

A close-up photograph of a waterfall cascading over dark, wet rocks. The water is white and frothy as it falls. In the top right corner, there is a green triangular graphic element containing a stylized white 'if' logo.

Education for Sustainability approaching SDG 4 and target 4.7

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Education for sustainability in creative disciplines at Universidad Pontificia Bolivariana, Universidad de Medellín and Institución Universitaria Pascual Bravo at Medellín – Colombia

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Abstract

The university plays a decisive role in the training of environmentally responsible individuals, which is why it has the obligation to include sustainability in its curricula, so that future professionals develop their work from a sustainable perspective, which leads them to act responsibly

and committed to their immediate environment. The process of integrating universities' education, research, operations and external facing activities to contribute to the achievement of the Sustainable Development Goals—SDG (SDSN, 2017) is difficult and involves a profound transformation of the educational model. This paper explores differing approaches and strategies to sustainability education in creative disciplines, their effects on student awareness towards sustainable development, assessing design and architecture curricula in three Higher Education Institutions in Medellín, Colombia. These are: Universidad de Medellín, Universidad Pontificia Bolivariana and Institución Universitaria Pascual Bravo. The three institutions use different sustainability education approaches.

Keywords: SDG4, Education, Sustainability, Creative Disciplines

Introduction

The SDG 4 in target 4.7 states that “By 2030, ensure that all learners gain the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence (...)” (UN, 2016), a goal that can only be achieved by transforming the skills and competencies that future professionals are expected to gain.

The project Education for sustainability and professional training in creative disciplines analyses the importance of incorporating sustainability criteria and guidelines into the higher education curriculum of disciplines such as design and architecture, as an essential component in the training of future professionals. The study focuses, in particular, on the training of students of clothing, fashion, product, graphic design and

architecture at different levels, through their immersion in the culture of sustainability, so that they can contribute as responsible citizens prepared to take part in decision making, to propose informed actions and solutions to the socio-environmental problems, and transform consumption and production practices.

This is an initial study of approximation to the field of education for sustainable development (EfSD) in Colombian universities, and because of the research problem, it is considered a qualitative approach of interpretative cut on an intentioned and reduced sample of programs.

Literature review

Education for Sustainable Development and Sustainable Learning Education

Traditional teaching methods offer students a cognitive understanding of sustainability issues but lack the holistic point of view, the diffusion of sustainability as a topic has outpaced the diffusion of tools to train future designers and architects to move beyond the largely settle a matter of awareness of these challenges creating effective solutions (Boarin, P. et al. 2020). Cotton and Winter (2010) state that a philosophical review of the concept of sustainability reveals that teaching sustainability is complex and requires different approaches. This is because sustainability as a concept requires context and subjectivity, traditional pedagogies based on positivist epistemology and instrumental ideology are inadequate to explore its complexity (Christie, B. et al., 2013).

Education for Sustainable Development (ESD) is an integral element of the 2030 Agenda, in particular Sustainable Development Goal 4 (SDG 4), and a key enabler for the achievement of all other SDGs. Although

ESD was first detailed at Agenda 21 (1992) (four major thrusts: 1. improve basic education, 2. reorient existing education, 3. develop public understanding, 4. Training); then at 1998, UN Commission on Sustainable Development (CSD) made an agreement on the essential role of education at sustainable development; UNESCO recognized at Education for Sustainable Development in Action Learning & Training Tools (2006) that “Progressing from the global concepts of ESD to locally relevant curriculum is a difficult process” (2006, p.25)

The Berlin Declaration on Education for Sustainable Development (2022) is a recent and important document that highlights the significance of ESD for humanity. It emphasized on the importance of:

Ensure (ensuring) that ESD is a foundational element of our education systems at all levels, with environmental and climate action as a core curriculum component, while maintaining a holistic perspective on ESD that recognizes the interrelatedness of all dimensions of sustainable development (p.3)

Implementing ESD with joint emphasis on the cognitive skills, social and emotional learning, and action competences for individual and societal dimensions of transformation, promoting individual behavioral change for sustainable development, equality and respect for human rights, as well as fundamental structural and cultural changes at the systemic level of economies and societies; and also promoting the required political action to bring about these changes (p.p.3-4)

Continuing the work with the United Nations Decade of Education for Sustainable Development (2005-2014) and the Global Action Programme (GAP) on ESD (2015-2019), today UNESCO is leading the Education 2030 Agenda, which is part of the commitment to accomplish the 17 Sustainable Development Goals by 2030. Education aims to ensure inclusive and fair quality education and promote lifelong learning opportunities for all.

The SDG 4, target 4.7, calls for development of skills and knowledge “through education for sustainable development and sustainable lifestyles” (United Nations 2015a). While the SDG Goal 4, Target 4.3, calls for ensuring equal access for all women and men to affordable and quality technical, vocational, and tertiary education, including universities around the world by 2030 (United Nations 2015b); the SDGs lack targets that would make this a reality in many low-income countries, where higher education requires reform and rebuilding. Instead of aiding these countries to (re) build and strengthen their fragile higher education systems and institutions, the SDGs, as expressed in Target 4.7, seem to aim only to provide opportunities to a selected group of individuals to study at universities in developed and some developing countries. This approach has failed in the past and will only lead to the creation of dependency on foreign aid and help, and the continuation of chronic lack of capacity in many low-income countries.

In Colombia, the Ministries of National Education and of Environment, Housing and Territorial Development in Colombia have been working since 2005 in strategies for including the environmental dimension in formal education based on the national educational and environmental policies, and the formation of an ethical culture in the management of environment, through the definition and implementation of School Environmental Projects (PRAE, for its acronym in Spanish).

The PRAE are pedagogical projects that promote the analysis and understanding of local, regional and national environmental problems, and generate spaces of participation to implement solution accordance with natural and socio-cultural dynamics. The focus of their work is training from a conception of sustainable development, understood as the use of resources in the present, without detriment to their use by future generations, with spatiotemporal references and based on respect for diversity and autonomy, and that contemplates not only economic

aspects but also social, cultural, political, ethical and aesthetic aspects in favor of a sustainable management of the environment.

These projects provide spaces in the school for the development of research and intervention strategies. The former involves pedagogical-didact and interdisciplinary processes, whose purpose is to critically reflect on the ways of seeing, reasoning and interpreting the world and the ways of relating to it; likewise, on the working methods, the approaches to knowledge and, the vision and interaction between the different components of the environment. The second intervention involves concrete actions of participation and community outreach.

The school works together with the environmental sector, with social organizations interested in the subject and with the community. In this way, the school can show its guiding role and open spaces for the self-regulation of citizen behaviors required for environmental sustainability. PRAE projects are examples of Education for Sustainable Development in Middle and High school, some methods and tools used in these projects may be replayed in Higher Education Institutions for the training of future professionals.

Previews research draws a blueprint of the different focus of implementing sustainability teaching in Higher Education Institutions around the world (Boarin, 2019; Cotton, D and Winter, J, 2010; Xiang, X, 2021; Christie, B et al., 2012). Boarin and coauthors reference different approaches to integrating sustainability in design and architectural programs have been implemented. "Some of these initiatives have been successful by involving sustainability aspects of existing courses, creating new sustainability-specific courses, and activities to improve students' sustainability awareness" (2019, p. 3).

The following sections will show different approaches to sustainable development education and their application into design and architectural curricula in Higher Education Institutions like SLE and

Sustainable Learning Education (SLE)

According to Hays and Reinders (2020), the intent of Sustainable Learning and Education (SLE) is to create and proliferate sustainable curricula, methods of learning and teachings that instill the skills and dispositions to thrive in complicated and challenging circumstances, and to contribute positively in making the world a better place. What makes SLE different from other pedagogical approaches or educational theories is its focus on sustainability, self-sufficiency, and consciousness. According to Stroh (2015), SLE overcomes the insufficiencies of a replication of solutions and incremental learning.

Facing the urgent requirements of The Global Education 2030 Agenda, a new paradigm for learning and teaching is required, since current models do not contribute to the required technological and social transformation, are ineffective and, according to Hays, 2017, may even be counterproductive. The author recognizes SLE as an “emerging and timely concept—a reimagined and re-engineered system of and for education and professional development” (2017), and suggests that SLE embodies the pillars of sustainability integrating them into the learning and educating process.

From this concept, with a constant exercise of bibliographic exploration, the team of researchers questioned how professional training programs in Colombia have integrated these pillars in their curricula, contributing to the achievement of the sustainable development goals, especially in programs of creative disciplines in the city of Medellin. Within this context, the exploration and review began.

Sustainable design and architectural education

The major tasks of sustainable design and architectural education are to teach students the concepts of sustainable development and knowledge of sustainable design (architectural, product, clothing and graphic), and to train them to incorporate sustainable technologies into their projects. (Álvarez, S.P. et al., 2016). As Xingwei Xiang and colleagues argue on their paper, A Pedagogical Approach to Incorporating the Concept of Sustainability into Design-to-Physical-Construction Teaching in Introductory Architectural Design Courses: A Case Study on a Bamboo Construction Project (2021), combining architecture design education and sustainability is commonly found in intermediate and senior years, as well as in higher degree programs.

Method

Qualitative methods such as bibliographic analysis, semi-structured interviews, and participatory observation were used. The objects of study in this paper are Curricula and SDGS in Colombia, especially Medellín. Relevant papers published in Scopus and Web of Science were reviewed, databases used for archiving scientific papers. The search string was intentionally designed to provide reasonable coverage of the diverse research that exists on Curricula, Creative Disciplines, Education for Sustainability and SDGS.

An online five question questionnaire was sent to approximately 700 students of creative disciplines, in the three institutions, on 18 of September 2021 (contact details for academics and students were retrieved by the academic secretaries of each institution), and 15 semi-structured interviews were conducted with faculty professors and administrative staff.

Questions provided a “snap shot” of current teachings and education on sustainability practices across creative disciplines, and were based on the SDG 4 target 4.7 literature. Analysis grids were constructed for the comparative study of the capacities and competencies of chosen professional training programs of the Universidad Pontificia Bolivariana, Institución Universitaria Pascual Bravo and Universidad de Medellín, all Higher Education Institutions in Medellín, Colombia.

Results and Discussion

Data Collection

The data collection for this research took place in July - November 2021 at the UPB, UdeM and I.U. Pascual Bravo and was primarily focused on creative disciplines curricula among the three institutions.

Initially, a literature review was made to attempt the categorial frame that supports the research. With this, a next stage of a comparative study was performed, searching and correlating capacities and competencies of chosen professional training programs; analysis grids were constructed and used, enabling the identification and recognition of the commonplaces and the particular ways of assuming sustainability in each training program.

Besides the literature review and comparative study previously made, the data collection was performed through two instruments: an online questionnaire designed to collect student's perspectives, and a protocol for semi-structured interviews destined to get a profound insight on professors' discourses related to sustainability. Using every instrument is described next.

Analysis Grids

A comparative study of the capacities and competencies of the professional training programs of the chosen Higher Education Institutions was conducted. Thereupon, analysis grids were constructed in a shared online file, enabling the researchers to look, identify and compare the information that every institution shared from the syllabus and curriculum of the chosen programs. The following is a preview of the grid elaborated and filled for the researchers.

Researchers draw some conclusions comparing information for the grid that shows the different approaches to sustainability and the multiple pedagogical and educational strategies in the three institutions.

UdeM: the commonplace in the syllabus where the word sustainability is found or directly referred to, or one component reviewed, is in the management courses, where students are expected to develop business models consistent with the principles of sustainability. The recognition of the context, requirements and problems appears in several competency criteria; although it is difficult to determine how often such problems correspond to those stated in the SDGs or the variables analyzed here. It is noteworthy that the techno-productive component, responsible for the training in the different productive and material processes, there is no explicit reference to impacts on the environment.

I.U. Pascual Bravo: within the review, concepts alluding to sustainability, sustainable design or sustainable development are noticed. The importance of approaching and applying practices that contribute to sustainability is recognized. Regarding the Interdependence component, only in the Human Development subjects the tools that allow the measurement or sign of impacts on human life against the ecosystems are recognized; in fact, it is the only course that directly

raises the importance of the SDGs in the elements of the competence to be developed.

UPB: clothing design programs present multiple competencies related to sustainable development in its descriptive letters. From the invitation to students to problematize and research the context from social, cultural, economic and environmental terms intended to manage contextualized and viable projects; the development of proposals that consider their productive, economic, environmental and social viability; the analysis of the socio-cultural, environmental and economic-productive implications of the garment product already made, and finally; the reflection on the traditions, practices, emergencies, and phenomena related to clothing and apparel. Considering the above, it can be said that this program conceives sustainability as a transversal axis of the curriculum, which impacts not only some courses, but becomes an end present in most of the training spaces.

Questionnaire

The questionnaire instrument used as an approach to understand the student's perspectives was designed looking for simplicity and clarity to get answers. Only five questions of multiple-choice selection were included. First, second and third questions were made to identify the university's affiliation; fourth and fifth allowed for several alternatives to be selected, and were made asking specifically about sustainability topics. Questions are related:

1. University where you study
2. Academic program you are enrolled in
3. Which semester are you in?
4. Show the topics about which you have received SUFFICIENT information for your professional development:

- Sustainable Development Goals (SDGs)
 - Bibliography, materials, processes linked to sustainable development available at your University.
 - Laws, agreements and/or regional, national and international policies related to sustainability
 - Local or regional situation linked to consumption and/or environmental protection
 - Best business or social practices in terms of sustainable development
 - Ancestral, indigenous, or native knowledge related to the diversity, care, protection and opportunities of natural resources.
 - The impact of your designs on relationships between people, or their impact on the environment.
5. Point out the topics that you could discuss and/or debate SUFFICIENTLY:
- The interdependence between people and the environment
 - Cultural, economic, social, biological diversity, etc. and the need to protect it
 - Your rights and duties as a human being
 - Your responsibility as a professional to contribute to a fair and fulfilling life of others
 - Your responsibility towards future generations is to guarantee their access to natural resources.
 - How your lifestyle can affect the availability of limited and renewable resources in the future
 - The need for everyone to develop skills and abilities to achieve a satisfying and sustainable life
 - The participation alternatives to which you are entitled.
 - Who to turn to make informed decisions about the impact of your projects on the environment
 - Alternatives that allow you to have a more sustainable lifestyle

The survey received answers from 658 students from the three mentioned universities within 12 academic programs related to creative disciplines. 42.7% declared that they were in the middle of their professional curriculum, 31.5% of students were just starting and 25.8% are finishing.

Some of the most significant data got are:

Semi-structured interviews

In order to know the professors' perspectives, 15 semi-structured interviews were conducted with five faculty professors at each university. Researchers questioned professors on how they incorporate the SDGs and apply them in their courses, opting for a semi-structured protocol that allows open spaces for profound dialogues.

The guiding questions for the conversation are:

- In what ways do you incorporate the SDGs and apply them in your courses?
- What strategies, teaching resources, and classroom exercises do you use in your courses to teach sustainable development issues?
- What strategies do you apply to implement a culture of sustainability in students?
- The interviews were recorded and transcript afterwards. From there, it was possible to make discourse analysis, emphasizing on the pedagogical strategies described.

Some of the most repeated words in the interviews were:

- Sustainability
- Project Consumption
- Territory

- Research
- Impact
- Technology
- Industry
- Responsible
- Strategies

Some of the most relevant topics that emerged during these meetings were:

- Context problems
- Reality principle
- Discourse
- Sustainability (Sostenibilidad vs. sustentabilidad)
- Hidden curriculum
- Student participation
- Questioning of consumption habits
- Interdependence
- Alternatives
- Entrepreneurship
- Critical thinking
- Student as a citizen
- Concept of viability
- Three pillars: economic, social, and environmental.
- About ODS: responsible production and consumption, equity, equality related to the ergonomics theme.
- Life, ethics, aesthetics
- Training for environmental and cultural sustainability
- Qualification of teachers (so that rubrics can incorporate evaluable aspects in the professional cycle)

Aside from over impact on students' views of sustainability which might be attributed to curriculum and pedagogy, students are also

affected by what it is known as “the hidden curriculum” (Jackson, 1968). This incorporates the messages sent by an individual tutor or an institution, often unconsciously and covertly, to students about how they ought to think and behave. A key way in which the hidden curriculum is made manifest is through the values of the institution, there is also potential for individual lecturers’ beliefs, as seen in the semi-structured interviews, to influence both the content and the structure of the curriculum.

Teachers interviewed, suggest that tutors actually influence students in ways well beyond the classroom or the subject, for example, by choosing texts and cultural products, commenting on their structure or contextualization, but also providing pawns for discussing issues of sustainability, climate change and ecological justice.

We considered that it is important to have a critical awareness of the different ways in which the hidden curriculum might be at work both within and beyond the classroom is essential to understand the impact of teaching about sustainability in creative disciplines. Drawing from the experiences described by the teachers in the three institutions, we may derive some strategies in two groups.

First, addressing wicked and real-life problems, identifying contemporary tensions which will help students recognize design problems in their environment and place them within the goals of sustainable development, and visualize the complexity of these problems and tensions identifying them as “wicked problems” (Kolko, 2012, Buchanan, 1989). Once this analysis is done, students are motivated to recognize the relationship between the global problems they have analyzed and the community. This reflection also serves as a personal evaluation criterion for their own design exercises in this and in other courses (Vélez - Granda, 2021). Students learn to understand the relationship between people, technology and the environment in multiple scales of relation.

Second, strengthening multidisciplinary and multi-actor approach to environmental and socio-cultural aspects involving local stakeholders, communities, teachers and students into collaborative and co-creative work. All these through understanding and studying real-life examples of use and reuse, recycled raw materials, the use of organic fibers, or collecting materials for recycling or reuse. The interviewees agree that this approach and teamwork extend the limits of design and architectural training towards working with complex socio-cultural, socio-economic and socio-technical systems that may lead to versatile understandings of sustainability.

Conclusion

Although the adoption of pedagogies and teaching methods advocated for Efs, SLE and SDG 4 is low, there is evidence that professors at the three institutions are actively seeking to make their lessons more interactive and innovative. Professors apply tools and methodologies to promote sustainable design and architecture under their own expertise, but very few of them are explicitly declared in the curricula from every training program.

When students approach projects related to genuine issues of living, they commit to doing the best they can in terms of sustainability and the impacts of their proposals. A sustainability strategy for the pedagogy of creative disciplines is needed, recognizing designers as problematizers, with context awareness, and as agents of change and transformation.

Overall, field explorations, collaborative design, analysis of wicked problems, while not a new pedagogical approach, are worth becoming an essential part of product, graphic and industrial design and architectural education. For both teachers and students, integrating field study into the curriculum permanently would allow transferring the traditional ideating-

making-reflecting activities from the studio into a real-life setting. Also, the wide analysis of real-life and wicked problems integrated into the curricula would allow a strong transformation in design and architectural projects.

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