

MINOR DEGREE IN REGENERATIVE DESIGN. A NEW DESIGN EDUCATION PARADIGM IN MEXICO

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ABSTRACT

A new narrative and approach to address the unprecedented challenges faced by society on a global scale is urgently needed. The concept of sustainability is deemed inadequate, and a shift towards regenerative design and development processes is proposed. Regenerative Design (RD) is presented as a systemic and ecological action that seeks to co-evolve with nature and reverse the degeneration of the earth's natural systems. The article proposes a new interdisciplinary engineering and design education programme from a regenerative approach at Tecnológico de Monterrey, which involves community participation, ethnographic tools, and design charrettes. The programme, in a minor degree format, aims to co-design human structures and systems that can co-evolve with living systems, value the relationship between human systems and the natural ecosystem, and create positive and abundant futures. Success cases are presented to exemplify the application of the methodology.

Keywords: Regenerative development, sustainability, regenerative learning, higher education, living systems

1 INTRODUCTION: PERTINENCE OF REGENERATIVE DESIGN IN HIGHER EDUCATION

The planetary-scale socio-ecological and climate crisis is related to a social injustice and a biodiversity loss [1, 2]. A fundamental rethinking of the way we develop territories, cities, and communities is needed. Also is needed a transition towards futures in which eco-social systems are designed to balance anthropogenic activity and the integrity of natural ecosystems [3, 4]. While sustainability promises not to affect future humanity, it does not contemplate the possibility of co-evolving with nature; It is no longer enough [5]. To restore human presence on Earth, we need to move towards regenerative sustainability [6, 7], which is aimed to heal our damaged world, allowing it to evolve and thrive [8,9]. It is needed to create a positive future through a worldview based on living systems [10]. With the 21st century comes a new paradigm of regenerative development and design [11], based on the understanding of the patterns of functioning of living systems, their uniqueness of each place, its essence, vocation, and potential, to design processes that help to affiliate us with nature, learning from it, collaborating in its restoration, reconciling with it and proposing a development based on "being nature".

Facing the socio-ecological crisis, it is paramount to strengthen knowledge and awareness in order to reduce or reverse its effects [12]. In this context, universities have the potential and responsibility to facilitate change. Signs of a transition towards regenerative approaches [27], circular society [14, 15], renewable energy-driven society [16], sustainable food production [17] and well-being [18] have been implemented. Learning and education have an important role as a catalyst of such transitions [19].

In the face of these new learning paradigms, this must include an epistemological review of education approaches themselves [20], including a rethinking and re-signification of educational structures, practices and policies inspired by a regenerative approach [3].

Regenerative learning in higher education aims to connect university education to the challenges of transition in ways that support personal and planetary health [21, 22] and to redirect and redesign transgressive systems within socio-ecological boundaries [23] highlighting leverage points and spaces within higher education where systemic change towards regenerative sustainability can take place [24]. Regenerative learning is based on an ecological approach that connects to transitions towards sustainability at the local level and helps prepare students to navigate current complexities and

uncertainties, contributing to a better and possible future, with a clear moral responsibility to contribute to healing human relationships with each other and within the living system [25, 26].

In this paper, it is presented the basis and methodological framework of the *Minor Degree in Regenerative Design* which, from an interdisciplinary approach, is implemented at the Tecnológico de Monterrey (TEC), and the reflection on the results of its first two editions.

2 CONCENTRATION AS MINOR DEGREE MODEL

In recent years TEC has been transforming and breaking boundaries in innovative education. With the Tec21 new educational model, TEC intends to activate and potentiate innovation capabilities. Likewise, it allows students to choose a path and make their graduate profile unique, seeking to make them more competitive and with more skills to face world's challenges. Each bachelor's degree of the model has three stages (entry, focus and specialization) and from the first semester they experience training units based on challenges, which have the objective of developing competencies which integrate knowledge, skills, attitudes and values [28]. Within the area of specialization of the School of Architecture, Art and Design, a series of semesters for the 4th year were designed with a Minor Degree format, projected as a concentration, which means that is an exclusive and 100% dedication by the student with any other subject to take. With this format, students strengthen and develop their skills through experiential learning experiences and solving a challenge together with companies and/or organizations.

In the Minor Degree in Regenerative Design (MDRD), as a distinctive, an interdisciplinary approach is encouraged through the participation of different experts as teachers or training partner or partners (company, NGO organization or government institution). The expertise of teachers includes architecture, design, biology, geography, anthropology, civil engineering, education science, urban planning, among others who are sensitive to the search for regenerative development and are transcendentalists in their disciplines. This MDRD is offered to students who are in the sixth or seventh semester of degrees in architecture, urban planning, design, civil engineering and sustainable development engineering.

2.1 Competences acquired

The Tec21 model also integrates a skills assessment scheme. These can be transversal, referring to the different courses, and disciplinary competencies, referring to the fact that they enhance the degree that they have chosen. For this MDRD, the student must acquire the following competencies: As Transversal competences, a) Ethical and citizen commitment, and b) Citizen commitment for social transformation. As disciplinary competences also were acquired c) Design and d) Systemic, prospective and participatory approach, e) Urban culture and environment and f) Regeneration strategies and g) Design of new avenues of innovation and h) Regenerative design itself.

In addition to the official evaluation of the development of the competencies listed above, and the feedback officially received on their experience in the Minor Degree, some particular surveys are designed and carried out at the beginning and at the end of the semester, specifically designed to assess both the experience that the students have students, such as their learning process, their acquisition of knowledge around the idea of regenerative development and design as well as the development of pro-environmental awareness and beliefs.

3 STRUCTURING THE COURSE

The course is developed through 17 intensive weeks focused on solving a challenge through answering the question: how can we potentiate the vitality of a specific site through regenerative processes? Therefore, the students will develop regenerative design proposals, such as processes, products, services, architecture, or landscapes. Always in collaboration with a community linked to an emerging natural, social, and cultural landscape. The aim is to reveal, through the potential and the vocation of place, the vital support for a better, possible, resilient, regenerative, fair and equitable future. The challenge is developed in a collaborative way, from the re-signification and recognition of the designer's own role, which evolves and adapts to the circumstances of place. The semester unfolds through an evolution of knowledge, feelings and experiences which aim to develop in students, teachers and the community a change of mindset as a deeper consciousness of the role of nature and each individual in the larger system. The curricula integrates a set of strategic tasks under the principles of regenerative design, in co-creation with a community and different stakeholders involved.

3.1 Challenge stages

- **Stage 1: Recognition of one, with the community and with place.** Within this stage, the resignification of oneself is sought, as a person and designer, with nature.
- **Stage 2: Regenerative Co-design and prototyping.** Stage where benefits obtained from collective decisions are identified.
- **Stage 3: Proposal, future plan and co-evaluation.** Stage where a regenerative strategy is ensured in the applied design.

Since the stages of the process are not linear, they are constantly retaken and fed back to advance to the next stage. The upward spiral diagram represents the way the process is evolving or when needed, going back to the previous stage in order to feed the final proposal. (See figure 1).

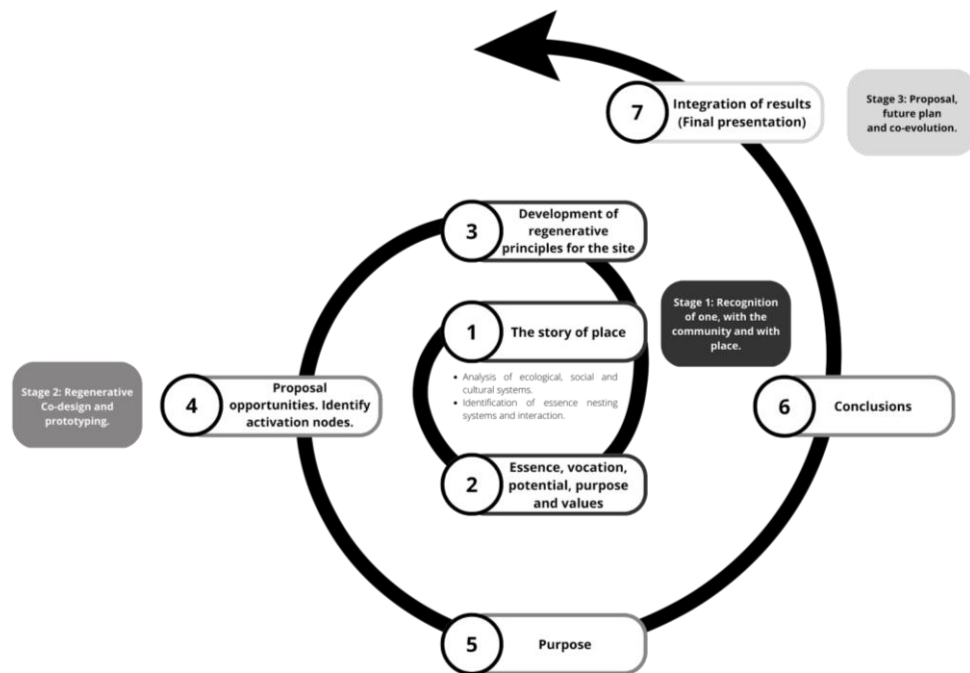


Figure 1. Challenge Stages. Credit: Carlos Cobreros

In the first stage, the student becomes aware of its role within the system through a deep understanding of “place” by understanding the ecological, cultural and social structure within the nested systems. As something distinctive in MDRD, in this stage, it is very important to reinforce the idea that we are nature, that we design being nature, for which there is a specific module, with specific activities for it.

Place is defined as the multilayered network of living systems within a geographic region that results from the complex interactions, over time, of ecological (climate, geology, soil, vegetation, water, wildlife, etc.) and cultural systems (distinctive customs, expressions of values, economic activities, forms of association, ideas for education, traditions, etc.). The regenerative paradigm affirms that development can and should contribute to the capacity of all the natural, cultural and economic systems that occur in a place to grow and evolve their health and continued viability [29]. The methodology applied for this regenerative understanding of place (living systems, including human systems), is based upon research, participatory processes supported using ethnographic tools and design charrettes. By answering the questions: how big is this place? and who is this place?, in this first stage the uniqueness of the place and its essence are revealed in order to take the next step in the design process.

The second stage will be focused on recognizing the potential and vocation by answering Who will this place be? and How will it evolve?. The next step will be to identify the nodal interventions. These are strategic interventions that can contribute to the evolution of the system. According to the regenerative principles these projects target the points of highest and most systemic return—similar to how in acupuncture, a set of points are recognized as most effective for achieving systemic regeneration. The findings are shared with the community to have their approval and consensus to continue developing the prototypes and co-design with the community.

The third stage focuses on the development of the whole proposal, conclusions and documentation. Finally, the results are shared with the community and stakeholders creating a field of positive engagement among different stakeholders that can contribute with the specific projects.

4 COURSE DEVELOPMENT: FIRST TWO EDITIONS

4.1 Edition 1: Campus Vivo

The first time this course was taught, it focused on developing the project together with a local training partner familiar to the students. In this case it was their own community, TEC - Campus Querétaro, which is located in the city of Querétaro, Mexico. The administrative office of the campus acted as training partner and to whom the finished project was presented. The campus is located in the north-central part of the city with an extension of 13 hectares. The university district, where it is located, has parks, shopping centres and different types of housing. Likewise, the campus integrates 14 buildings, sports fields, parking lots, green areas and a small "canal" that works as a rainwater collector. For the development of the project, the students had the task of understanding the "place" through the phases of the course and the challenge identified.

On this first occasion, 13 architecture and design students participated, which were subdivided into teams that focused on different areas of the campus. Teams are formed by affinity between peers or by topics of interest. Campus Vivo project resulted in a master plan and in three main interventions: 1) *A-Puente*, a concept that features an experiential path aimed to eradicate the fragmented space re-signifying "water as bridge and generator of life" and potentiate and diversify campus infrastructure into an opportunity to manage water positively. (See Figure 2); 2) *Living Future Lab and Ethnobotanical Garden*, a regenerative learning area within the campus featuring classrooms, a museum space, a plant conservatory, and parking lots surrounded by an ethnobotanical garden with the capacity to host, conserve, and integrate native plants as an edible forest; 3) *Parque Flux*, An open space for coexistence both interpersonally and with nature. In this way, connections between the campus and the city would be generated, becoming a point of exchange of knowledge and biodiversity.



Figure 2. *A-Puente* and *Women's plot* concepts. Credit: CDR students cohorts

4.2 Edition 2: Juanacatlán Regenerativo

For the second edition of the concentration, the venue chosen was the community of Juanacatlán, located in the municipality of Tapalpa in the state of Jalisco, Mexico. The training partners were Tapalpa Municipality Administration, Rainforest Alliance and Juanacatlán Delegate Office. The community of Juanacatlán is located in the temperate mountains between the towns of Tapalpa, Atemajac de Brizuela and Chiquilistlán. This community of approximately 4,000 inhabitants depends on agriculture (corn and berries), forestry and tourism. For the development of the project, the students had the task of visiting Tapalpa at different times according to the phases of the course and the challenges encountered with the help of the training partners. Ten students from the architecture and design careers participated, which were subdivided into four teams. In this case the teams were formed also by affinity between peers or by topics of interest: water, forest, women and tourism.

The "Juanacatlán Regenerativo" project resulted in the following interventions: 1) *Water as living system*, a proposal to improve, manage and value water use. It integrates various systems to cultivate, zone and circulate water. A series of natural springs and streams are identified as gathering spaces but also as enhanced functional spaces that prevent floods and distribute water around the community; 2) *Tourism and identity*, a proposal aimed to highlight the main attractions of the village and improve its

identity. Several walking trails, monuments, rural image identity and an environmental pedagogic space are interconnected, guiding the visitor to appreciate and maintain continuous regeneration; *Women cooperation and wellbeing*, a space for women, where they can participate in caring for its community and personal well-being. The place is adapted for cultivation activities, work with medicinal plants and organizing cultural and training activities, such as physical exercise, art, gastronomy and trade. It includes a plot where an equipped classroom, outdoor gathering spaces and allotments (See figure 2); *Living Forest Museum*, An open space in which the community is acknowledged for its way of herbalism, forest management and collection of native vegetation. An educational corridor and nursery are displayed as strategies to regenerate their natural resources.

5 DISCUSSION AND CONCLUSIONS

The incorporation of this new way of learning focused on regeneration at TEC, provided an opportunity to focus beyond the mechanistic approach to a more ecological and systemic approach. The model of MDRD undertaken by students in one semester, as a unique course, manifested a solid involvement in what matters most, which is to seek for a living and healthy planet. It was thanks to the participation of a team of teachers with an interdisciplinary scope that the course was carried out successfully. Although the first edition was somewhat experimental, the expertise of the teachers was expanded for the second edition. All the proposals generated a set of actions, services, experiences, architecture and products design that value the relationship between the human system and the living and natural ecosystem.

The proposed competencies are developed by the students, and through the surveys that were carried out in both editions, could be known that the students obtained a very positive experience of change and that the main aspects and principles of regenerative development and design were acquired and deepened. It was also obtained that the connectivity and bond with nature increased and with it a greater feeling of belonging, of being part of nature itself, as well as that a greater environmental awareness was developed. Serving vulnerable communities, linking with the training partner and delivering good results to the community were achieved. Finally, gratitude, abundance, ecological balance and mindset change are sought in the pedagogy of this MDRD and are aspects that break with current paradigms. Since learning and education have an important role as catalyst for regenerative cultures transitions, this MDRD seeks to change some of the current teaching and learning paradigms through promoting ecological and systemic thinking instead of linear thinking. Through a deep nature immersion to achieve a change of mindset in the emotional and intuitive level, and not only focusing on intellectual and practical abilities, focusing on the narrative of place instead of a rational diagnosis of the site, by focusing on potentials rather than problems and the engagement with a community to develop capacities and not welfarism.

Currently the third edition is being developed and the teaching processes and new implementations that continue to be documented will continue to be investigated.

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