prepare students to practice design in a world where rapid technological advances and strategic acumen are essential knowledge for success. As part of its initial planning, DIDI identified its "DNA" as the combination of three pillars: visual literacy, technological fluency, and strategic proficiency. At the core of our DNA, we have the 4Cs, which stand for Conceptualize complex ideas, Communicate them, Craft them by making, and Care about human and planetary impact of design.

Foundation Program

In the first year, the curriculum covers the fundamental design skills, such as the history and theory of design, visual communication tools, storytelling, and the overall design process, ^{1 2 3} while also integrating technological fluency, such as coding and the use of CNC machinery. Theoretically, students study complex problem solving through critical and systems thinking. Basic entrepreneurial skills are also introduced in Spring. Students are exposed to the inter and cross-disciplinarity of the program, and they learn to bridge disciplines and approaches, which we believe is a key to innovation.

Lecture courses like History of Design and Design Across Scales in the fall, as well as Design Futures and Design Strategies and Entrepreneurship in spring reinforce theoretical underpinnings, while the six credit point Studios and the three credit point workshops allow students to apply theory through hands-on experimentation and projects. students learn to apply critical thinking and creativity within a "making", or "learning by doing" approach, being encouraged to take risks. A main focus is innovation and challenging the status quo, while considering positive impacts to humanity and the planet.

In this paper we will focus on two courses of the Spring semester: the studio, FoS102 How to Design (Almost) Anything, and the workshop, FoW102 Material (In)Formation. These two courses are independent, yet intentionally connected. The workshop is a course designed to give the technical and methodological skills that then are applied and tested in the Studio as per Figure 1.



Figure 1. Diagram showing the structure and teaching collaboration of the Studio FoS102 How to Design (Almost) Anything and the Workshop FoW102 Material (In)Formation with modules inspired by the four disciplines.

FoW102 Material (In)Formation Workshop

This course is subdivided in modules which explore specific topics from different disciplines taught by different professors, including Algorithmic Design, Artificial Intelligence, Augmented Reality, CNC Manufacturing, Microcontrollers and sensors, Body and Form, Kinetic Systems, Bio-Plastics and Bio-Composites, and Research Methodology. Particularly relevant to this paper is the Bioplastics and Bio-composites module, conducted by the main author, and which builds on a personal professional and research agenda initiated some years before.

Students explore theoretical and experimental aspects about plastics from a technical and cultural perspective. For example, from a cultural point of view and to better engage students with the topic, examples from pop culture of comic superheroes from Japan and US, as well as the ubiquitous use of plastics in contemporary everyday life, are discussed. On the technical side, an introduction about the chemical components, the typologies, and the main manufacture technologies of petrochemical plastics, serves as a basis to discuss contemporary use-abuse of the material, to introduce later topics like plastic waste and the limitations of recycling, among others.

A brief introduction to the history of pre-petro-plastics discusses Parkesine, Collodion and Celluloid, and why these inventions were a result of needs of the time. This historic approach is used to contextualize contemporary material development, by comparing today's challenges with pre-plastic samples, as we face the challenge of substituting materials with very important characteristics. After this initial theory, students learn about different biological polymers like carbohydrates, proteins, and polyesters, to provide a background to the second part of the module, the practical, hands-on

experimentation. Here the students must develop their own material samples and combinations. A short demonstration in the Fabrication lab familiarizes students with basic procedures, ingredients, tools, and methodology.

The module has multiple goals. On one hand, students learn to set up a systematic experimentation methodology, and to evaluate the results. On the other hand, the module provides students different perspectives about the role of materials, and how designers and innovators can propose new materials and technologies. This practical learning is supported by the theory, where students become more aware of the impact of material development and production, as part of the complete life cycle when designing a product.

In this module, each iteration becomes part of the narrative of the next iteration, and the process is documented systematically to create new knowledge. So far, the workshop and module have been taught twice, in March 2019 and 2020. The first iteration set up the basis, so students were tasked to create a series of bioplastic samples by using any biological polymer. To introduce the making side of the module, the students were encouraged to consult Stevens' book "Green Plastic" ⁴ to replicate some of the proposed materials, or to use the open library Materiom ⁵.

The samples had to be photographed periodically, as illustrated in Figure 2. as part of the observation and documentation of the recipes and the physical properties of the resulting materials.



Figure 2. Samples of the bioplastic investigation, Nikhilesh Mohan. Material (In) Formation workshop, Bioplastics & Biocomposites module, March 2019.

Due to time limits and availability, the students mainly used carbohydrates, starch or agar. This initial experimentation served as basis for the next iteration, in which we limited the initial variety of materials, while focusing on more variations of the recipe in a specific timeframe.

In2019, the most ambitious students experimented with some layering as composite materials, embedding fibers and fabrics in their bioplastics. This served as basis for the second iteration in 2020, where the best explorations from the previous year were shared with the new batch of students and used as basis for subsequent exploration. The main intention has been to systematically organize an archive of the developed bioplastics, by generating and sharing knowledge.

The second iteration explored polymer composites, in which different polymers (binders) are used to holds other materials, forming a mechanical and chemical whole by addition. There was no restriction on the typology of the reinforcing material, which could be a fiber, a powder, or other particles. The only limitation was to avoid petrochemicals, limiting to organic binders.

Reinforcement materials selected by students ranged from desert sand as in Figure 3 to orange peels. Students compared the characteristics of the new material, while understanding and documenting different "recipes" by altering the ratios between the binders and the reinforcement material.

The feedback of this second iteration will be used for a new module planned to be taught in 2021, which will focus on materials that are abundant in the region as a byproduct of processes of local industries, like date palm fibers, or locally abundant materials like desert sand.



Figure 3. Biopolymer composites investigation using a bioplastic matrix with sand reinforcements, samples, Asma Almarri. Material (In) Formation workshop, Bioplastics & Biocomposites module, March 2020.

FoW102 How to Design (Almost) Anything Studio

In DIDI a studio is a six-credit point, nine contact hours per week course, where the students must develop a guided project, usually following a three phase structure: Phase 1) Research & Analysis, Phase 2) Design Development and Phase 3) Final Presentation. Our foundation studios are co-taught by different professors, providing students rich and diverse feedback, while also triggering debates among faculty during the classes, where students can actively participate.

The Studio was co-designed by the founding faculty to provide a solid design foundation, while allowing students to pursue their interests and choose their future paths. The aim is to give students an explicit introduction to design fundamentals, focusing on a single core project throughout the complete term, with a thorough development process from research and concept generation to project execution. During the Fall, students explore interdisciplinary methods to manipulate relationships between materials, systems, and environments in an imagined scenario in the year 2050.

The project is titled "Symbiotic Creatures", to emphasize the focus on the exploration of sustainability through the lens of interaction between different elements. The expected final outcomes are neither literal "creatures" nor commercial "products", but rather exploratory dynamic artifacts that interact, move or are activated by the elements. The project aims to show students that the objects we design are interactive systems, and not isolated units. This idea of a system is further made explicit through the concept of creature or organism. Symbiosis, in biology and ecology, describes relationships between two or more different species co-existing within an ecosystem, with variations as commensalism, mutualism and parasitism.

In Phase One, the students use "design fiction" as a primary tool for speculative research for their "Symbiotic Creatures". While design fiction can be used for speculative projects, professional designers also use similar tools in day-to-day practice, such as "future forecasting", "trend-spotting" and "scenarios" ⁶. After conducting research around symbiosis, the students investigate and analyze recent and emerging technological innovations, and visualize their influence on different future scenarios for the year 2050. These scenarios will then be used to drive the development of the design concepts, which will be rendered and materialized in Phases Two and Three.

Artificial Meat, 4D printing, Meta-Materials, Self-Healing materials and Social robots are some of the emerging and future technologies used to imagine future applications and implications by visualizing possible scenarios. Using diagrams, storyboards, mind maps and other forms of representation, students summarize their analysis of the chosen technologies, answering questions like: Why is this technology important? How does it work, and what is its "action"? What elements are "consumed"? What is metabolized? How does symbiosis play a role in the function or interaction with the environment?

After this initial exploration, the next step is to imagine a future world where society and the environment have been transformed by the analyzed technology. Guiding questions include: How would aspects of this future world be augmented, transformed, or diminished when compared to the world we live in? What positive or negative consequences does this transformation have? What challenges and opportunities would this create in the world?

In Phase two students explore different "symbiotic creature" ideas, within the scenarios illustrated in the previous step, to subsequently develop the artifact both digitally and physically using the tools taught in studio and the previously described workshop, which is taught simultaneously. The students are also encouraged to reflect on concepts already explored in the previous studio, FoS101 Exploring Design, such as systems thinking, biological analogies, relationships with a site or host, ideas of cycles, and form development. Multiple design and fabrication tools are used to explore different possibilities and constraints in the design process. This constitutes the insight on how tools shape our design thinking.

Phase Three is about developing a final functioning prototype as an entity in its hardware and software, between digital and physical development, transforming the idea into an interactive artifact, powered by mechanical components, electronics, and code. Some of the key elements in phase three are: choice of materials; manufacturing techniques; scale; interactive kinematic systems; sensors, servos and microcontrollers; joinery systems; tests; simulations, and above all design detailing and quality of craftsmanship of the prototypes. Technical drawings and orthographic views are also required, to show the different details of the students' projects during the final submission, and as a way of training effective design documentation and communication. Storyboards also show assembly and sequence of use and operation, how to assemble the object, or also how the object performs and works.

FURTHER DEVELOPMENT OF TOPICS IN RELATED PROJECTS FROM UPPER YEARS

One of the main outcomes of the module embedded in the workshop, as described above, is the capacity to influence the students in their personal research, which can be deepened in subsequent years and courses. This is the case of some projects developed by students in their second year, during their cross-concentration journey. For example, the project Judhur, developed by the students Alhaan Ahmed, Abdulaziz Alzamil and Heba Naji, within the Strategic Design Management Studio conducted by Dr Miikka J. Lehtonen, exemplifies this. Here the students had the opportunity to develop a system to create revenue from date farming waste, and the previous research and experimentation on the recombination of materials was a crucial part to motivate them for this project, Figure 4. The project was selected for exhibition in the 2020 MENA Global Grad Show, as part of the Dubai Design Week, and has been preselected for seed funding for future entrepreneurial development.



Figure 4. Judhur, transformation of the waste by-product date seeds into new materials, products, and new revenue streams for date farms. MENA Global grad Show November 2020. Alhaan Ahmed, Abdulaziz Alzamil, Heba Naji.

At the same time, the second year Fashion Design workshop was conducted by Noorin Khamisani, DIDI Fashion lecturer, with the support of the main author in relation to the exploration of biomaterials. This active collaboration used the result of the module in the foundation workshop as a possibility for the students to design their own materials, and better develop their designs. In this case the exploration focused on the use of natural fibers as per Figure 5, and looked for inspiration to realities like Biofabricate⁷.

All these spinoff experiences are also used as references and examples in the foundation workshop module, to inspire new students with possible future applications, to shape their own educational journey.



Figure 5. Biomaterial investigation applied to fashion design, Maha Abdalla. Fashion workshop FaW201, Fall 2019.

CONCLUSIONS

SYNERGIES WITHIN TEACHING-BASED RESEARCH AND RESEARCH-BASED TEACHING IN DESIGN AND INNOVATION

We conclude by highlighting that faculty research should inform teaching, and likewise, during coteaching and through cross-pollination of ideas with colleagues and students, teaching can also inform research, thus becoming synergistic cycles, where teaching and research interact in cyclic feedback loops as synthesized in Figure 6.



Figure 6. Diagram showing the network of influence between personal research agendas, teaching, research within the course, students' outcome, and the influence across the cross-concentration courses.

An important element discussed above is the continuous research, or development of new knowledge, through the progressive use of prior material developed by undergraduate students, for future development by younger junior students, as in the case of the workshop projects and specifically the bioplastics module described in this paper.

In our personal experiences as design educators, we see that, not surprisingly, key topics developed by faculty in their previous research influence the material taught and student perceptions and approaches to studio and workshop projects. Further, it is understandable that the framing of the curriculum and projects is also based on faculty's worldviews and topics of interest. However, it is less explored how co-teaching and undergraduate student's projects and ideas can inform faculty research and change faculty worldviews.

For example, author two has evolved his research topics from a more traditional perspective of Biomimicry and Design for Sustainability⁸, where low-technology, vernacular solutions and going back to nature were key aspects, to a more future-oriented understanding of biological design, where there is not only a "Biomimicry" ⁹ or imitation of nature, but rather a technologically, or biotechnologically enhanced design, inspired by new disciplines like BioDesign ¹⁰ and Next Nature ¹¹, and with new applications such a design for aerospace and colonization of other planets.

In the case of the main author, prior personal research and experiments were used as a basis to select some of the topics and activities in the courses described above, and iterations of teaching, for example the Bioplastics module in the workshop, have been beneficial to re-define some terms of the research, as well as subsequent improvements for teaching. Expanding the knowledge on a specific topic has the double benefit to inform the teaching activity and the research. The main task of the faculty has been to define clear boundaries to guide the students in their exploration. The results are helpful in many ways: they re-define the teaching and become teaching materials, they inform other courses, they inform the primary research, and they also inform applied professional practice.

Finally, a key aspect of our experience is also the interdisciplinary and collaborative nature of our studios and workshops, where people from different cultures and disciplines, namely Architecture and

Industrial design, and with different approaches and research topics like aerospace, computational design, sustainability and biomimicry, among others, worked together. This is also exemplified in the modularity of the workshop, where many different topics are taught by different professors, yet becoming part of an overall course.

NOTES

¹ Gail Grant Hannah and Rowena Reed Kostellow, *Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationships* (Princeton Architectural Press, 2002).

² Christian Boucharenc, *Design for a Contemporary World* (Singapore: Nus Press, 2008).

³ Elivio Bonollo, *Product Design: A course in first principles* (Upfront Publishing, 2015).

⁴ E. S. Stevens, *Green Plastics: An introduction to the New Science of Biodegradable Plastics* (Princeton University Press, 2001).

⁵ "Nature's Recipe Book" Materiom, accessed January 29, 2021, https://materiom.org/.

⁶ Alex Milton & Paul Rodgers, *Research methods for Product Design* (London: Laurence King Publishing, 2013), 30.

⁷ Biofabricate, accessed January 29, 2021, https://www.biofabricate.co/.

⁸ Carlos Montana-Hoyos, *BIO-ID4S: Biomimicry in Industrial Design for Sustainability*, (VDM Verlag, Germany, 2010).

⁹ Janine Benyus. *Biomimicry: Innovation Inspired by Nature* (New York: William Morrow & Co, 1997).

¹⁰ William Myers, *Bio design: Nature, Science, Creativity* (London: Thames & Hudson, 2012).

¹¹ "Exploring Next Nature", Koert van Meensvort, accessed January 29, 2021,

https://nextnature.net/2005/03/exploring-next-nature.

BIBLIOGRAPHY

Benyus, Janine. Biomimicry: Innovation Inspired by Nature. New York: William Morrow & Co, 1997.

Biofabricate. Accessed January 29, 2021. https://www.biofabricate.co/.

Boucharenc, Christian. Design for a Contemporary World. Singapore: Nus Press, 2008.

Bonollo, Elivio. Product Design: A course in first principles. Upfront Publishing, 2015.

Hannah, Gail G., and Rowena Reed Kostellow. *Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationships*. Princeton Architectural Press, 2002.

Materiom. "Nature's Recipe Book". Accessed January 29, 2021. https://materiom.org/.

Milton Alex, and Paul Rodgers. *Research methods for Product Design*. London: Laurence King Publishing, 2013. Montana-Hoyos, C. "BIO-ID4S: Biomimicry in Industrial Design for Sustainability". VDM Verlag, Germany, 2010.

Myers, William. Bio design: Nature, Science, Creativity. London: Thames & Hudson, 2012.

Stevens, E. S. Green Plastics: An introduction to the New Science of Biodegradable Plastics. Princeton University Press, 2001.

van Meensvort, Koert. "Exploring Next Nature". Accessed January 29, 2021. https://nextnature.net/2005/03/exploring-next-nature.

THE AGENDA OF ARCHITECTURAL THEORY AS A DATA SET

Author: MELİS BALOĞLU, YÜKSEL DEMİR

Institution: ISTANBUL TECHNICAL UNIVERSITY, TURKEY

INTRODUCTION

The complexity of nature, economy and society are dynamic as well as architectural agenda. Architectural agenda is not defined only by architecture but also its relations to other realms such as (a) architectural education, (b) architecture as both theory and practice, and (c) social and cultural realm. Despite the dynamic structure of the social realm and the architecture realm, the institutional change in the field of architectural education is slow, conservative, and non-sustainable. Tutors' educational agenda shared through the syllabus with students. The current agenda of conventional architectural theory courses often fail to address contemporary issues but the canonical texts as Frank Ching's books are continued to be reproduced locally and globally. This situation creates a gap between theory and practice. This gap would be closed if one can approach the architectural agenda as a complex system. A complex system that each time a new concept, a new work, a new actor, or a new text is added to the architectural agenda, it reconstructs itself as a whole. Complex systems can be understood by a system approach. In the case of the Theories of Architectural Design (TAD) course which has been instructed by Prof. Dr. Yüksel Demir in Istanbul Technical University in Turkey since 2003, the syllabus is open. In this case, open means the agenda of the course is built by the agendas of students and the tutor(s) simultaneously in each semester. The course aims to examine all the dimensions of architecture, through essential "concepts", "questions" and/or "problems", "texts", "works", "events" and "individuals" in unity. In this respect, this research used syllabus as a data set to understand a small part of architecture's local and global agenda. Actors/authors of the source texts/books in the syllabus, are the components of this research. The data set builds on;

• 1A: the top 20 ranked actors of sourcebooks between 2013 and 2017 from syllabus according to Open Syllabus Project¹ to have an idea about the global agenda of architecture,

• 1B: the top 20 ranked actors of sourcebooks between 2012 and 2020 from the syllabus of TAD to have an idea about the local and learner-centered agenda of the architecture,

• 1C: the actors of the top 7/20 ranked sources between 2012 and 2020 from the syllabus of TAD filtered through Google n-gram,

• 1D: the actors of the top 7/20 ranked sources between 2013 and 2017 from the syllabus of Open Syllabus Project filtered through Google n-gram.

After the analysis, this research concludes that the agenda of TAD (1B) is affected by the country's social agenda. The actors/authors can be dependent or independent from time; they can be also dependent or independent from space. The architectural agenda on a global scale can influence the

local architectural agenda. In conclusion, the interaction between the global and the local agenda is linked to each other by their actors, works, events, etc. And it is proven by the system approach to the architectural agenda.

COMPLEX SYSTEM

In this research, the architectural agenda is illustrated as a complex system that each time a new concept, new work, new actor, or new text is added to the agenda, it reconstructs itself as a whole. Each element added to the system is regarded as its relation to the whole. Syllabuses are one of the crucial elements of the architectural education agenda if they are seen as the infrastructure of theory. In this section, the idea of a complex system and system approach will be explained to reflect on why the architectural agenda is seen as a complex system. Systems are defined as "wholes" consisting of entities and relationships that function through the interrelatedness of their parts and exhibit existential properties independent of their parts² If architectural theory and practice are perceived as a whole, then one can understand that if one of them is missing, it affects the behavior of the whole. Complex conditions can be understood by the system approach. System theory helps to understand and analyze problems of organized complexity as large and infinite numbers of variables and their interactions. The components of a system commonly modeled as agents³. The examples for the agents are people, cells, offices, etc. In this research, the agents are the actors / authors / artists / architects. The agents are linked to each other by their actions. The interaction occurs mostly locally which means the interactions affect the neighborhood of the first agent firstly. However, their consequences are often global which affects the system as a whole. Iteration is the key to understanding complexity. Each variable co-produces the others and in turn, is co-produced by the others. Which one comes first is irrelevant because none can exist without the others, so the components of the system are independent of time. They have to happen at the same time. Successful iterations help to understand and more closely approximate the nature of the whole.⁴

SYLLABUS AS INFRASTRUCTURE OF THEORY

In Deschooling Society Ivan Illich⁵ described a way to build a learning system by changing the roles in the system called learning webs. Educational resources are usually labeled according to educators' curricular goals as in architectural realms. He proposed to do the contrary, to label four different approaches which enable the student to gain access to any educational resource which may help him to define and achieve his own goals:

1. Reference services to educational objects – which facilitate access to things or processes used for formal learning. Some of these things can be reserved for this purpose, stored in libraries, rental agencies, laboratories, and showrooms like museums and theatres; others can be in daily use in factories, airports, or on farms, but made available to students as apprentices or on off-hours.

2. Skill exchanges – which permit persons to list their skills, the conditions under which they are willing to serve as models for others who want to learn these skills, and the addresses at which they can be reached.

3. Peer-matching - a communications network that permits persons to describe the learning activity in which they wish to engage, in the hope of finding a partner for the inquiry.

4. Reference services to educators-at-large – who can be listed in a directory giving the addresses and self-descriptions of professionals, paraprofessionals, and freelancers, along with conditions of access to their services. Such educators... could be chosen by polling or consulting their former clients.

Syllabuses reflect the educators' curricular goals. The syllabus can be seen as the infrastructure of theory and it frames theories in categories, classifications, and topics. Syllabuses are not like books or

essays in terms of their focus, but they contribute to one's educational life in their own way. One can understand the point of view of an instructor when she or he looks at the way the instructor organizes the syllabus. Which texts are part of the syllabus or how the texts are organized? To be able to ask these questions gives us the idea to rethink how another one thinks or teaches theory. With these thoughts and concerns, focusing on several syllabi can offer a new window to look at different problems of architecture and new solutions to the different problems. The syllabus also gives the current global and local agenda of institutions. With the help of the syllabus, canonical texts are reproduced constantly, and they are actively fed by academia, but a culturally diverse syllabus is needed.

The agenda of architecture changes every day since it is situated in nature and culture. These relations and changes cause dynamic relations and create a more complex agenda for architecture. Academia often follows the actual agenda of architecture much slower and this can cause a lack of understanding for students to understand the real problems and solutions. According to Tzonis⁶, the problem was the explosion of differentiation and specialization of architectural knowledge and division of labor in architectural practice as a result of technological, epistemological, economic, and social forces demanding a place in the curriculum (as well as equivalent quantities of people and spaces). In a platform called e-flux, the agenda of architectural theory is also discussed by Theory's curriculum. *Theory's Curriculum* is an extra-academic initiative that seeks to provide theory with a means to challenge its existing methods of pedagogical reproduction. It seeks to build a collaborative project that brings together isolated laborers to pool ideas and methods across dispersed institutions and geographies, to compare inherited models, to detect received assumptions, and to ask fundamental questions about what and how we should teach and learn when we teach and learn architectural theory.⁷

Architectural students equip themselves with a toolkit to practice architecture but also, they should learn to think with theories of architecture as much as they think of the toolkit. As open-minded people, they should know the limits and the power of theories.

McKenzie Wark⁸ has also argued, the conditions of intellectual laboring in the academy today necessitate that we adopt a more realistic approach to theorizing as to the cumulative task of many smaller efforts, rather than the great leaps forward once marked by grand philosophical systems or public intellectuals. The students-participated syllabus can create a change. With a more open approach, students and instructors can create an agenda for a course. In a scenario illustrated like this, instructors can act as a curator.

CASE STUDIES

Case studies include one project called Open Syllabus and one architectural theory course named Theories of Architectural Design (TAD). Open Syllabus is a non-profit organization that collects and analyzes millions of syllabi. There are 60,572 syllabuses under the field of architecture between the years 2013 and 2017. Open Syllabus is selected for two reasons as a case study. The first one is to illustrate an idea on the global agenda of architecture. The second one is that the data is based on a syllabus which is built by instructors of the courses.

Theories of Architectural Design (TAD) course which is instructed by Prof. Dr. Yüksel Demir in Istanbul Technical University in Turkey. The course is selected also for two reasons as a case study. The first one is to illustrate an idea on the local agenda of architecture. The second one is related to the course's special character on the course syllabus which is open. It means the agenda of the course is built by the agendas of students and the tutor(s) simultaneously in each semester. The course aims to examine all the dimensions of architecture, through essential "concepts", "questions" and/or

"problems", "texts", "works", "events" and "individuals" in unity. In this research, individuals/ actors/ authors are the parameters for the research.

The next sections will explain the case studies in detail.

Case Study 01A: Open Syllabus Project, opensyllabus.org, 2013-2017



Figure 1. The network map of the Open Syllabus

The visualization above shows the 164,720 most frequently assigned texts in the Open Syllabus corpus, a database of 6,059,459 college course syllabi. In figure 2, the most 20 repeated actors and sources are listed below.

1	Building Construction Illustrated	Frank Ching
2	Architecture, Form, Space and Order	Frank Ching
3	Architectural Graphics	Frank Ching
4	The Image of the City	Kevin Lynch
5	The Death and Life of Great American Cities	Jane Jacobs
6	Architectural Graphics Standards	Charles George Ramsey
7	The Architect's Studio Companion: Rules of Thumb for Preliminary Design	Edward Allen
8	Fundamentals of Building Construction: Materials and Methods	Edward Allen
9	Design Drawing	Frank Ching, Steven P. Juroszek
10	Modern Architecture: A Critical History	Kenneth Frampton
11	Constructing Architecture	Andrea Deplazes
12	Pattern Language Towns Buildings Construction	Christopher Alexander
13	Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century	Peter Hall
14	The Poetics of Space	Gaston Bachelard
15	A Visual Dictionary of Architecture	Frank Ching
16	Cradle to Cradle	Michael Braungart
17	The Eyes of the Skin	Juhani Pallasmaa
18	The City Reader	Richard T. LeGates, Frederi Stout
19	Modern Architecture Since 1900	William J. R. Curtis
20	Design With Nature	Ian L. McHarg

Figure 2. The top twenty sources and actors of the Open Syllabus

Case Study 01B: Theories of Architectural Design 2012-2020

There are 344 actors/authors written to the agenda of the class by students between the years 2012 and 2020. Although the students do not have to write architects' names as actors, they mostly wrote the names of architects as a part of their agenda but they also mentioned Coco Chanel, Andy Warhol, and Turkish politicians' names etc. which shows that the actual social agenda of the country affects the agenda of students. In this case, it also affects the agenda of the course.

The quantitative analysis of the TAD actors' agenda shows that there are things rather independent from time and space or dependent on time and space. Le Corbusier, Frank Llyod Wright, and Mimar Sinan are timeless actors. As a non-architect, Andy Warhol is also a timeless actor. Local actors are also a part of the agenda of the course such as architect Sedat Hakkı Eldem and Mimar Sinan.



Figure 3. The top twenty sources and actors of TAD

1C: the actors of the top 7/20 ranked sources between 2012 and 2020 from the syllabus of TAD filtered through Google n-gram

The authors independent from time according to Google n-gram:

- Zaha Hadid
- Le Corbusier
- Peter Zumthor
- Rem Koolhaas
- Mimar Sinan
- Andy Warhol
- Sedat Hakkı Eldem



Figure 4. The authors compared with the help of Google n-gram

When two local architects Sedat Hakkı Eldem and Mimar Sinan are compared with the help of ngram, Mimar Sinan is a more global actor.

1D: the actors of the top 7/20 ranked sources between 2013 and 2017 from the syllabus of Open Syllabus Project filtered through Google n-gram



Figure 5. The top twenty sources and actors of Open Syllabus, RAW io9

Out of twenty actors, the most repeated seven were selected to compare. Frank Ching is the most repeated author of Open Syllabus in the field of architecture as seen in figure 2. When it is compared with the help of Google n-gram, it is obvious that Frank Ching is not a timeless actor. Jane Jacobs is mentioned more and is timeless within the selected time frame [2013-2017].


Figure 6. The authors compared with the help of Google n-gram

The authors independent from time according to Google n-gram:

- Frank Ching (rank 1,2,3,15 / 20, according to Open Syllabus Project, figure 2)
- Christopher Alexander (rank 12 / 20, according to Open Syllabus Project, figure 2)
- Gaston Bachelard (rank 14 / 20, according to Open Syllabus Project, figure 2)
- Jane Jacobs (rank 5 / 20, according to Open Syllabus Project, figure 2)
- Juhani Pallasmaa (rank 17 / 20, according to Open Syllabus Project, figure 2)
- Kenneth Frampton (rank 10 / 20, according to Open Syllabus Project, figure 2)
- Kevin Lynch (rank 4 / 20, according to Open Syllabus Project, figure 2)

Conclusion: Case Studies

In conclusion, the quantitative analysis of the TAD actors' agenda shows that there are things rather independent from time and space or dependent on time and space. Le Corbusier, Frank Llyod Wright, and Mimar Sinan are timeless actors. As a non-architect, Andy Warhol is also a timeless actor. Local actors are also a part of the agenda of the course such as architect Sedat Hakkı Eldem and Mimar Sinan. The global actor agenda is examined according to the Open Syllabus Project. The actors of the top twenty reference books were examined again with the help of Google n-gram. The timeless actors are Christopher Alexander, Gaston Bachelard, Jane Jacobs, Juhani Pallasmaa, Kenneth Frampton, and Kevin Lynch. The book Cradle to Cradle by Michael Braungart (Figure 2. No.16) is not a book under the category of architecture. It is the only book out of the architecture category in the list of Open Syllabus Project, but it is related to the concept of circular economy, circular design, and no waste policies. Since the climate crises, biobased design and circular economy have been contemporary topics from a global perspective, it is no surprise that a book that covers these topics is in the curriculum. In the local case of TAD, there is no mention of this book since the social agenda of the country is still local compared to the global agenda of the world. Juhani Pallasmaa is also a timeless actor, globally and locally. The reason could be also related to AR-VR technologies and the search for haptic experience in digital time. Christopher Alexander is still an actor for various disciplines including computer science and design; he is timeless with his system approach. His influence is still valid for global and local cases.

CONCLUSION

The system called a university is made up of buildings, students, professors, administrators, libraries, books, computers—and one could go on and say what all those things are made up of. Elements do not have to be physical things. Intangibles are also elements of a system. In a university, school pride and academic prowess are two intangibles that can be very important elements of the system.¹⁰ The

Architectural agenda as a complex system is not defined only by Architecture but also its relations to other realms such as (a)architectural education, (b)architecture as both theory and practice, and (c)social and cultural realm. In this research, it is seen that students' agenda is affected by the social agenda of the country, Turkey. What is obvious is, the analysis of the data from TAD shows that students are aware of real-life problems so that they could mention them. The ideological reality of an architectural studio or a non-studio course can become the constructed reality of that course and the reality could be forgotten. The plurality of architectural actors, tools, works, and texts could be forgotten. The paradigm set by a group of instructors in a university becomes the constructed reality of the institution and is continued to reproduce over generations. Students should participate more actively in their education. They should be allowed to bring something outside according to their own agenda to their institution. They should be also aware of the situation and demand to discuss other topics and non-canonical works. Students should be aware of the existing paradigm. With this awareness, they should build an external repository which is far from the existing paradigm to be able to set their own position in the field of architecture and build their own ethic. As a result of this study, it is concluded that the (a)course agenda is also affected by the (c)social agenda of the country. Both the architectural realm and the social realm share the same problems or actors or concepts and relations. Although this is the situation, the actual agenda of architectural education is only changed according to the institution's agenda, not according to the student's agenda. The educational agenda should be more open, culturally diverse, accessible, inclusive, and objective. To be more open, the educational agenda should be free from institutional paradigms.

NOTES

¹'Open Syllabus Project', accessed January 30, 2021, http://opensyllabus.org

² John L. Motloch, Introduction to Landscape Design (New York: Van Nostrand Reinhold, 1991)

³ Francis Heylighen, 'Complexity and Self-organization'. eds. by Marcia J. Bates and Mary Niles Maack, (Taylor & Francis,2008)

⁴ Jamshid Gharajedaghi, J. Systems thinking: Managing chaos and complexity, a platform for designing business architecture (Burlington: MA: Butterworth-Heinemann/Elsevier, 2006) p.112

⁵ Ivan Illich. *Deschooling Society* (Marion Boyars Publishers, 1970). p.81

⁶ Alexander Tzonis. 'Architectural Education: The Core and the local,' Frontiers of Architectural Research 3 (2014): 477-479

⁷ 'E-flux', accessed on January 30, 2021, https://www.e-flux.com/architecture/curriculum/262997/editorial/

⁸ McKenzie Wark, *General Intellects: Twenty-One Thinkers for the Twenty-First Century* (New York: Verso, 2017), 1–15.

⁹ 'RAW GRAPHS', accessed on January 30, 2021, https://densitydesign.org/research/raw/

¹⁰ Donella H. Meadows, *Thinking in Systems: A Primer* (London: Chelsea Green Publishing, 2011), 13.

BIBLIOGRAPHY

Allen, Stan. Practice vs. Project, Practice, Architecture, Technique and Representation. Abingdon: Routledge, 2009, xii–xxv.

Althusser, Louis. Lenin and Philosophy and other Essays, Ideology and Ideological State Apparatuses. Translated by Ben Brewster. New York: Monthly Review Press, 2001. 121–176.

Edwards, Paul. Thinking Globally in A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming. Cambridge: MIT Press, 2010, 1–25.

Kauffman, Stuart A. The origins of order: Self-organisation and selection in evolution. Oxford: Oxford University Press, 1993.

Lavin, Slyvia. "Theory into History; Or, the Will to Anthology." Journal of the Society of Architectural Historians 58, no. 3 (September 1999): 494–499.

Nesbitt, Kate. Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965 1995. New York: Princeton Architectural Press, 1996, p.22.

Newman, Newman. Networks: An Introduction. Oxford: Oxford University Press, 2010.

Newman, Mark. "The Structure and Function of Complex Networks." Computer Physics Communications 147, no. 1-2 (March 2003): 40-45.

Ockman, Joan. Architecture Culture 1943-1968. New York: Rizzoli, 1993, 449.

Von Bertalanffy, Ludwig. General System Theory. New York: George Braziller, 1968.

LIVING WHERE THE IMMATERIAL MATTERS_ TOWARDS THE COMMONS

Authors: MARIA HADJISOTERIOU, YIORGOS HADJICHRISTOU

Institution: UNIVERSITY OF NICOSIA, CYPRUS

INTRODUCTION

In a need of rethinking and redefining our cities due to the increasing global environmental, social and economic crises, Unit 2^1 aims to enrich our architectural understanding of Commons and explore their potential role in articulating architectural ideas.

The current pandemic revealed the aggravation of a myriad other crises - social, economic, environmental, political, cultural etc. Architecture, Urban design and in general the built environment echo their repercussions are called to responsibly and drastically respond to them.

In the light of the inability of the current socioeconomic systems to meet these rapidly escalating crises, Unit 2 reacts by taking on such a responsibility. It deals with the notion of the Commons and explores their potential role in articulating architectural ideas as a way to shed light on an optimistic future redolent with environmental, social and cultural sensitivities. The Unit dives into the discussion of the immaterial matter, and its innovative impact on the emergence of hybrid urban environments². Architecture and the city are seen as one unified evolving organism which keeps incessantly defining and being defined by multiple agents. As Pallasmaa argues³ a building is not an end itself; it frames, articulates, restructures, gives significance, relates, separates and unites, facilitates and prohibits'.

Beginning from the notion that (social) space is a (social) product⁴, the Unit provokes questions on the role of the architect not as a dictating designer, but rather as a facilitator, an agent. Generating discussion by extending the notion of architecture to a process where vital questions are placed:

'is production of space as a collaborative process?'

'can we make the process of architecture a dialogue'

'how do we involve local actors- as co-authors'

INCLUSIVE ARCHITECTURE

The Unit aims at raising awareness for and claiming the right of the people to the city as another aspect of addressing the 'Commons'. Discussions on the parameters and the objectives of an Inclusive Architecture aim at addressing people's diverse needs. Could the understanding of the user, not as a generic person but as a unique individual that has the right to co-inhabit, co-appropriate⁵ the city, shift radically the direction and essence of architecture and the built environment? Could we finally facilitate people to appropriate architecture? As Lefebvre argues - "to inhabit is to appropriate space,

in the midst of constraints, that is to say, to be in a conflict- often acute- between the constraining powers and the forces of appropriation"⁶.

Corporeal and sensory capabilities and social needs should be facilitated, allowing users to act as equal social actors, influencing the way spaces are shaped. Focusing on designing for and together with the people with diverse needs (social groups) and capabilities (elderly people, kids, people with limited mobility, vision, hearing etc.) allows us to go beyond 'generic' architectural space and address concerns and insights on parameters that influence decisions of design.

In contradistinction to the dictating architecture of the prevailing forces of society- the capital, the engagement with specific human corporeal and sensory needs and abilities alongside with explicit social needs will lead inevitably to precise and unique spatial, architectural and urban proposals.

Understanding the commons: exploring its potential role in architecture

'... a cultural process...' Peter Linebaugh

- "... a subjective process..." Tim Rayner
- *'...a social practice...' Stephan Meretz*⁷

The approach of Architecture as Inclusive inevitably leads us to search for more socially sustainable living environments where the Commons could be their ever-evolving ingredient. Wendy Brown, in her 'Undoing the Demos- Neoliberalism's Stealth Revolution' revealing work⁸, sheds light on this matter. It reveals the silent but harsh aggressiveness of the existing economic system and points out the relentless attack on publics and what Foucault called "society". It continues to delineate its aggravating detriment on the society and shows how 'dismantled public institutions and political spaces, altering the principle of "inclusion of all". The Unit takes a stance and facilitates the students to utter voices of resistance against the vile impact of the existing socio-economic system on the society and environment. It expresses it by directing the focusing towards issues of Inclusive Architecture.

Apart from some small-scale communities, 'the Commons' is not yet widely explored, or someone could argue that it just started embryonically emerging in the contemporary urbanities. The Unit is called to immerse into this realm and offer its understanding and proposition of what and how this can be 'constructed' in various scales and conditions. The urban built realms seen as one interacting entity, in the mode of a social sustainable future that keeps incessantly defining and been defined by the 'idea of Commons', is expected to harness the identity of each student's project.

Stavrides advocates that common space is not an accomplished state of things but a process⁹. He defines spaces as an active form of social relations that cannot be fixed, it keeps producing those who produce it. Furthermore, Stavirides coins the understanding that 'Common space remains common when it keeps on destroying the boundaries between public and private not by absorbing on into the other, but by transforming their historically shaped antithesis into a myriad of new synthesis'. This stance is aspired to be used in the Unit's environment as the driving force for the redirection of architecture: to flood the built environments with the emergence of an abundance of unprecedented human topographies; that is to transform the conventional rigid, monolithic structures imposed by the leading (economic and not only) forces and shape the new world with the multitudes of identities of all humans, or in other words to lead to an architecture of inclusion.

The Spatial aspect of the idea of Commons

The notion of Commons can be transferred in ideas of generating space and the potentiality of spatial relations. As Stavrides argues social realities unfold in and through space thus connecting experiences

of space to possibilities of expanding them and transcending them. Opportunities of exploring the potentiality of space is linked with the way space is performed¹⁰.

The Unit aims to investigate ideas of performative space, where the architect allows for strategies of flexible and transformable spatial scenarios to take place. An investigation on ideas of vague space [non assigned strict program] can unfold opportunities for various inhabitation and appropriation scenarios thus enhancing opportunities of Common activities and appropriation taking place in a community.

SPATIAL AGENCY

Beginning from the notion that (social) space is a (social) product¹¹ the Unit introduces questions in relation to the process of production of social space.

Is production of space a collaborative process? How do we include others in the design process? Can we make the process of architecture a dialogue? How do we involve local actors? What is the redefined role of the architect / professional?

Discussing architecture as a social space, it questions the expert's authorship of the architect. Borrowing the definition of the term 'Agent'¹² one that effects change through empowerment of others, allowing them to engage in their spatial environments in ways previously unknown or unavailable to them, opening up new freedoms and potentials as a result of reconfigured social space, the role of the architect is re-introduced as an 'Agent' of being responsive to the longer-term desires and needs of the multitude of others who build, live in, work in, occupy, and experience architecture and social space.

Space is not a static object; it never finishes at the moment of completion¹³. As social space evolves over time though the contribution of various actors, the temporal character of architecture is emphasized.

The production of space is discussed as an organic process that evolves and adapts to the needs and aspirations of the users where it allows multiple social actors to contribute to the creation of 'social space'.

INTANGIBLE QUALITIES IN ARCHITECTURE / ISSUES OF PERCEPTION

It is expected from the students, in this level of their studies, to tackle with the issue of the immaterial as an indispensable part of the material matter and the tectonics.

Immaterial and material components are seen in a flux relationship. Jonathan Hill advocates that 'Immaterial–Material' weaves the two together, so that they are in conjunction not opposition'¹⁴

The Unit draws attention on Blurred Boundaries Notions, emphasizing on the abundance of 'inbetween conditions' rather than treating fixed binary relations¹⁵ (Tactile – Immaterial / Tectonic-Atmospheric / Unexpected – Familiar / Fragmented – Whole / Chance factors – Planned / Aging – Evanescent)

METHODOLOGY

Unit 2 acts as a Platform to debate new approaches of doing architecture; interdisciplinary is celebrated. The Unit follows a nonlinear methodology. Ideas are discussed and tested simultaneously in parallel assignments. A cyclic pedagogical process allows students to enrich their research and revisit their investigation by applying ideas in different scale projects and reevaluate them as they get dipper into their research.

Students tackle with different aspects, starting from a theoretical background to a practical application in various scales that enables them to anchor their investigations through making.

Theoretical background

The theoretical discussion generated by the four sub-thematic [inclusive architecture, commons, spatial agency, intangible qualities] acts as the backbone of the creative process, guiding the students to lead their relevant spatial, social and urban explorations of unique architectural spatial qualities with distinctive immaterial merits.

Parallel projects

Students work parallel with four main projects as illustrated in Table 1 that influence each other.

At the beginning of the semester students were introduced to an international design studio of the University of Universities [UOU]¹⁶, a new pedagogical initiative that emerged during the pandemic of Covid-19 in Spring 2020. Students were flexible to choose workshops during the semester depending on their own interests and enrich it with their investigations of the Unit's thematic.

Parallel to the above students engaged with two competitions, a smaller scale and an urban scale one and a local Live project, in order to apply ideas of the Units' sub-thematic simultaneously in a micro and a macro scale.

UOU international studio	Small-scale competition	Urban-scale competition	Live project Limassol port student competition
UOU workshop participation	testing theoretical ideas discussed in the Unit.	testing theoretical ideas discussed in the Unit.	integrated thematic in WS3 of UOU
Designing by your Avatar Designing for differently abled individuals Response to the theoretical background of Unit 2 Investigation on intangible & spatial qualities in Architecture			

Table 1. Project breakdown

Simultaneously immateriality was triggered by the element of chance¹⁷ as a design tool. It was introduced by the implementation of fast exercises in class with emphasis to intangible qualities of space, where atmospheric environment and immateriality are investigated.

Students were expected to revisit their work by making a mental map by the end of the semester, a timeline, where connections and links between seemingly unrelated projects created a thread of exploration.

UOU / ws3 cognitive mapping

The Unit's participation in UOU with WS3: cognitive mapping workshop¹⁸ aimed at raising awareness for the right of the people to the city, to its appropriation and opening the discussion to the realm of Urban Commons, towards an Inclusive Architecture.

Cognitive mapping as illustrated in Figure 1 was discussed as an abstraction covering those cognitive or mental abilities to enable us to collect, organize, store, recall and manipulate information about the physical environment. The map assigns preferences, determines attitudes and predicts possibilities.



Figure 2. Example of a cognitive mapping

Avatar

Students were asked to borrow an avatar as illustrated in Figure 2 with diverse needs and capabilities (elderly people, kids, people with limited mobility, vision, hearing etc.) in order to explore a site of Public Transportation Infrastructure. The placing of themselves in the position of the 'other' enabled the students to experience a potential public space not in the isolation of their own experience or as one member of any specific group of people. It made them understand that each individual and any minority group may become an equal social actor that influences the way space is designed.

The engagement with their avatar enabled students to bring unexpectedly interesting explorations of the built environment from very specific points of view such as, from a person with impaired vision that all the encountered binaries were blurred, a worker that was in need of resting in the town, a dog with a leash that had its own needs, elderly with dementia etc.



Figure 3. Example of an avatar

STRATEGIES DERIVING FROM THE PROJECTS

By unfolding a sample of student projects, we intend to demonstrate the potential role that Unit's 2 methodology could play in the discourse of architectural pedagogy and nurturing of socially aware architects, in order to act as agents for the production of an adaptable responsive social space.

"XY Laxamentum house"

XY Laxamentum house¹⁹ as illustrated in Figure 3, is an exploration of an adaptable typology of a tiny house for the elderly. The structure aimed to respond to the user by addressing issues of limited mobility, assisted living and problems arising from social isolation of the elderly from their families. The idea of the accordion mechanism was tested in order to provide adaptability in two different scales, in a micro scale in relation to the domestic space and in a macro scale of the relation of the unit as an insert in the urban context. Primary architectural elements as floors, walls, whole spaces can move, slide, open in order to alter the small house to meet the physical needs of its users, and at the same time interact and get engaged with its immediate surroundings or other tiny houses units addressing isolation by creating opportunities of socializing and sustainable living.



Figure 4. "XY Laxamentum house" project

"Space of No-Time"

"Space of No-Time' $project^{20}$ as illustrated in Figure 4 is a reaction to the separation between humanity and nature and among humans and the deterioration of the environment due to the capitalistic system.



Figure 5. "Space of No-Time" project

The driving force of the investigation is the challenge of the society to dissolve the illusory separation of man and nature and bring back that sense of connection. By going against the trend of privatizing city public and common spaces and bring about a notion of returning the cities common spaces back to the people, opportunities of connection and synergy are constantly being sought through the inbetween spaces. It looks into a place making of societies of solidarity, orchestration of activities in the shared spaces that promote collaborative mode of urbanity and inclusion of various groups of people.

"Cognitive urban village"

The "Cognitive urban village"²¹ project as illustrated in Figure 5, is investigating design concepts that can potentially upgrade the character of downtown city center and infuse new life in the urban core. It further adopts concepts on how Commoning between vastly different publics can be achieved through design. The site chosen, the old city in Nicosia, is burdened by a lack of immediate interactions between the elderly, those specifically with dementia who tend to get marginalized and left in isolated elderly homes, and the other publics: the migrant workers, the students, the younger locals, the hippies, the children and even animals. The project begins exploring the possibility of reversing this

reality by creating a completely new sustainable realm that prioritizes those with dementia within the old town's existing fabric, not in an isolated environment but in co-existence with the city's everyday life.

The main idea focuses on the user with deriving matters of memory by exploring the element of the facades. Borrowing the notion of "heterotopia"²² of Foucault, the idea of appropriation of space and in particular the in-between space created between the public and private domain of the street is discussed as an opportunity of infusing in the city instances of 'other places'. Attachments, expansions, and unused surfaces on the facades are explored in scenarios of temporary inhabitation, in order to facilitate the remembering but also to link stories with each other and with the city, leading to generating a stronger sense of community. The materiality of the façade is explored as a living organism that includes planting and considers animals as equal inhabitants of the city. Biodiversity is enhanced.



Figure 6. "Cognitive urban village"

"Synergies while ascending-descending"

The "Synergies while ascending-descending_ Transporting immaterial and material processes" project²³ as illustrated in Figure 6 is tackling with the over-consumption of resources, the city's sprawling and neglecting of the rural context. Situated in the rural area of Troodos mountains, in the village of Polystypos, a new architecture of transportation is being investigated. An exchange network is being developed into a complex and sustainable mechanism where air paths revived from former aerial transportation are re-devised and appropriated in order to exchange not only goods but also rural/urban environments, processes and workshops including kitchens, relaxing spaces, coffee shops and restaurants. Stations are located strategically in order to attract more life to the mountains, empower the engagement of people in rural areas, create healthier hybrid environments and processes for the production and transportation of food. At the same time, the structural system is designed in order to utilize the solar and geo-thermal energies, as well as the forces of gravity and wind in order to create a sustainable structure.



Figure 7. "Synergies while ascending-descending"

CONCLUSION

As architects how do we respond to the ever aggravating, aggressive existing socioeconomic systems? Could Architectural Pedagogy play a significant role to re-introduce the architect as an 'Agent', and not a dictator, taking the multiple role of a mediator, facilitator and designer for the emerging of social space and a catalyst for the process of Commoning?

Could design studio methodology act as a Research Platform in order to debate that architecture is responding to space as a social product?

How could Interdisciplinarity be included and celebrated in the design process?

Could Design be generated from the principle of inclusion of all, a bottom-up approach where the everyday person and any other being [animal?] act as equal social actors?

NOTES

¹ Maria Hadjisoteriou YH. Unit 2: Living where the immaterial matters_ towards the commons. . 2020.

² Yiorgos hadjichristou MH. Immaterial matters in changing, resilient cities. . 2015:49-58.

³ The aura of sacred, lecture by Juhani Pallasmaa. Catholic University's School of Architecture and Planning in Washington, DC: ; 2011.

⁴ Lefebvre H. The production of space. Blackwell; 1991.

⁵ Stanek L. Henri Lefebvre on space : Architecture, urban research, and the production of theory. Minneapolis Minn.]: Univ Of Minnesota Press; 2011

⁶ Lefebvre H, Bononno R, Stanek Ł. Toward an architecture of enjoyment. Minneapolis: Univ Of Minnesota Press; 2014.

⁷ Hadjimichael M. Seminars on radical geographies. . 2018.

⁸ Brown W. Undoing the demos : Neoliberalism's stealth revolution. Vol First edition. New York: Zone Books; 2015.

⁹ Stavrides S. Common space : The city as commons. London: Zed Books; 2016.

¹⁰ Stavrides S. Common spaces of urban emancipation. Manchester: Manchester University Press; 2019.

¹¹ Lefebvre H. The production of space. Blackwell; 1991.

¹² Awan N, Schneider T, Till J. Spatial agency: Other ways of doing architecture. Abingdon, Oxon England]: Routledge; 2011.

¹³ Awan N, Schneider T, Till J. Spatial agency: Other ways of doing architecture. Abingdon, Oxon England]: Routledge; 2011.

¹⁴ Hill J. Immaterial architecture. 1st ed. ed. Routledge; 2006.

¹⁵ Yiorgos hadjichristou MH. Immaterial matters in changing, resilient cities. . 2015:49-58.

¹⁶ UNIVERSITY of universities [UOU] / an international teaching project developed during the lockdown by teachers of six european universities: Alicante university spain, american university dubai, european university madrid , ion minku university rumania , umea university sweden, university of nicosia cyprus, UEW bristol UK. . 2020.

¹⁷ Manolopoulou Y. Architectures of chance. Taylor and Francis; 2013.

¹⁸ Menikou, Markella Hadjisoteriou, Maria Hadjichristou, Yiorgos. UOU / workshop 3: Cognitive mapping. . 2021.

¹⁹ Project developed by Vasilis Panayides & Giorgos Kyriakides, Unit 2, academic year 2020-21, University of Nicosia, Architecture department.

²⁰ Project developed by Anastasia Milona, Unit 2, academic year 2020-21, University of Nicosia, Architecture department.

²¹ Project developed by Yvonne Assimwe, Unit 2, academic year 2020-21, University of Nicosia, Architecture department.

²² Michel Focault Dehaene and De Cauter Routledge, 2008

²³ Project developed by Christos Savva, Unit 2, academic year 2020-21, University of Nicosia, Architecture department.

BIBLIOGRAPHY

Antoniou Veronika, Yiorgos Hadjichristou, and Alessandra Swiny. "Cyprus State Pavilion 'Human Topographies_Emerging Identities".

Blokland-Potters, Talja. 2017. Community as Urban Practice. Malden, MA: Polity.

Elliott, Brian. 2011. Benjamin for Architects. Abingdon, Oxon: Routledge.

Federicci, Silvia. 2019. *Re-Enchanting the World: Feminism and the Politics of the Commons*. Canada: PM Press.

- Friedman, Yona, Maria Rodriguez, Kenneth Frampton, Manuel Orazi, and Hans Ulrich Obrist. 2011. Architecture with the People, by the People, for the People : Yona Friedman Actar.
- Hadjichristou, Yiorgos. 2018. "Reverbarations in the Dormatnlands / Αντηχήσεις Στην Κοιμώμενη Γη." In *The Cypriot City Paradigm_Urbanity Issues in Design and Planning*, edited by Nikos Patsavos and Ioannis Pissourios, 437-469.

- Petrescu, Doina and Kim Trogal. 2017. The Social (Re)Production of Architecture : Politics, Values and Actions in Contemporary Practice. London: Routledge.
- Sadler, Simon. 1998. The Situationist City. Cambridge Mass: The MIT Press.
- Sharr, Adam. 2007. Heidegger for Architects. London: Routledge.
- Vidler, Anthony. 1992. The Architectural Uncanny : Essays in the Modern Unhomely MIT Press.
- Zumthor, Peter. 2006. Atmospheres : Architectural Environments, Surrounding Objects Birkhauser.
- Tanizaki, Junichiro. 1977. In Praise of Shadows. New Haven, Conn: Leete's Island Books.
- Massey, Doreen. 2005. For Space. London, Thousand Oaks, New Delhi: SAGE Publications.
- Homi, K. Bhabha. 2007. 1. Aga Khan Award for Architecture. Intervention Architecture, Building for Change. I.B. Tauris & Co Ltd, 2007. I.B. Tauris & Co Ltd.
- Hadjisoteriou Maria, K.-Petrou Angela, Sevina Floridou. 2019. "Coming together in Mouttalos", Journal: Architecture and Culture, Routledge, Taylor and Francis. 518-521
- Hadjisoteriou Maria, K.-Petrou Angela, "Adaptive Strategies & Urban Identities, Larnaca Oil Refinery Coastal Area", book "Rethinking, Reinterpreting and Restructuring Composite Cities", Publisher: Cambridge scholars publishing. 2017
- Maria Hadjisoteriou YH. Unit 2: Living where the immaterial matters_ towards the commons. . 2020.
- Yiorgos hadjichristou MH. Immaterial matters in changing, resilient cities. . 2015:49-58.
- The aura of sacred, lecture by Juhani Pallasmaa. Catholic University's School of Architecture and Planning in Washington, DC: 2011.
- Lefebvre H. The production of space. Blackwell; 1991.
- Stanek L. Henri Lefebvre on space : Architecture, urban research, and the production of theory. Minneapolis Minn.]: Univ Of Minnesota Press; 2011
- Lefebvre H, Bononno R, Stanek Ł. Toward an architecture of enjoyment. Minneapolis: Univ Of Minnesota Press; 2014.
- Brown W. Undoing the demos : Neoliberalism's stealth revolution. Vol First edition. New York: Zone Books; 2015. Stavrides Stavros. Common space : The city as commons. London: Zed Books; 2016.
- Stavrides Stavros. Common spaces of urban emancipation. Manchester: Manchester University Press; 2019.
- Lefebvre H. The production of space. Blackwell; 1991.
- Awan N, Schneider T, Till J. Spatial agency: Other ways of doing architecture. Abingdon, Oxon England]: Routledge; 2011.
- Hill J. Immaterial architecture. 1st ed. ed. Routledge; 2006.
- Yiorgos hadjichristou MH. Immaterial matters in changing, resilient cities. . 2015:49-58.
- Manolopoulou Y. Architectures of chance. Taylor and Francis; 2013.
- Michel Focault Dehaene and De Cauter Routledge, 2008

ANTI-AMNESIA AS A LEVER FOR ACTIVE PEDAGOGY: ARTICULATING DESIGN AND MEDIA TOWARDS CRAFT AND INDUSTRIAL HERITAGE PRESERVATION IN PORTUGAL

Author:

JORGE BRANDÃO PEREIRA¹, HEITOR ALVELOS², ABHISHEK CHATTERJEE²

Institution:

¹ POLYTECHNIC INSTITUTE OF CÁVADO AND AVE, PORTUGAL; ² UNIVERSITY OF PORTO, PORTUGAL

INTRODUCTION

The following paper acknowledges the multidisciplinary role of media within the context of Anti-Amnesia, a research project that seeks to sustain disappearing traditional industries and practices in northern and central Portugal (POCI-01-0145-FEDER-029022). It is addressed a global outlook that deals with methods, strategies and creativity, and copes with new and more complex challenges and work forms. Thus, it is presently necessary to address design's role in terms of overall cultural change, and in particular, within the scope of restoring craft-based local economies currently on the decline.

In this regard, the project considers four instances of traditional making from the respective regions that represent varying degrees of technological obsolescence as vantage points for studying the multiplicity of factors behind the ongoing capitulation: *Almalaguês* handweaving, *Azulejos* tilework, traditional shoemaking, and letterpress typography.

As a pedagogical tool that extends beyond digital mediation, it acknowledges and encourages alternative expressions of knowledge transfer – such as craft ecosystems –fostering a betterment of creative approaches in academic environments. It focuses the teaching-learning-research bias by focusing on the recovery and restoration of related identities, traditions, and systems of knowledge, a mediation strategy that is based on the synthesis of several complementary media-centric courses of action. The project, deriving from its research and mediation experience with the study contexts, also argues that the process to determine the viability of traditional making should not be restricted to pecuniary validation, and should accommodate intangible and long-term influences of crafts and small-scale industries. The project's conducted research sees an ongoing reversion of its outcomes into multiple contexts of related socio-cultural appropriation through a "build-measure-learn" loop, a significant extent of which is attained by the means of curricular participation from design students.

A THEORETICAL FRAMEWORK

Traditional economies' heritage and empirical knowledge present a sustained potential to become a territory for design action as a strategic constituent for the development. In recent years, there has been

a growing interest on how design can augment organizational development, create meaningful links between businesses and society, and bridge gaps between its own theory and practice^{1 2}. In present times of accelerated technological development and economic internationalization, design has also been playing an active role in the maintenance of localised practices, products, and industries through the use of contemporary media as a means of identity/building and value addition^{3 4}.

There are changes occurring in the global economy driven by globalization, technological innovation and communication paradigm shifts. The new set up drive the adoption of development strategies by institutions and organizations for their general improvement. Globalization of society promotes changes in citizens' social behaviours. For traditional economies, the achievement of greater competitiveness has become the key factor for their sustainability and growth, in a society that seeks differentiation, novelty and cultural change. In this context, design may have an important role to play. The International Council of Design (ico-D) aims at "advocating for design as an effective way of advancing the best interests of humanity and the environment"⁵. Design is promoted as an efficiency and differentiation tool, to create and deploy an organizational culture, integrating all stages of product development. It takes up a narrative of optimism that is passed to organizations and to the collective discourse. Linked to this process are development variables, which influence many sectors. These variables require the integration of technology as well as economic, social and cultural requirements. These requirements shift the discussion to the preservation of cultural identity, articulating global culture with local culture, while seeking to, simultaneously, universalize and localize.

DESIGN RESEARCH AS A MEDIUM FOR CONTEXTUAL RECOVERY

Anti-Amnesia, a design research project, engages in a process of mediation that responds to evergrowing evidence of disappearing traditional small-scale industrial practices in Northern and Central Portugal. Typical craft and industrial cultures are facing an unprecedented scale and complexity of challenges to their viability as a consequence of emerging global commercial and industrial realities^{6 7} ⁸. The project accordingly procures means for constructing a scholarly infrastructure that can aid in their thorough cultural appraisal, identify and promote the critical but unrealized non-economic value propositions, and correspondingly, endure their socio-economic validity in the modern era of fastpaced change.

Design can be considered as a key facet of modern economics and culture; however, its essence resides in creative economies⁹¹⁰. Design's commitment to the sector requires a holistic perspective, by apprehending both its strategic and integrated aims, that include negotiating economic development, aiding in social cohesion, and contributing to contemporary urban culture. Design seeks to contribute to business development as a strategic constituent acting in management processes and effectuating systemic or supplemental changes. Thus, as a means for developing a shared vision, creative processes assist in optimizing corporate performance. The materialization of ideas, respectively, can be attributed to focusing on developing a suitable solution for each project, reinforcing the message, linking codes and languages, enhancing affections, and considering the needs and desires of the intended audience. This approach can presently be witnessed traversing economic, social, and cultural dimensions of diverse scales and forms of impact.

The proposed approach opens up possibilities to provide meaningful contributions towards generating innovation that is better suited to people's common and particular needs, desires, and aspirations connected with the products and services they acquire. The cultural capital of each individual—their personality, their cultural background, the environment in which they operate, and the use case scenarios they derive from artifacts—can become a trigger for innovation: understanding what is central and/or a catalyst for change can provide an understanding of individual, subjective value, and

thus, resonate in terms of anticipating associated behavioral economics towards securing present and potential markets.

BRIDGING THEORY TO ACTION RESEARCH

In order to adapt such relevant attributes of the emerging dynamic between design and organizational management within the context of dissipating craft-based industries, Anti-Amnesia considers four case studies that may help uncover an extensive range of potential factors behind the ongoing decline of traditional making. This set of cases comprises traditional Portuguese shoemaking, tile-making, traditional hand weaving, and letterpress typography, with each instance representing a different degree of technological and/or cultural obsolescence. The case studies also represent a wealth of specialized knowledge that is embedded in their respective material culture, encompassing unique techniques, processes, and creativity that can become a critical asset to innovation within the associated industries, despite presently standing on the verge of permanent loss.

Correspondingly, Anti-Amnesia intervenes by focusing on the recovery and restoration of related identities, traditions, and systems of knowledge: mediation processes based on the synthesis of several complementary media-centric courses of action. The recovered knowledge correspondingly creates footing for informed design-driven restorative measures, such as new product and communication approaches, and provides orientation for updating traditional media and business strategies to tackle contemporary challenges. Contemporary design and media practices thus showcase their propensity towards collaboratively addressing craft-based creative economies of diverse configurations and contexts. They may employ an integrative approach based on interdisciplinarity, that effectuates mutually advantageous interaction between different stakeholders. The legitimization of empirical and practice-led knowledge through design and media research can thus make a significant contribution to their individual and collective scope and depth as multi-disciplinary interfaces and inform their potential roles within other emergent and uncertain territories.

As reference for understanding the potential factors behind the ongoing capitulation of traditional small-scale and craft-based industries, the research considers four case studies: traditional Portuguese shoemaking, tile-making, weaving and letterpress typography, with each instance representing varying degrees of technological and/or cultural obsolescence. From the outset, the project comprehends the need for constructing a constructive response to a common identifiable element of depreciation — globalization — and its entailing effects on production and consumption locally and worldwide. This issue is timely and pressing, and among the most critical concerns discussed in European and international cultural policymaking, research projects, and design studies and practices^{11 12 13 14}. This discourse finds its own vivid examples in contemporary Portugal through instances such as Almalaguês handweaving, for whom design-based mediation has become imperative for continuity. However, in order to maintain the efficacy of such mediation, the project recognizes that a collaborative exploration of resolutions is required in order to not compromise on the related identities or originality of traditional making.

The project also takes into account the existence of a wealth of specialized knowledge that may be embedded in the material culture and human narratives surrounding these traditional industrial contexts; these may be on the verge of being lost permanently, if not urgently acted upon. Thus, the project's first course of action has been to articulate and functionalize a recovery strategy that employs an array of tactical interventions, including ethnographic research, documentation and archiving. The recovered knowledge correspondingly forms the basis for informed and design-driven restorative actions such as product and communication design, and for orienting new media and business strategies, in addition to being archived for future interpretation. The associated methodological framework is underpinned by ethnographic research methods from the social sciences¹⁵ ¹⁶ that have proven to be highly effective when applied in conjunction with design methods. The project builds upon collaborative doctoral and postdoctoral design research previously developed with traditional industries in the specified regions in Portugal, and incorporates the obtained experience, methods, and outputs towards further culmination.

Almalaguês case-study

The textile craft of Almalaguês is a traditional hand weaving technique that is endemic to two villages in the outskirts of Coimbra in Central Portugal and has been practiced since the 11th Century¹⁷. Despite such distinct historical value, the knowledge of the practice is fairly limited beyond its typical bastions.

The complexity and the exclusivity factor underlying the Almalaguês practice is, however, incoherent with its apparent lack of acknowledgment in regional cultural and academic discourses. Gomes¹⁸ observes that the chaste aesthetics of the fabric may have contributed to its relative anonymity, wherein, other materials with more ostentatious colors and features may have prevailed over the craft's discreet subtleties in historical accounts. Supplementary evidence such as the intergenerational transmission of the craft's technical knowledge, and its deeply folkloric customs and traditions provide an argument for its locally circumscribed footprint, however, in consideration of its remarkable longevity, the millenary weaving form within its cultural landscape can be considered an institution.

At present, however, the practice is facing an uncertain future beyond it current generation of active weavers. Over the past few decades, its traditional markets have been subjugated by large-scale competitors that offer foreign-made goods in greater variety at lower price points. The community of Almalaguês weavers have made an effort towards offsetting the extenuating circumstances by widening their market approach and product ranges and have formed an association to cooperatively identify potential resolutions, however, these measures have done little to consolidate their position. Facing imminent market loss, the newer generations of the community have refrained from taking up the practice altogether, choosing other vocations instead to earn a living. Almalaguês' cultural, material, and processual legacy thus rests precariously on the resolve of a few remaining practitioners, and subsequently, on opening collaborative channels of mediation, such as with design research¹⁹, which can help preserve knowledge of inestimable value, and determine approaches for sustainable economic growth and innovation.



Figure 1. Pedagogical workshop in class, engaging women artisans and design students.

Azulejos do Porto case-study

Portugal's well-known *Azulejos* tiles are in a state of flux. The original hand-printed version of the practice may have long ceded ground to more mechanized forms; however, its legacy, marked by century-old artefacts that still adorn building facades, is disintegrating rapidly. As urban centers such as Porto expand and accept newer architectural paradigms, *azulejos*, a cultural archetype from an earlier era, transforms into a thematic discourse. The symbolic value of the craft, as a cultural marker, thus gains more significance than its material and processual heritage and jeopardizes the continuity of the manual aspects which are equally relevant in terms of industrial heritage. The increasing cases of tile-theft conversely make a striking argument for the enduring demand for originality, however, in the absence of a dedicated community of practice, mediation through design becomes convoluted.

Project Anti-Amnesia thus lays particular emphasis on gaining visibility of emergent actions that are being employed from within the wider creative community towards issue. Traditional techniques and practices are inevitably affected by the inconsistent economic and sociocultural circumstances; however, it is often possible to locate endogenous movements that undertake reformatory measures.

A case in point is an initiative which the project considers as a relevant subject of study towards comprehending the tradition of tile making in Porto, since it aims to revive and sustain the authenticity factor behind the original craft in absence of a dedicated community of practice²⁰. The Porto-based initiative in question represents one of the few remaining instances of entities that are currently involved in small-scale production of hand-painted tiles, in a city that was once home to several large-scale tile-producing kilns, the last of which ceased to operate in the 1980s.

As a result of these restorative measures, the initiative represents an intervention scenario which not only promotes active community-based creative engagement with a heritage craft and its associated concerns but also communicates the undiminished value of a local traditional practice to a global audience. Its three-pronged strategy for cultural reconsideration essentially includes design, documentation, and dissemination: as a methodological approach, this falls in line with Anti-Amnesia's articulations, and can potentially inform ongoing and future community-based heritage management interventions²¹.



Figure 2. Workshops provided by Azulejos do Porto entail a communal call to action, but during lockdown in 2020 a digital interaction was promoted.

Damasceno Letterpress Studio case-study

The Damasceno print studio, celebrating its 50th year in business in 2019, is a family-run entity that has remained active, while many others have ceased in the region, through maintaining a zoetic connection with younger generations, ideas, and projects²². The studio attributes its longevity to the strength derived from such associations, which have helped overcome pressures to redefine their entity or be characterised in during the past five decades that have coincided with multiple shifts in the

paradigms of printmaking. Such reconciliation of paradoxes has had names and protagonists in Tipografia Damasceno: it did not occur as a consequence of strategic planning, but as a natural product of conviviality. Innovation, similarly, has been realized through quotidian interactions, thereby transcending the term and confuting claims to its processualization.

At Damasceno, there exists a galore of evidence as to why letterpress printmaking is not just an industrial practice, but a sociocultural institution in motion. Amidst the softly radiating heat of machines, an evocative scent of ink, and rhythmic reverberations of contrivances, a space can be found that is brimming with meaning. Its surfaces, tools, drawers, materials, and particularly, the countless posters populating each wall tell stories of umbilical relations with protagonists of different eras, and of knowledge that is inherited and perpetuated, not by any decree, but by serenity attained through its continued diffusion.

Letterpress, in practice and processes, has always flanked the visual creativity of graphic art. Reasoning and creative stimulation have correspondingly developed as a means to adapt and imbibe the aesthetic objectives of graphic communication into effective methodological, technical, mechanical and material possibilities of typography. Upon its induction within the scope of design, the practice gained authors (designers) who expanded applicability while maintaining its intrinsic rigour. In this way, the craft continues to find creative agents who have helped in maintaining its relevance and in the perpetuation of its know-how²³.



Figure 3. Letterpress typography articulates design creativity with the printing media itself, in a handson approach to teaching and pedagogy.

Netos Footwear Factory case-study

Established in the mid 1960's, the Netos footwear factory is a small-scale family-run manufacturing unit based in São João de Madeira, in Northern Portugal. A part of a bigger and considerably more organized sector in Portugal, Netos may not immediately give the impression of being under technological duress as much as the other described cases.

The historical discourse here is similar to that of Azulejos, as manual practices in shoemaking have long been replaced by mechanised production, and hence a direct relation cannot be made between digital advancements and the decline of making by hand. The implications, however, are far more evident if we consider the prevailing circumstances in light of the significant priority upheaval of the footwear sector as a whole – from a balanced domestic and export model to an all-out export centric one – an approach which is effectively marginalizing local brands and small-scale manufacturing units, such as Netos, that have historically relied on the long-established balance between domestic and export trade.

Testimonies of footwear makers gathered during the ethnographic stages of the research further consolidate this argument, indicating that over the past two decades, the industry's preoccupation with technological upgrades, specifically in service of larger firms, may have abated a respective amount of deliberation in developing small and cottage scale concerns and indigenous labels, which may also have welcomed similar guidance in relation to function/product upgradation.



Figure 4. The Portuguese footwear industry's export centric approach is effectively marginalizing small-scale manufacturing.

CONCLUSION

With the development of new organizational methods and processes, and in consideration of their economic repercussions, design stands to gain a further interpretation in the way of a mediation strategy that, in conjunction with new media tools, can create/identify value propositions and provide actionable insights into restoring dissipating creative practices. Anti-Amnesia is based on the understanding that in the scope of the relationship between global models of interpretation and pedagogical activities, more concrete learning can be attained in environments that are favorable for fostering meaningful learning processes. In accordance, it was established a conducive classroom environment through introducing thematic project-based workshops with the aim of creating a learning ladder between understanding, meaning and action: which was adjoined to the students' professional training, and entailed processes of active learning and pedagogical construction within contexts not previously observable or open to experimentation. These activities were built in the ambit of the research project and contributed to the modelling of a distinct design pedagogy. In this way, the pedagogy was motivated by and open to external processes, maintaining and stimulating the habit of questioning in the students about their surroundings. The successful implementation of this bridge also brought more cognitive maturity, combined with a deeper understanding of pedagogical processes in general for the researchers, providing an accentuated view of the role of design, and learning built at the service of knowledge and the understanding of the world and of real issues. In addition, it involved everyone equally within a shared space and with shared purpose and provided greater motivation on the part of those wanting to learn.

The collaborations with the respective case study contexts consolidated their relationship with Anti-Amnesia and opened up territories for further expansion of theory and practice. Teachers, acting as mediators between the research and the students' creative discourse, found a suitable position to collect and interpret crucial information, reflect on the learnings, and propose advancements regarding the configuration and execution of an effective pedagogical model for design. The concept of classrooms as living laboratories for research was also validated and underlined its potential to transform and be transformed. Action research, thereby, showcased that it can become a potent means of attaining positive change and innovation, and accordingly, the discipline of design can move from being a specialised practice to a basis for participation and co-creation

AMPS, Architecture_MPS, PARADE, Manchester School of Architecture (University of Manchester / Manchester Metropolitan University)

NOTES

¹ Milena Droumeva, and David Murphy. "A Sound Pedagogy – Active Learning through Media Production". *EDULEARN16 Proceedings*, 3974-3982, 2016.

² Stine Ejsing-Duun and Helle Marie Skovbjerg. "Design as a Mode of Inquiry in Design Pedagogy and Design Thinking". *International Journal of Art & Design Education*, 38(2), 445-460, 2017.

³ Nicola J. Thomas, Fiona Hackney and Katie Bunnell. "Connecting craft and communities". *Connected Communities. Arts and Humanities Research Council*, 2011.

⁴ Sinikka Pöllänen. "Beyond craft and art – A pedagogical model for craft as self-expression". *International Journal of Education Through Art*, 7(2), 111-125, 2007.

⁵ ico-D (2015). *Mission*. Accessed November 1, 2020. https://www.ico-d.org/about/index#vision-and-values

⁶ António Gomes. "Design, Tradition and Craft: The Case of Almalaguês", *PhD Design Forum*, 2016.

⁷ Pedro de Almeida and Abhishek Chatterjee. "Sapatilhas: Cultural Significance and Industrial Legacy". Ciência 2016 Lisbon, Ministry of Science, Technology and Higher Education, 2016.

⁸ Cláudia Albino. À procura de práticas sábias – Design e Artesanato na significação dos Territórios (Looking for Wise Practices. Design and Handicraft in the significance of the Territories). CEARTE - Centro de Formação Profissional do Artesanato, 2017.

⁹ Roberto Verganti. Design-driven innovation – changing the rules of competition by radically innovating what things mean. Harvard University Press, 2009.

¹⁰ Kevin Clark and Ron Smith. "Unleashing the power of design thinking". *Design Management Review*, Vol.19/3, Summer 2008.

¹¹ Allison J. Clarke. Design anthropology. Object culture in the 21st Century. Vienna: Springer- Verlag, 2011.

¹² Ezio Manzini. *Design, when everybody designs: An introduction to design for social innovation*. Massachusetts: MIT Press, 2015

¹³ European Union. *Design as a driver of user-centred innovation*. Commission of the European Communities, 2009.

¹⁴ European Union. *Implementing an Action Plan for Design-Driven Innovation*. Commission of the European Communities, 2013.

¹⁵ Sarah Pink. *Doing visual ethnography*. Sage, 2007.

¹⁶ Gillian Rose. Visual Methodologies: An introduction to the interpretation of visual materials, 3rd ed. Sage, 2011.

¹⁷ Gomes, António. *Almalaguez: tecer o futuro com os fios do passado.* Doctoral dissertation, University of Porto, Porto, Portugal, 2018.

¹⁸ Gomes, António. *Almalaguez: tecer o futuro com os fios do passado.*

¹⁹ Brandão Pereira, Jorge, Alvelos, Heitor and Chatterjee, Abhishek. "Bridging Design Education and a Portuguese Handicraft Tradition – Pedagogical Experimentation through Design for Doing." *Conference Proceedings 9th International Conference The Future of Education*, 23-27, Filodiritto Publisher, 2019.

²⁰ Elliott, Christopher. "In Porto, A Push To Save Portugal's Historic Azulejo Tiles", Forbes Magazine. Accessed May 14, 2020. https://www.forbes.com/sites/christopherelliott/ 2020/02/14/in-porto-a-push-to-save-portugals-historic-azulejo-tiles/#501795322cf3

²¹ Brandão Pereira, Jorge, Alvelos, Heitor and Chatterjee, Abhishek. "Active pedagogy in art and design education – case study on the heritage and semantics of the Portuguese graphic tradition of 'Azulejos'". *Conference Proceedings 10th International Conference The Future of Education*, 49-54, Filodiritto Publisher, 2020.

²² Soldado, Camilo. *Damasceno: a tipografia do fim do mundo chegou aos 50 anos*. Accessed January 8, 2020. https://www.publico.pt/2019/04/14/local/noticia/damasceno-tipografia-fim-mundo-chegou-50-anos-1869134

²³ Alvelos, Heitor, Brandão Pereira, Jorge, Chatterjee, Abhishek and Pedro Amado. "A pedagogy of the quotidian
– letterpress and typography as heritage towards a restorative action of design". *Hyphen, a typographic forum* XII
18, 9-16, 2020.

BIBLIOGRAPHY

- Droumeva, Milena and David Murphy. "A Sound Pedagogy Active Learning through Media Production". *EDULEARN16 Proceedings*, 3974-3982, 2016.
- Ejsing-Duun, Stine and Helle Marie Skovbjerg. "Design as a Mode of Inquiry in Design Pedagogy and Design Thinking". *International Journal of Art & Design Education*, 38(2), 445-460, 2017.

Thomas, Nicola J, Fiona Hackney, and Katie Bunnell. "Connecting craft and communities". *Connected Communities. Arts and Humanities Research Council*, 2011.

- Pöllänen, Sinikka. "Beyond craft and art A pedagogical model for craft as self-expression". *International Journal* of *Education Through Art*, 7(2), 111-125, 2007.
- ico-D (2015). Mission. Accessed November 1, 2020. https://www.ico-d.org/about/index#vision-and-values

Gomes, António. "Design, Tradition and Craft: The Case of Almalaguês", PhD Design Forum, 2016.

- de Almeida, Pedro and Abhishek Chatterjee. "Sapatilhas: Cultural Significance and Industrial Legacy". Ciência 2016 Lisbon, Ministry of Science, Technology and Higher Education, 2016.
- Albino, Cláudia. À procura de práticas sábias Design e Artesanato na significação dos Territórios (Looking for Wise Practices. Design and Handicraft in the significance of the Territories). CEARTE - Centro de Formação Profissional do Artesanato, 2017.
- Verganti, Roberto. Design-driven innovation changing the rules of competition by radically innovating what things mean. Harvard University Press, 2009.
- Clark, Kevin and Ron Smith. "Unleashing the power of design thinking". *Design Management Review*, Vol.19/3, Summer 2008.

Clarke, Allison J.. Design anthropology. Object culture in the 21st Century. Vienna: Springer- Verlag, 2011.

Manzini, Ezio. *Design, when everybody designs: An introduction to design for social innovation.* Massachusetts: MIT Press, 2015

European Union. *Design as a driver of user-centred innovation*. Commission of the European Communities, 2009. European Union. *Implementing an Action Plan for Design-Driven Innovation*. Commission of the European Communities, 2013.

Pink, Sarah. Doing visual ethnography. Sage, 2007.

Rose, Gillian. Visual Methodologies: An introduction to the interpretation of visual materials, 3rd ed. Sage, 2011.

- Gomes, António. *Almalaguez: tecer o futuro com os fios do passado*. Doctoral dissertation, University of Porto, Porto, Porto, Portugal, 2018.
- Brandão Pereira, Jorge, Heitor Alvelos, and Abhishek Chatterjee. "Bridging Design Education and a Portuguese Handicraft Tradition – Pedagogical Experimentation through Design for Doing." *Conference Proceedings 9th International Conference The Future of Education*, 23-27, Filodiritto Publisher, 2019.
- Elliott, Christopher. "In Porto, A Push To Save Portugal's Historic Azulejo Tiles", Forbes Magazine. Accessed May 14, 2020. https://www.forbes.com/sites/christopherelliott/ 2020/02/14/in-porto-a-push-to-save-portugals-historic-azulejo-tiles/#501795322cf3
- Brandão Pereira, Jorge, Heitor Alvelos, and Abhishek Chatterjee. "Active pedagogy in art and design education case study on the heritage and semantics of the Portuguese graphic tradition of 'Azulejos'". *Conference Proceedings 10th International Conference The Future of Education*, 49-54, Filodiritto Publisher, 2020.
- Soldado, Camilo. *Damasceno: a tipografia do fim do mundo chegou aos 50 anos*. Accessed January 8, 2020. https://www.publico.pt/2019/04/14/local/noticia/damasceno-tipografia-fim-mundo-chegou-50-anos-1869134
- Alvelos, Heitor, Jorge Brandão Pereira, Abhishek Chatterjee, and Pedro Amado. "A pedagogy of the quotidian letterpress and typography as heritage towards a restorative action of design". *Hyphen, a typographic forum* XII 18, 9-16, 2020.



AMPS PROCEEDINGS SERIES 22.2

Front cover image: DCMA.

AMPS, Manchester School of Architecture Manchester: 02-04 December, 2020

© AMPS