Design Pedagogy for Learning Sustainability with Communities

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Abstract. This paper discusses tools and methods of learning for upcoming professionals to explore and understand sustainability in relation to people, neighborhoods and communities during the workshop 'Small is Beautiful'. The workshop has been jointly developed since 2016 by academic faculty in Architecture, Interior Design, Visual Communication, Design Management and Social Community Work from India and Israel. The workshop takes place each summer in India and Israel simultaneously. Students from the above fields and countries participate in multidisciplinary and multicultural teams. Each team is assigned a case study in a community where people live in dense environments and often have limited economic resources. Students are challenged with a design task and develop together with people in the community concepts that can improve living conditions in the specific site and might hopefully be scaled up to be implemented elsewhere in the world. According to 'Habitat III New Urban Agenda' the main tool for urban sustainability and resilience is the ability to design solutions that cover different scales, time frames and disciplines, all through a cultural and human-based perspective. Such solutions can be derived from communities in different cultures, living within limitations of small spaces, who develop intrinsic design responses that are remarkably resilient and suitable to the context. This forms a significant area of study largely ignored by designers. The research method is based on the triangulation of qualitative (before and after interviews with all participants) and quantitative methods, as well as design analysis of the case studies. The research suggests that a combination of multidisciplinary, multicultural and participatory practice is a viable pedagogical tool for sustainable transformative education. Findings indicate that this multi-layered design education facilitates the development of skills critical to the understanding of complex systemic socio-technological problems, and to foster the development of creative solutions viable for implementation in the community.

1. Introduction

This paper is a product of a series of annual workshops focused on a multicultural and multidisciplinary approach towards sustainable design conducted simultaneously in India (various States) and Israel (Jerusalem) since 2016. Each year, over the course of ten days, approximately 40 students and faculty members in the fields of Architecture, Product Design, Visual Communication, and Social and Community Work collaborate to work on case study communities in India and Israel. The selected case studies have a common typology of small housing units and high-density occupancy.
buildings (Persov, Yehuda, Kantor, & Pelman, 2017). The workshop utilizes different components of transformative environmental education such as knowledge, skills, emotion, and behavior, together with Problem-Based Learning (PBL), multidisciplinary learning and human-based perspective. Students start the workshop by learning about the case studies, participating in the re-enactment of a problematic scenario, designing solutions with the community and finally publicly presenting their solutions to the communities (Joseph & Blumenfeld, 2006).

The subject of the workshop is ‘Small is Beautiful: A study of Design as if People Mattered” adopted from E.F. Schumacher’s book ‘Small is Beautiful: A Study of Economics As If People Mattered’ (1973), that addresses the optimization of resources at the individual and community level. Accordingly, participants were asked to engage in questions involving scales of design by asking ‘what is small?’ and cultural questions such as ‘what is beautiful in this smallness’? Participants were also asked to look into the history of their case study and design a practical and innovative solution involving interaction with the community, their peers, and meeting sustainable development goals drawn from the New Urban Agenda (NUA).

This paper investigates learning outcomes achieved in the sustainable design workshop and draws conclusions and recommendations for further curriculum development for education designers, architects, engineers and social and community workers for the NUA challenges. The pedagogy, which was developed to teach new sustainable development competencies, includes three main components:

- **Human-based design perspective** that combines the strengths of grounded theory with co-design methods. It is conducted through a ‘multiple-loop’ research and design process, which is conducted through several iterative sessions with case study communities. The first session is dedicated to a joint exploration process, followed by classwork in which opportunities are developed. Opportunities are presented to communities for a co-design phase, which then leads to a final concept presentation. In both meeting sessions, the community and other stakeholders act as an integrated part of the design team.

- **Multidisciplinary research and development teams** are formed, making sure that there is a maximum mix between the different professions. Each team had students from Social and Community work, Engineering, Visual Design, Product Design, Crafts and Architecture.

- **Multicultural collaboration between participants** within the teams and in between teams in Israel and India. Since the teams simultaneously conduct parallel research and development processes, they were asked to share their findings with their peers in the other country.

All of these components led to a competency-based workshop that aimed to be a transformative boot camp in sustainable design to build the students’ perspectives on their professional responsibilities and provide them a practical toolbox to participate in the NUA.

2. **Sustainable Development and the New Urban Agenda**

The New Urban Agenda (NUA) was published in Quito, Ecuador, in 2016. This guiding document was developed in a global process, involving 26 “urban thinkers campuses,” engaging 7,847 professionals from a wide array of disciplines from 124 countries and 2,137 organizations. The final draft was written by secretaries of 10 UN member states, later negotiated by 197 UN member states and finally adopted in Quito. The NUA is based on principles from former UN declarations; adequate shelter for all, as developed in ‘Habitat II’ and the environmental responsibility and the eradication of poverty as developed in ‘The Millennium Development Goals.’ These principles were reaffirmed in UN forums including the ‘World Summit on Sustainable Development’ in 2002 and, and ‘Rio+20’ in 2012, in which the Sustainable Development Goals (SDG) were developed (Sustainable Development Goals, 2018). This context is the conceptual foundation that shaped the goals of the Habitat III New Urban Agenda. The Habitat III vision is:

“We share a vision of cities for all, referring to the equal use and enjoyment of cities and human settlements, seeking to promote inclusivity and ensure that all inhabitants, of present and future generations, without discrimination of any kind, are able to inhabit and produce just, safe, healthy,
accessible, affordable, resilient and sustainable cities and human settlements to foster prosperity and quality of life for all” (New Urban Agenda, 2016, p. 5)

To fulfill this vision, all institutions of Higher Education (HE) must participate in a coordinated effort (UNESCO, 2005). This paper focuses on understanding the learning outcomes of an international, multicultural and multidisciplinary sustainable design workshop, adapted from the NUA:

- Sustainable urban development through **design at different scales** - global, regional, national, sub-national, local and domestic - requires a variety of competencies in **multidisciplinary design**. These competencies will enable those who practice different scales of design to work together, from planning, to architecture, to product and service design and visual communication.

- Sustainable urban development through **design within multiple timeframes**:
  - **Past** - Celebrate heritage as a source for resilience and sustainable development.
  - **Present** – Ensure a sense of belonging and ownership among all inhabitants through equal use and enjoyment of cities by all.
  - **Future** - Design a shared vision of ‘cities for all,’ including both present and future generations. Design for protection, conservation, restoration, and the promotion of urban ecosystems. Minimize environmental and climate change impact through design for behavioral change and design of sustainable consumption and production patterns.

- Sustainable urban development through **cultural and human-based design perspective** that will assimilate age, ethnicity, and gender considerations into the design process in order to achieve social justice and to ensure equal and inclusive economic opportunities.

### 3. Education for Sustainable Development

The fact that no one professional field can solve problems of this magnitude (Capra, 1996) points towards the need to develop a new design field that involves all scales of design: from urban planning through architecture, to service and product design and all forms of visual communication (Orr, 1992). In addition, there is a need to establish new design competencies that will enable graduates to become promoters of sustainable development.

In the field of HE for sustainability, a large volume of research concludes that competencies needed for sustainable development include systems thinking, futures thinking, values thinking, strategic thinking, collaboration (or interpersonal) competence, and problem-solving as a meta-competence (Wiek, 2015). The term ‘competencies’ refers to a combination of **knowledge, skills**, and **attitude** that enables successful problem-solving and the performance of complex tasks. HE needs to prepare graduates with both the willingness and adequate competencies for achieving a sustainable future through contribution to resolutions of societal and environmental challenges (Brundiers & Wiek, 2011).

Small Is Beautiful’s pedagogy is based on Transformative Learning (TL), which is part of the constructivist education paradigm. This paradigm focuses on the relativity of understanding and the subjectivity of the perception of reality by the learners. Students become aware of the constant dynamism of knowledge through their own design and knowledge creation, which begins with personal interpretation of existing knowledge and its evolution through dialogue with changes in the external environment (Moore, 2005). TL pedagogy, together with the principle of multidisciplinary learning, may help to bridge the gap between disciplines created through ‘professional signatures’ (Shreeve, 2015), isolated vocabulary, detachment of research and development from the community and environment, and a narrow perspective. TL and multidisciplinary pedagogies may bridge this gap through the creation of multiple connections with surrounding environments, stakeholders and communities in a process involving active learning and the creation of solutions (Mezirow, 1997), (Sipos, Battisti, & Grimm, 2008), (Brundiers & Wiek, 2011). Problem-Based Learning (PBL) involves real-life challenges and people and is one of the prevalent TL constructivist pedagogies (Major & Palmer, 2001).
4. Research Method

The research method is based on the triangulation of qualitative methods through an online survey that was conducted before and after the workshop in 2019. In addition, we used information from group discussion and formal course feedback as well as design analysis of the case studies.

Interactions, observations and discussions with participants in the theoretical and practical aspects of the workshop have also been used as a source of qualitative data input for the research. Theoretical inputs in the workshop included ‘environment mapping’, ‘sustainability index’, ‘sustainability gestalts’ and ‘SWOT analysis’ while practical exercises included site visits, interview and discussion with community members.

5. Findings

Analysis of the findings was conducted through the perception of the student group as a whole - both designers and non-designers, and both Indian and Israeli. It is clear that there are differences within the experiences and learning of engineers, architects, social workers, product and graphic designers, yet the main goal was to educate a multidisciplinary and culturally diverse group of creative professionals. And therefore, findings were analyzed from a group perspective.

5.1. Pre-course expectations

Prior to the course, each student was asked to write his or her expectations from the course. From the replies of 45 students, four main themes were defined:

- **Multidisciplinary peer learning:** Students seemed to be excited and worried at the same time from the upcoming experience of working in a multidisciplinary team. Many of them enrolled especially for this experience, which is considered unusual among Higher Education Institute (HEI) students. They were looking not only to the social aspects of working with people who are trained differently but also to learn about their professional tools, perspectives, and ways of thinking.
• **A mix of learning from the field (versus textbooks) and experiencing a different culture:** Students placed special importance on non-textual learning and field experience that will expose them to different cultures. They hoped that direct meetings with people will provide them with new insights, new perspectives on life and promote creativity.

• **Learning about sustainable design:** Although the main theme of the course is sustainable design, this theme was not on the top priority of students’ expectations. Student’s expected to learn about solutions for small living spaces, green and sustainable building methods, ecological ways of living, practice, and theory of sustainability, and innovation in the field of sustainability.

• **Competencies and practical skills in sustainability:** A minor level of expectations was placed on the practical aspects of sustainable design. Students stated interest in research and development methods that they will be able to implement into their studies and/or practice.

### 5.2. Post-course reflections
At the end of the course, a survey composed of five questions was distributed among all students. A total of 51 responses were received from a total of 46 students (5 of which were from the same students expressing themselves both in English and in Hebrew). The questions were:

• What have you learned about yourself?
• What have you learned about your colleagues and working in a team?
• What have you learned from the people you met in the case study?
• What are you taking with you on your future professional journey?
• Tell us about your role in the teamwork.

Text analysis identified 208 segments that were analyzed through the following 4 perspectives:

• **Literacy - how do students write about their professions?**
• **Multidisciplinary - How do students perceive their participation in a multidisciplinary team?**
• **Sustainability - what are the sustainable design values learned?**
• **Multiculturality - how students perceived the meeting with different cultures?**

Multidisciplinarity has been the most dominant perspective through which the student described their learning with 69 references. Followed by a rich use of sustainable design literacy with 53 references, and moderate use of sustainability values with 49 references. The least mentioned subject was multicultural learning with 37 references, which seems to be a more complex learning outcome.

#### 5.2.1. Multidisciplinary - How do students perceive their participation in a multidisciplinary team?
This theme gained the largest amount of references. It is composed of 5 sub-themes:

• The need for participants to face competitiveness and lack of shared language - this theme is about coping with the difficulties of working together with other disciplines. It appeared in most of the student’s texts.
• Positive experience which brings self-efficacy - along with the hardship of multidisciplinary teamwork, comes the benefit. Students reported a feeling of accomplishment, efficacy and creativity while working with peers and the satisfaction of promoting sustainability.
• Benefit from peer learning - students were able to recognize that they were teaching and also learning from the knowledge, skills, and practical tools of their peers.
• Team management experience was regarded by some students as an important learning outcome that they took along for their professional practice.
• Some students identified a meta-effect which is derived from multidisciplinary work in which their teams were better equipped to solve problems than disciplinary ones.

#### 5.2.2. Literacy - how do students write about their professions?
The need to change existing knowledge, behaviors and skills, point toward the understanding that in order to achieve sustainable design - a fundamental system-wide change needs to be accomplished. A
common theme was an understanding of the interrelations between the physical and behavioral, between the personal and the communal, and the connection between the economic, social and environmental aspects of sustainability. Sustainable design was perceived in many of the students’ texts as something that needs to be affordable. Also, terms of a systematic understanding of sustainability problems are seen in the text. Design student professional literacy included a wide vocabulary of social aspects both as a value driver and as a criterion of ‘good design’. The literacy was examined along with two main perspectives of sustainability, the eco-centric versus the anthropocentric and the behavioral sustainability versus the physical:

- Physical - products, structures and spatial aspects of sustainable design
- Behavioral - personal family and community aspects of sustainable design
- The anthropocentric perspective which puts the wellbeing of the human as the focal point of sustainability efforts
- The eco-centric perspective which puts the ecosystem’s well-being at the center of the sustainability efforts

The eco-centric paradigm was not reflected in the texts. All identified texts were related to the anthropocentric paradigm. There was a stronger volume of behavioral aspects of sustainable design, yet most of the students had acknowledged the combination of several components of sustainability.

5.2.3. Sustainability - what sustainable design values have been learned?
Sustainable design is the official title of the course, yet it is only third in the volume of the learning outcomes as analyzed from student’s texts. This theme may be divided into the following four equally divided sets of sustainable design values:

- Personal proactivity along with technical sustainable design tools and knowledge
- Humbly listening to people and appreciating personal, family and community values
- An inner drive for a personal behavioral change
- Cultural heritage and natural sustainable design

5.2.4. Multiculturality - how students perceived the meeting with different cultures?
Multicultural design is one of the pillars of the SIB project. Organizers go a long way to create an intense educational process that will lead students to experience the different cultural perceptions of reality. Findings show that students do not articulate this experience relative to the other 2 pillars - multidisciplinary and sustainability.

Findings show that Israeli students who participated in India experienced culture more intensely. But at the same time, Israeli students participating in Israel, and Indian students participating in India, reported a lower intensity of cultural learning. Social work students were more alert to culture and had a broader vocabulary. Within this theme, there are 3 categories:

- Inspiring, enriching and interesting cultural perspectives
- There is need for cultural tolerance and multiple interactions (listening and exploring) with people before designing
- Sustainability is derived from culture

5.2.5. Multi-layered design education facilitates the development of professionals with critical skills
The title of the workshop is ‘sustainable design’ and therefore, students reported in the pre-workshop declaration that they expect to gain practical methods and tools for sustainable design, yet in the post-workshop questionnaire, this outcome was less regarded as a skill or competency. With regard to the multidisciplinary and cultural aspects, during the workshop intensive interactions with the case study communities, students realized that affordable solutions that may also be applied elsewhere are not necessarily possible to be achieved through products or structures, but need a system-wide perspective that takes into account intangibles such as culture, social systems, and economic constraints. Findings reinforce the fundamental approach of the workshop for transformative sustainable education that is
based on fieldwork, multidiscipline and multicultural teams. This research points out that on development of broad, multi-layered view of each discipline that allows for the expansion of creative perspectives and solutions. Students also reported that learning from the field and from their peers and communities is more valuable to them than learning from lectures and theoretical presentations.

5.2.6. Real-life experience of the complexity of socio-technological problems
Analysis of research data points that students understood and experienced the level of complexity of socio-technological problems. An important educational tool that leads to that was that community members were regarded as part of the research and development team. The student shared with their assigned case-study community their thoughts and insights using visual illustrations throughout the seven-day workshop. The community response included feedback on the proposed solutions according to their culture, profession, technological situation, domestic situation and family structure. Together they addressed complex socio-technological issues.

5.2.7. Design analysis
The design analysis of the case studies at the end of the SIB workshop in Belagavi and Jerusalem revealed common themes that included simplistic living, minimalism and living within existing resources, family and community values related to a sense of belonging and connection to a land, sentimental value for work and intergenerational knowledge transfer. Multifunctional public and private spaces as well as distance from city center as empowerment of family, community and neighborhood were some of the physical aspects.

Creating a historic preservation map to identify heritage sites and buildings, recognizing the needs of an aging population, generating jobs for youth who are migrating outside and maintaining the urban aesthetics were some of the design challenges identified in Belagavi as it transforms from a small town to a smart city. In Jerusalem, mapping the needs of families, leveraging municipal resources for local communities, reducing consumerism and creating a visual identity for the home and community, as a determinant of image, behavior and community values, were found to be the key challenges.

These values and challenges indicate a marked difference from the outputs of conventional design approach to sustainable design education. It reveals a more holistic, systems-thinking and bottom-up approach that could be achieved through the multidisciplinary, multicultural and people-centric design process adopted in the ‘Small is Beautiful’ workshop.

6. Conclusion
Research determined that the combination of multidisciplinary, participatory practice and multicultural learning have different levels of impact on the students. Altogether, these pedagogical tools have been shown to generate sustainable transformative education. Analysis of student feedback shows that Multidisciplinarity is the most valuable learning tool. The mixed teams generated peer learning, development of interpersonal skills, and experience in creative team management. The participatory practice was pointed out as a very powerful pedagogy that generated learning both within the teams during preparations to the meeting with the communities, and during the design work that followed. This participatory repetitive prototyping process with actual communities lead to development of solutions with scaling-up potential. It was also one of the vehicles to multi-cultural learning. Multicultural aspects of the workshop had a strong impact, yet they were the least understood by students – this reflected on them in an abstract way.

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