25TH INTERNATIONAL CONFERENCE ON ENGINEERING AND PRODUCT DESIGN EDUCATION
7-8 SEPTEMBER 2023, ELISAVA UNIVERSITY SCHOOL OF DESIGN AND ENGINEERING, BARCELONA, SPAIN

EDUCATION IN DESIGN FOR SUSTAINABILITY AND NEW SOCIAL CHANGES

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ABSTRACT
This paper is an ongoing research study that highlights sustainability and social ventures to create connections between academic and business world to design towards the new functions of XXI century's reality. The authors underline how design practices can help to create a pilot project, implementing social changes. This means that governmental inefficiency presents as a new problem that designers, educators and entrepreneurs must face, demanding to endlessly diagnose the situation. This research proposes to redesign and develop a self-sustainable habitat for minorities, such as, refugees, something that is integrated in the city and not isolated. The issue of building in historic centres is essential to understand the life of the city in a changing world. That is, it is the ability to design systems and not compact and definitive frames. Methodologically, this research is sustained by transversal thinking, pattern-language, and sustainability, connecting established methods with new techniques. The paper presents some cases studies with design students where creative activities transformed the entire urban community. The authors want to prove that designing inclusive systems can serve as a stimulus to attract companies, creating new stakeholders that stimulate new product development and innovation.

Keywords: Reflective practitioners, self-sustainable habitat, pattern-language, co-design

1 INTRODUCTION
Sustainability issues are characterized by complexity and ambiguity as a reflex of liquid reality [1], but there is still unsustainable development due to globalization of resource-intensive economic progress and consumerist lifestyle [2]. To recognized sustainability with a pluralistic view, it is urgent to develop policy instruments, such as sustainable strategies, mutual methods, and collective goals. In view of COP26, sustainability is increasing in importance relative to social changes. Nevertheless, empirical outcomes show that methodologically it is hard to translate into practice in education discussion and that often it is a question of communication rather than sustainability. "We then discuss whether sustainability communication is something 'unique‖' or simply communication that happens to deal with sustainability" [3]. For instance, having a discourse oriented to students, means using communication about sustainability (CaS) as it is an excellent opportunity, a sender-receiver-oriented and one-to-many communication mode, sharing ideas about sustainability [4]. Although, in design education how is it possible to reflect progressive thinking of the liquid reality moving from humanitarian but trivial greening to greater principles of sustainability? Jeremy Rifkin [5] states that today's consumer is no longer in the situation to ask himself/herself whether (or not) he/she wish to have this or that object that he/she doesn't have. The question that ultimately occupy his/her mind is if he/she wants new experiences to live. This new rationality means that communication change, not only rearranges society and human connections, but also social perceptions. Concerning connections in design education, Tomas Maldonado [6] argues that design process might include cooperation and integration dynamics and that means comprising several factors. Either factors related to the use, the enjoyment and the individual or social consumption of the product (functional, symbolic, or cultural factors). Either those factors related to its production (technical-economic, technical-constructive, technical-systemic, technical-productive, technical-distributive). "Industrial design is a creative activity whose aims is to determine the formal qualities of objects produced by industry. These formal qualities are not only the external features but

are principally those structural and functional relationships which convert a system to a coherent unity both from the point of view of the producer and the user. Industrial design extends to embrace all the aspects of human environment, which are conditioned by industrial production" [6]. On one side, as Ezio Manzini [7] argues sustainability must be the meta-project of all Design Research activities and not, as it has been in recent years, a kind of specialized sector, alongside other specialized sectors. Therefore, design process applied to design education includes collective well-being of humanity, environment, and the whole planet [5]. Empathy is an imperative base for the true cooperation and integration; hence it may evidence vital. On the other side, Ingvill Gjerdrum Maus [8] describes two methods to design education for sustainability. Firstly, master-and-apprentice model that focuses on how to design. Secondly, student-centred model where the students are less dependent on the teacher. This means the information is no longer private, but public and required transparency and consistency and it is used, among others proposes to public communication and education [9].

2 AIMS OF THE STUDY

The concept of sustainable development discussed in this study is related to building construction process in design education. This study aims to explore how teachers make consciousness of reflective practice, and their individual experience in being a reflective practitioner [10]. The study also considers the concept of pattern-language [11], as a contribution to the history of design methods in building construction. The concept of sustainability in architecture has been debated under several titles since 1970s. While the concept "environmental design" was used in 1970s, "green design" in 1980s, "ecological design" in the late 1980s and in 1990s, the concept "sustainable design" has started to be used since mid-1990s [12]. In a building construction of sustainability product, it is important to define the materials, the process, the infrastructures, cutting material waste, recycling, guaranteeing energy effectiveness or reducing the preservation costs. Burcu Gulay Tasci [12] states that 50% of the energy produced in the world is consumed by buildings and the other 50% is used in industry and transportation. The 2014 Declaration on Education for Sustainable Development (ESD) practice is focus oriented to the realization of the UNESCO agenda for sustainable development and recognized the potential "(…) to empower learners to transform themselves and the society they live in by developing knowledge, skills, attitudes, competences and values required for addressing global citizenship and local contextual challenges of the present and the future, such as critical and systemic thinking, analytical problem-solving, creativity, working collaboratively… making decisions in the face of uncertainty, and understanding of the interconnected of global challenges and responsibilities emanating from such awareness [13]. Although, there is the absence of and instrument to connect these notions in order education systems fully embrace sustainable development [14]. In fact, the problems of the world do not present to practitioners as well-formed structures [10].

2.1 Students' Teacher as Reflective practitioners

In response to create competent and intuitive practitioners, the paper rethinks education for reflective practice and proposes an innovative structure for sustainability by building construction process, where ESD points will successfully connect to framework the sustainable implementation, combining the authors' practitioner skills, analytical pedagogy, reflective practice and referring to reflection-on-experience [10]. Reflective learning model improves the conscious practice of design. Postulates that reflective thinking addresses practical problems, allowing for doubt before possible solutions are reached [10]. Students learn through and from experience to be reflective practitioners as a means of exercising professional activity. The research critical analyse the concept of reflective practitioner. [15] states the characteristics of reflective practitioners are: 1) Open-mindedness; 2) Responsibility; 3) Wholeheartedness.

2.2 Pattern-language as a sustainable methodology to think city's issues

The study considers the concept of pattern-language as Christopher Alexander [11] states due to the direct influence he has had upon counter-tendency project groups such as Archigram. The concept of 'Pattern language' resided in splitting design problems into patterns, enabling the solution of some of the project subsystems. Alexander's proposition consisted of identifying and solving subsystems that constituted the project's complexity and in connecting every subsystem's pattern among them and the user. "This means you must treat the pattern as an 'entity'; and try to conceive of this entity, entire and whole, before you start creating any other patterns" [11]. In this case, the intuition of associating 'pattern'

to a whole of the city becomes a reflection-on-experience practice comparing the exercise of design to an exercise proceeding from speculations, through semantic association, to solve problems that may be concealed or poorly defined. Thus, it is relevant to choose a methodology focus oriented to a part of the city with a strong semantic connotation, as self-sustainable habitat.

3 RESEARCH PROCESS

Today, the phenomenon of liquid modernity [1] presents itself as a complex and fluid truth that conveys disquieting sensations. As Zymunt Bauman states “the most poignant yet the least answerable question of our times of liquid modernity is not 'What is to be done?' (in order to make the world better or happier), but 'Who is going to do it?'” [1]. Therefore, citizens are gradually inclined to recognize their role in the world, helping direct charity. The payment associated with the idea of helping someone causes happiness. Moreover, “the only two useful things one would expect, and wish, 'public power' to deliver are to observe 'human rights', that is to let everyone go her or his own way, and to enable everyone to do it in peace (…)” [1]. Thus, this might be a great opportunity to the cause of refugees.

3.1 Purpose

Refugee camps are defined as “locations where refugees reside and where, in most cases, host governments and humanitarian actors’ provide assistance and services in a centralized matter” [16]. Camps should be the exception, and as much as possible a temporary measure. According to United Nations High Commissioner for Refugees (UNHCR), the process of allowing “refugees to access and live in dignity in secure settlements that improve their social, economic and environmental quality of life as a community and also, enabling refugees to access shelter solutions that provide privacy, security and protection from the elements, emotional support, and a space to live and store belongings in a dignified matter” [17]. The current global crisis encourages unconventional results. This situation allows designers and all community to work together in cooperation to implement pilot and better solutions. According with United Nations Conference on Housing and Sustainable Urban Development report, about 37% of international migration is between developing countries, and around 40% of international migrants have moved to a neighbouring country within their region of origin [18]. Specifically, they move to urban areas and countries are simultaneously places of origin, transit, and destination. In fact, in this study, the elaboration of the purpose creates relevant opportunities to think about design education. While twentieth century design education focused on function and form, the design education debate today focuses on relationships, limits, energies, culture, and sustainability.

3.2 Related work

A case that confirms this research is Kengo Kuma’s interpretation of vernacular construction of Japan. A challenge to identify “local typologies and their responsiveness to micro-local conditions.” [19]. It means the ability to patterns changed in space and to adapt to local and external factors interacting in the process. A pattern may resolve a problem in a way that “you can use this solution a million times over without ever doing it the same way twice” [11]. Constructions should be adapted to places and individual needs, suggesting flexible design to meet the real requests.

Another case that validates this study is Rai Studio and Architecture for Humanity Tehran, in collaboration with the Norwegian Refugee Council. The atelier completed an adobe construction prototype [20]. The construction, built in an Afghan Refugee Camp in Kerman - Iran, had 100-meter square meter domed shelter that was comprised of approximately 6,000 mud bricks [21]. As professor Pouya Khazaeli states “social sustainability in design is our main focus area here. It means to study how these refugees live, communicate, the meaning of privacy in their live, which materials they prefer and use for construction, which kind of construction techniques they use themselves, how much they spend normally to construct their own shelters (…)” [21].

Japanese Architect, Shigeru Ban is a further case. He developed several types of shelters for a pilot neighbourhood. Unlike typical refugee shelters, these structures were made to provide a home for long periods of displacement and the four typologies developed are informed by Shigeru Ban Architects' vast experience with disaster relief projects and the building techniques of local people. “The four proposed typologies were inspired by the building techniques of the nomadic Turkana people and were generated based on extensive research on the vernacular architecture of the region and a comprehensive survey of the refugee population” [22].

Finally, a Portuguese case comprising a space for food preparation to build a seasonal and temporary solution. The project involved a partnership with a Portuguese company, who financed the project [23]. This kind of framework identifies stages in the design process that are influenced by culture and sustainability, and the pattern they are likely to form [24]. The resolution may be implemented through problem-solving in a particular context. In this case, considering the problem of refugee situation.

4 METHOD

In this study, methodology was understood as no linear but cycled process. This is an on-going research qualitative, mixed interventionist and non-interventionist study and integrated a master's in design education programme, including teachers and students. The non-interventionist phase consists of the analyses and interpretations of concepts and historical contents from the past. The interventionist phase resides on a pilot project. An interpretation that includes external factors and is deductive like manufacturing, inductive like self-production, abductive like connecting propositions through practice and a story-telling process like if on is telling a story in a renewal way.

5 PEOPLE, PRODUCTION, PROMOTION

The project was developed in 2016 by 6 teachers (4 architects, 1 engineer and 1 designer), and 1 student from the master's in design of IPVC, Instituto Politécnico de Viana do Castelo. The project consists of a modular resolution for one person. The shelter is a temporary solution for refugees and homeless to use it when they needed it. The project involved a partnership with a Portuguese company, who financed the project. The research applied at an academic experimentation level can become a key instrument to bridge the gap between business and academia. The way teachers make consciousness of their individual experience guide them to become reflective practitioners. Therefore, the student learns through and from experience to be reflective practitioners to exercise professional action. The authors collected and analysed data to define the sustainable habitat with the subsequent features:

- The shelter should contain all the necessary equipment for sleeping.
- The module should have 2,5 x 2 meters.
- The shelter conformation should allow mobility.
- The module should promote and connote sustainability.
- The shelter should ensure open/closed configurations.
- A second module contains a toilet and a shower.
- When not in use, the shelter is easily removable and mobile and relies on municipal water supply, sewage, and electricity. The product presents itself as an innovative solution prepared to reach phenomena of social flows such as the movement of refugees.

The construction of a second module is foreseen, which will encompass the physiological actions related to bathroom space. The process included meetings with the school lieders, the companies, the city-hall, and no-governmental entities. To apply knowledge to practice and, finally to create and develop the prototype, in a first moment, the model was designed and was open to criticism from the student, the teachers and entrepreneurs. Co-design process add value to create students' teacher as reflective practitioners and prompting intuitive practice guided be experience. Concerning materials, it will be used aluminium as it is the main material of the project's partner and because it is easy to clean. The project will be officially during the 2023. The system contains scientific and social dissemination, with repercussions on social networks, and regional press. The next step will be the creation of a partnership with municipalities in the region.

6 PROPOSITIONS FOR DESIGN

With a rising number of refugees and migrants in Europe seeking for better conditions, this self-sustainable habitat encouraged new sustainable models and ask European customers to consume brands for causes. The expense one has with the offering causes happiness, which is a great occasion for today's reality. The sell-sustainable habitat certified students to connect with local companies. Also, it linked companies from different sectors, which had never worked together, stimulating cross-fertilization [25]. The companies were challenged to participate in a project creating new opportunities for change. Teachers and students had the opportunity to interpret precise technologies and materials. Having this new methodology in mind, design students were able to improve new concepts and to cross new

experiences and areas of knowledge. The self-sustainable habitat highlighted the technical competences of the materials. In addition, the new product development emphasizes the semantic competence in design, relating black cork with the tubular iron structure, providing hot and cold sensations in a visceral, behavioural, and reflective process [26]. The self-sustainable habitat is an occasion for all to change.

7 RECOMMENDATIONS

Considering the study produced, in the following phase it is recommended:

- To build a local network, connecting different professionals from distinct fields. The project includes a school of design and a research centre, the town hall, local non-governmental associations, material companies and artisans.
- To promote cooperation and co-work. To draw a teamwork system may contribute to create new businesses and join ventures, developing sustainability and competitiveness.
- Methodologically, the research was based on an open and constantly changing briefing.
- To relay other fields and specialists present in the city to create a stronger system.
- To develop the process of generating ideas and creating project hypotheses in partnership with the companies involved. The creation of the project at the prototype level will guide the project at the application level, allowing to timely identify future production errors.
- To create a design process that combines tradition and innovation presents a creative, experimental, and innovative methodology and transfers knowledge to society.
- The academy benefits from the experiences carried out with case studies to be used in future teaching/learning initiatives as a diffused education.

8 CONCLUSIONS

This study emphasizes sustainability and social ventures to create links between the academic world and the business sector regarding the new functions of today's reality. The authors highlight that it is possible to create social changes by creating a pilot project, relating design students and entrepreneurs. Also, the paper rethinks education and offers an innovative structure for sustainability, where ESD points will productively link to framework the sustainable achievement, combining the authors' practitioner skills, analytical pedagogy, reflective practice and suggesting to reflection-on-experience. Considering the translation of people, the social phenomenon of refugees that qualify today's reality, the authors presented a self-sustainable habitat designed and developed with master design students and businessmen. With this idea in mind, it is possible to educate students to become good designers, if one educates them to become better citizens. For students the project was an occasion to interpret specific technologies and materials. Students were able to create new concepts and to cross new experiences from different areas of knowledge. In fact, the worth today could be the universal key to identify new bounds of quality. For educators this plan was a chance to think about design education, developing connections with other professionals, promoting job rotation and cooperation. In fact, the development of design depends on the ability to connect education with research and profession. For manufactured industries the creation of this self-sustainable habitat is an opportunity to change, participating in a new venture. The proximity between entrepreneurs and handcrafters may become strategic for the survival of the above areas. For society, the project may increase the concept of sustainability. It is a productive action that promotes multidisciplinary and interferes in the real world, instead of designing for an imaginary city of the future.

ACKNOWLEDGEMENTS

The authors acknowledge IPVC, Instituto Politécnico de Viana do Castelo and CIAUD, Research Centre for Architecture, Urbanism and Design, Lisbon School of Architecture, Universidade de Lisboa.

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