

Sustainable Campuses as Living Labs for Sustainable Development: An Overview of a Brazilian Community University



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Abstract The growing societal demands for higher education institutions (HEIs) actions towards sustainable development, characterize these institutions as powerful drivers of change. Accordingly, this paper aims to understand how sustainable campuses, as living labs, promote innovations for sustainable development through the case of a Brazilian Community University. To accomplish this objective, this study presents a review of literature on sustainable development at universities, followed by the analysis of the case of a Brazilian Community University, the University of Southern Santa Catarina (Unisul). For the data collection, we performed semi structured qualitative interviews with 15 faculty members of Unisul, aligned with the review of the university's institutional documents and the categories mapped in the literature. The implementation of sustainable campuses as living labs at HEIs creates a propitious environment for innovation and practical learning, motivating both internal and external communities, leading society towards sustainable development. Thus, as a community university, Unisul promotes several practices to engage the community through education, capacity building, research, outreach, academic events, consulting on business, architectural assistance and medical consulting to the community, legal assistance, medical clinics, also promoting sustainability in campuses' infrastructure, inspiring the local communities to incorporate the university's sustainable values.

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1 Introduction

Since the 1970s, the international awareness on environmental education and further education for sustainable development (ESD) is increasing (Mckeown and Hopkins 2010; Lozano et al. 2015b). In 1975, the United Nations Educational, Scientific and Cultural Organization (UNESCO) issued the Belgrade charter, stating the primary role of education in overcoming environmental challenges through capacity-building, international cooperation, and development of interdisciplinary, continuous and preventive ecological education programs (UNESCO 1975).

Several other declarations, conferences and initiatives on ESD have been issued, such as the Tbilisi Declaration, the Talloires Declaration, the United Nations' Decade of ESD, the Roadmap for implementing the global action program on ESD, the Sustainable Development Goals, among others.

In 2015, global leaders through a joint effort launched the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development, anchored in 17 Goals to ensure global development over the next 15 years. Amidst these objectives, Goal 4 reinforces the importance of promoting inclusive and quality education universally (United Nations 2017; Owens 2017).

In this context, this paper aims to understand how sustainable campuses, as living labs, promote innovations for sustainable development through the case of a Brazilian Community University. The next section presents a brief review of the literature on higher education for sustainable development and sustainable campuses as living labs; followed by the presentation of the methods, the results and discussions of the findings, and the conclusions and recommendations.

2 Literature Review: The Role of Higher Education for Sustainable Development

The term environmental education is commonly used to emphasize the correlation between education and the awareness on environmental sustainability, developing ecological behaviors and critical thinking (Zsóka et al. 2013; Carleton-Hug and Hug 2010).

ESD is a field of research that aims to implement sustainability in the curriculum and operational activities of HEIs, leading society to adopt sustainable behaviors and thinking (Zsóka et al. 2013). ESD's goal is to encourage the establishment of new ethical and responsible mindsets, educating society towards environmental

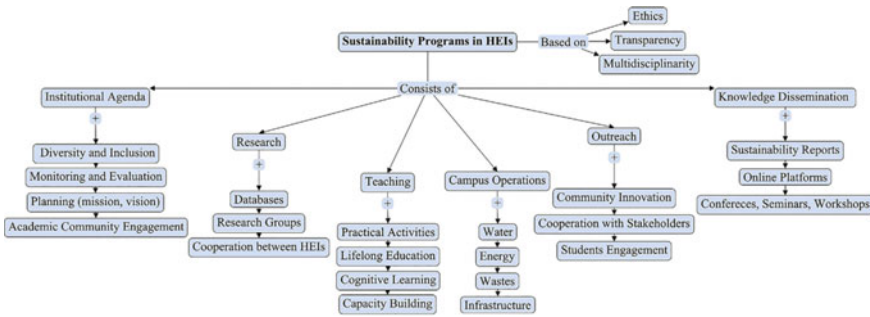


Fig. 1 Sustainability in higher education. Source Berchin et al. (2018)

sustainability, shaping behaviors and developing collective consciousness (Carleton-Hug and Hug 2010; Zsóka et al. 2013).

The implementation of ESD at HEIs allows the development of future leaders, ensuring that economic and social development, and sustainability can be accomplished concomitantly (Xiong et al. 2013). Therefore, several authors emphasize the importance of HEIs in the creation of an institutional agenda for sustainable development, leading society’s transformation through education (Guerra et al. 2016; Berchin et al. 2017, 2018).

The creation of living labs not only contribute to sustainable development but also to the achievement of the SDGs. Actions and activities promoted on the HEIs’ environment allow the collaboration between academia and the community, improving health and well-being (SDG 3), encouraging gender equality (SDG 5), promoting decent work and consequently guaranteeing economic development (SDG 8), reducing inequalities (SDG 10), promoting sustainability among cities (SDG 11), and generating innovations for sustainable development and climate change mitigation and adaptation (SDG 13).

Figure 1 summarizes several relevant actions described in the international scientific literature that can be implemented by HEIs in the development of a holistic and efficient program for ESD.

2.1 Sustainable Campuses as Living Labs for Sustainable Development

University campuses are complex environments capable of influencing both internal and external communities in its surroundings (Posner and Stuart 2013). A holistic ESD program, besides imbedding sustainability in the curricula, demands the promotion of sustainable interventions on HEIs, allowing students to experience sustainability on campus, motivating the adoption of sustainable behaviors and developing critical thinking (Azeiteiro et al. 2015; Ramos et al. 2015; Yuan and Zuo 2013).

These interventions imply intensive management and development processes within education institutions, which demand adaptation of HEIs' practices and facilities towards the implementation of sustainable initiatives (Berchin et al. 2017; Bantanur et al. 2015; Yuan and Zuo 2013).

Sustainable campus operations require the adoption of practices that stimulate energy efficiency and sustainable energy generation; sustainable transportation, such as promoting the use of bicycles, carpooling and public transportation; waste management; development of and adaptation to sustainable buildings; management of water resources; health, safety and ergonomics (Velazquez et al. 2006; Berchin et al. 2017; Bantanur et al. 2015; Waheed et al. 2011; Zhang et al. 2011; Lozano et al. 2015b; Hancock and Nuttman 2014).

Universities play a major role concerning the achievement of the SDGs, therefore, the implementation of open-innovation initiatives, such as living labs, reinforce the importance of shared knowledge among stakeholders, accelerating innovation and benefiting the society (Chesbrough et al. 2005). Living labs consist in open-innovation environments, which foster the development of sustainable solutions through a joint-effort between the university and its local communities, promoting the establishment of a collaborative, integrated and sustained system (Eriksson et al. 2005; Burbridge 2017).

Living labs consider five pillars into its core principles: value, sustainability, influence, realism and openness (Ståhlbröst 2012). Environmental innovation practices open-labs reduce the ecological impacts of economic activities, endeavoring to ensure the development of a cleaner global environment (Voytenko et al. 2016).

Experimentation is one of sustainability's essential premises and living labs act towards this purpose, turning cities and communities into research implementation fields (Dryzek 1997). Thus, living labs are crucial towards the achievement of sustainable development, especially regarding education, since the campuses' environment is propitious to promote experimentation and engagement between relevant stakeholders such as students, researchers, professors and local communities, focusing on the establishment of adequate sustainable solutions which can be locally tested, monitored, implemented and consequently solving regional or global challenges (Konig 2013).

The adoption of sustainable practices, the development of cooperative environments, outreach initiatives, water, energy and food efficient campuses constitute HEIs as relevant living labs, which contribute to society, generating shared-knowledge, integration between the community and campus members as well as solutions to local and international social, economic and environmental challenges. Table 1 shows a definition of living labs as understood in this study, also showing its main dimensions (sustainable buildings and facilities, creative and collaborative environments, collaboration and knowledge dissemination, and outreach). The adoption of these dimensions by HEIs make them key environments for sustainable development (these dimensions also supported the development of the questionnaires and the analysis of its results).

Table 1 Living labs and its dimensions

Dimension	Living labs
Description	Sustainability principles must be adopted in academic campuses operations, acting as practical learning environments, or living laboratories, where students and professors are immersed. Thus, enabling both internal and external communities to live sustainability experiences in the university
Authors	Berchin et al. (2018), Burbridge (2017), Cosgrave et al. (2013), Evans et al. (2015), Leminen et al. (2012), Ståhlbröst (2012), Trencher et al. (2015)
	<i>Sustainable buildings and facilities</i>
Description	Sustainable environments, besides helping to reduce the ecological footprint of HEIs, also promote the immersion of students and professors in a sustainable environment that operates as participative, socially inclusive, economically viable and environmentally responsible laboratories. In addition, such interventions create more creative and collaborative environments, stimulating active learning, awareness and critical thinking. These interventions can be made through sustainable water management, waste management and recycling programs, sustainable energy generation and energy efficiency, sustainable transport programs, green walls, green roofs and smart buildings
Authors	Adom̄bent et al. (2014), Anand et al. (2015), Azeiteiro et al. (2015), Bantanur et al. (2015), Berchin et al. (2017, 2018), Gómez et al. (2015), Guerra et al. (2016), Hancock and Nuttman, (2014), Lozano et al. (2013a, b, 2015a), Ramos et al. (2015), Velazquez et al. (2006), Verhulst and Lambrechts (2015), Waheed et al. (2011), Wals (2014), Yuan and Zuo (2013), Zhang et al. (2011)
	<i>Creative and collaborative environments</i>
Description	HEIs can contribute to the development of creative and collaborative environments propitious to an active learning and innovations
Authors	Adom̄bent et al. (2014), Anand et al. (2015), Azeiteiro et al. (2015), Berchin et al. (2017, 2018), Gómez et al. (2015), Lozano et al. (2013b, 2015b), Ramos et al. (2015), Velazquez et al. (2006), Verhulst and Lambrechts (2015), Wals (2014), Yuan and Zuo (2013)
	<i>Collaboration and knowledge dissemination</i>
Description	Collaboration with other HEIs and stakeholders in educational institutions enables the dissemination of experiences, knowledge, methods and cases of success on sustainable practices, also disseminating sustainability awareness and education
Authors	Adom̄bent et al. (2014), Anand et al. (2015), Azeiteiro et al. (2015), Berchin et al. (2018), Gómez et al. (2015), Guerra et al. (2016), Hancock and Nuttman (2014), Lozano et al. (2013b, 2015b), Stephens and Graham (2010), Velazquez et al. (2006), Verhulst and Lambrechts (2015), Waheed et al. (2011), Wals (2014), Yuan and Zuo (2013)
	<i>Outreach</i>
Description	Outreach programs, focused on ESD, stimulate students and professors to practice the knowledge taught in class, promoting local development, sustainability awareness, capacity building and engaging stakeholders
Authors	Azeiteiro et al. (2015), Berchin et al. (2018), Lambrechts et al. (2013), Lozano et al. (2013a, b), Waheed et al. (2011), Wals (2014), Guerra et al. (2016)

3 Methods

This study uses a qualitative approach to collect and analyze the necessary data to achieve its goal, “to understand how sustainable campuses, as living labs, promote innovations for sustainable development through the case of a Brazilian Community University”. The University of Southern Santa Catarina (Unisul) was chosen as a case study. Unisul is a community university in South Brazil, which demonstrates its commitment with sustainability and social development.

Unisul was founded in 1964, in the state of Santa Catarina, in South Brazil. Currently, the university has nearly 30 thousand students and thousands of faculty and staffs, which collaborates to establish the relevance of its actions towards sustainable development in the communities where the university operates (Unisul 2015).

As a community university, Unisul is a non-profit institution with social responsibility, devoted to public use and committed to education, social welfare and student development (Unisul 2015; Teixeira 1994). Thus, sustainable development is a core value amidst Unisul’s institutional objectives, aiming to stimulate economic development coupled with environmental preservation, social justice, sustainability and innovation. Moreover, in order to promote quality education, research and innovation, Unisul upholds a network of national and international partnerships with stakeholders and other relevant global HEIs (Unisul 2015; Berchin et al. 2018).

This study used the semi-structured interviews method to collect the data. In order to be representative, 15 collaborators were interviewed, including: the Unisul’s Dean; the Pro-rector of Teaching, Research, Graduation, Outreach and Innovation; all the campuses administrations; HEIs managers on Education, Research, Outreach and Innovation, responsible for the Environmental Education Policy of Unisul, and other employees indicated by them. The Interviewees were coded from Interviewee 1 to Interviewee 15.

The open-ended questions of the questionnaire (Table 2) were based on the literature. The categories used for creating and organizing the interviews were: teaching, research, outreach, campus operations and management (Berchin et al. 2018; Guerra et al. 2016).

To analyze the data from the semi-structured interviews, we followed the indications of Bardin (2011), which are pre-analysis, when the interviews are transcribed and reviewed; material exploration, when an in-depth analysis of the collected material takes place; and subjective interpretation of the research outcomes, through the analysis and comparison among the propositions stated on the current scientific literature.

Based on the literature, the categories used for organizing and analyzing the interviews were: teaching, research, outreach, campus operations and management. Thus, after analyzing the interviews, and for the aims of this study, we organized Unisul’s practices as living labs for sustainable development according to the categories mapped in the literature: sustainable buildings and facilities, creative and collaborative environments, collaboration and knowledge dissemination, and outreach.

Table 2 Interview questionnaire

What does sustainable development mean to you?
In your opinion, what is the role of HEIs for sustainable development?
In your opinion, how do HEIs influence the development of its surrounding communities?
Regarding the development and implementation of sustainable practices at Unisul, what were the main challenges/obstacles faced?
Regarding the development and implementation of sustainable practices at Unisul, what were the main incentives/facilitators encountered? Which factors stimulated this process?
In your opinion, what is the importance of implementing sustainable practices on campuses in HEIs? How does Unisul address this issue?
In your opinion, how does Unisul promotes innovations that contribute to local sustainable development?
Which are the key-programs and actions towards sustainability implemented in the Unisul?

4 Results and Discussion: The Case of Unisul

Unisul's environmental education policies are funded on Brazilian laws regarding ESD. Even though there is an integration between Unisul's campuses and its guidelines towards ESD, each campus have the flexibility to develop its own sustainability initiatives, promoting the transversality of sustainability across the institution (Unisul 2017). Accordingly, Unisul's policies for ESD regards education, research, outreach, campus operations and management activities.

It is noteworthy that Unisul and the interviewees use the term "environmental education", but considering the literature and for the aim of this paper, we will standardize Unisul's practices as ESD. Thus, the term "living lab" was only used by one interviewee, however, we analyzed the interviews categorizing them in the dimensions of living labs, namely: sustainable buildings and facilities, creative and collaborative environments, collaboration and knowledge dissemination, and outreach.

4.1 *Unisul's Practices as Living Labs for Sustainable Development*

The analysis of the interviews, suggest that the implementation of sustainability practices in universities, can translate into holistic ESD programs (or environmental education programs), since universities and their campuses serve as role models of learning, awareness and inspiration for both the internal/academic community and the external community in the university's surroundings.

It is important to emphasize that among the main drivers of sustainability practices at Unisul, are: (a) normative/legal push; (b) demand from civil society; (c) internal research and outreach initiatives; (d) The community nature of the university; and e) the support of managers.

According to the interviewees 1, 3 and 13, Unisul operates as a living lab, incorporating innovative and sustainable practices in its campuses, in its research practices, outreach programs and learning methods and environment, aiming to stimulate students' development and qualification, as well as promoting the development of local communities.

Interviewee 3 also stated that Unisul acts as a community actor, by promoting a continuous dialogue with society, "either through outreach or through Unisul's concerns that its applied researches benefits the society". These practices occur through Unisul's concerns with the accessibility and inclusiveness of its actions for local development, by offering scholarships, capacitation and training programs, community service through health support centers, legal and business consulting; in addition to practices of internal sustainability, such as energy efficiency and solar energy generation that can inspire changes in the surrounding communities' behavior (Interviewees 3 and 8). Thus, Unisul is also concerned with entrepreneurship and technological and social innovation for sustainable development (Interviewee 3).

Considering the influence of university campuses in disseminating awareness and ESD, Interviewee 1 understands that

today only in undergraduate courses we have more than 150 thousand citizens formed in by our university, imagine all these people having the experience of a sustainable campus, it would sensitize them in social and environmental terms, because these people are currently working in companies, governmental agencies. They are here in our region, in other Brazilian regions, and even in other regions of the world, so I have no doubt that the social impact of sustainable practices are enormous (Interviewee 1).

With this same line of thought and also regarding the university's relations with its surrounding communities, Interviewee 13 considers that only in one of the Unisul's Campuses, in Pedra Branca, the university has about seven thousand students who must be in the university for at least 3500 h. Therefore they should contribute to the development of the university and the community in its surroundings, particularly considering that these students and faculty have an impact in the community. Further exploring this logic, these seven thousand students entering and leaving the campus, make the traffic of the residents of that community unfeasible during class periods, causing a direct impact on the lives of approximately twelve thousand inhabitants of that neighborhood (Interviewee 13). Therefore, imbedding sustainability practices in campus operations and within the community is necessary to establish a good and positive relation with the university's surroundings.

Through sustainability practices on campus, students experience a practical learning, receiving knowledge and awareness to sustainable development, becoming disseminators and multipliers of these practices (Interviewees 2, 6 and 12). Thus, sustainability practices and infrastructure influence and inspire the internal community and the community in the university surroundings (Interviewees 3, 8 and 12).

In addition to these practices, Interviewee 4 also recognizes that energy efficiency and solar energy generation practices at Unisul's campuses, in addition to reducing energy bills, also promote students' awareness to sustainability practices and technologies. Professors can also use these technologies and sustainable structures as learning environments (e.g. electrical engineering professors who take students to

assess the peaks of energy generated, how much carbon is mitigated, how many trees are saved, and other forms of study).

Interviewee 5 considers that “the example is a great way to mobilize and raise awareness” on sustainability. Therefore, sustainable campuses contribute directly to “create and demonstrate ways for students and the community to interact with these technologies”, being “a great showcase for sustainability actions that can be expanded to other communities”. Thus, Interviewee 9 and Interviewee 10 also believe that the experience of sustainability practices on university campuses contributes to cultural and behavioral changes.

Interviewee 11 considers the university campus as an incubator of new ideas, new habits, new technologies, then “the more the campus assumes this responsibility with sustainability, the more it forms people which will multiply these actions”. Accordingly, people in contact with the campus become multipliers and disseminators of the sustainability practices, attitudes, knowledge and experiences lived on campus.

Interviewee 13 understands Unisul as a community and innovative university, concerned with meeting social demands through research and outreach, transferring knowledge and technologies to the society, promoting sustainable development. Thus, the university must penetrate the community and society must be inserted in the university, since both are part of the same ecosystem (Interviewee 13).

Considering the university campus as a learning environment and a development ecosystem, Interviewees 13 and 14 believes that campuses should be an environment for sustainability experimentation and innovation, because this practical experience transforms behaviors, attitudes and thinking, transforming these students into multipliers of the lived practices.

In addition to sustainable campus, Unisul maintains several learning and outreach projects open to the community, to train and develop their skills and resilience. Thus, Unisul also focus on events open to the community, aiming to develop a Green Agenda in the Campuses, as indicated by the university’s ESD policy and program. Among the commitments of this agenda, the Green June receives great attention, with the objective of “sensitizing the academic community and the society around Unisul, about the principles, practices, premises and attitudes that we must take to achieve sustainable development” (Unisul 2017).

Through outreach and the relationship with the communities surrounding its campuses, Unisul promotes social entrepreneurship and innovations that contribute to local sustainable development (Interviewees 4 and 6). Thus, Interviewee 8 and 10 highlight the importance of developing a plan for implementing and measuring the sustainability commitment of the institution.

In addition to fulfilling its mission to train qualified citizens, Unisul engages with assistance to the communities and to the vulnerable population, through the provision of health care services, consulting in law, management and entrepreneurship, and other social services, contributing to the sustainable development of these communities (Interviewees 7 and 12).

These ESD practices help to prepare, shape and sensitize students to become “qualified future professionals who can success in the market and in society with an innovative thinking and care for sustainable development”, also educating them to

apply these premises in their professional performance and in their role as responsible citizens (Interviewee 7).

Among the outreach projects, Interviewees 7 and 12 indicate that Unisul has a longstanding relation with the local communities, promoting academic events open to the community, outreach courses to empower people, and research projects that stimulate local development and welfare. Interviewee 7 also considers that “events are a tool and a very important strategy for the university, to maintain and straighten the proximity among stakeholders, and the relationship between the university and the community”.

The insertion of the university in the communities, through partnerships and collaborations, contributes to the promotion of local development through the training of qualified people and the transferring of knowledge and technologies (Interviewees 9 and 12). The openness of the university to the communities also operate as a form of qualification, awareness and leisure to the local communities. Interviewee 14 highlights the importance of engaging students to develop plans to improve their local communities as their final report for the bachelor, stimulating them to contribute to the sustainable development of their communities.

Finally, Interviewee 15 observes that university campuses are references to the community in which they are inserted, therefore, the adoption of sustainable practices on campus generate an inspiring and conscientious effect throughout the community; in addition, outreach is the most direct intervention model in which the university operates in the community.

In this regard, Table 3 summarizes the practices for sustainable development promoted by Unisul to operate as a living lab for sustainable development. The interviewees indicated these practices as the main sources of ESD and innovation for sustainable development promoted by the university, also contributing to local sustainable development.

These practices open the university to the community, so besides doing outreach programs, Unisul also enables and invites the community to use the university and its facilities for learning, consultancy and wellbeing. Therefore, Unisul operates as living labs, integrating the university with its surroundings and promoting an integrated, inclusive sustainable development.

5 Conclusions and Recommendations

This study’s main goal is to understand how sustainable campuses, as living labs, promote innovations for sustainable development through the case of a Brazilian Community University, Unisul. Innovation relates to new processes, methods, technologies and institutions, aiming to promote long-term welfare, development and social wellbeing, while reducing environmental risks. As a result of the analysis we could understand that innovations for sustainable development occur in every level and sector of a university. These innovations, as observed in Unisul, occur through:

Table 3 Unisul's practices as living labs for sustainable development

Sustainable buildings and facilities	<ul style="list-style-type: none"> • Photovoltaic solar energy generation; • Energy efficiency programs; • Sustainable waste management: recycling, reducing waste-paper generation, selective waste separation, organic waste composter; • Rainwater collection and water reuse in the labs of architecture, engineer and chemistry; and • Waste water treatment and reuse in the water/aquatic complex
Creative and collaborative environments	<ul style="list-style-type: none"> • Sustainable and self-sustaining hydroponic food garden; • Innovation and sustainability in research centers and teaching methods; • The Technology Centre of Unisul, with innovation labs focused on research, technology development, analysis, teaching and learning; • The Innovation Agency of Unisul; and • Use of the organic compost to produce medicinal plants used in the courses of naturology, gastronomy and medicine
Collaboration and knowledge dissemination	<ul style="list-style-type: none"> • Sustainability events on campus: congresses, workshops, lectures; • Courses of short duration for capacitation and training; and • ESD programs open to both internal and external communities
Outreach	<ul style="list-style-type: none"> • Actions for improving the wellbeing of local communities, such as the cleaning of local rivers with the community; • The biodiesel project in a fishing community to increase the community's income and reduce water pollution from oil; • The sustainable school in Rancho Queimado, which combines the use of sustainable technologies and ESD; • The Solidarity Economy program; • The Welcoming the Immigrants program; • The participation in the committee of the Cubatão River's water basin; • Health care projects to the low-income communities, through dental clinics, medical clinics, community hospitals; • Programs of legal assistance and advice, human rights and citizenship; • Program for women's rights and education against violence; • Programs for business consultancy, stimulating entrepreneurship, internationalization and strategic management; • Programs for stimulating sports and digital inclusion; and • Collaboration with primary and secondary schools, through programs of educative games, incentives to reading and literature, health education and ESD

- The implementation of innovative management practices for HEIs, transforming behaviors and stimulating the adoption of new technologies for sustainability;
- Innovative education methodologies and practices, integrating research, collaboration, practical and active learning;
- Research, through the development of new knowledge, technologies and methods;
- Outreach, through the exchange of knowledge between different HEIs and stakeholders, promoting the development of local communities;
- The adoption of innovative practices on campus, through sustainability initiatives, decreasing HEIs' ecological footprint, stimulating learning and raising sustainability awareness in both internal and external communities.

Universities operate as learning environments to the students and the communities surrounding its campuses; therefore, these institutions can inspire, shape behaviors and influence a large contingent of people towards sustainability through the adoption of programs regarding research, outreach and education for sustainable development.

Universities and their campuses operate as living labs when allowing experimentation and collaboration among students and the community, which must be funded on sustainability's core principles. Besides reducing HEIs ecological footprint, sustainable environments act as an innovation ecosystem, guided by sustainable principles allowing practical experimentation on campus. Moreover, imbedding sustainability in educational institutions, transforming them into living labs through sustainable buildings and facilities, creative and collaborative environments, collaboration and knowledge dissemination, and outreach, contributes to the promotion of local sustainable development.

The analysis of the interviews with Unisul's faculty, suggests that sustainable learning environments enable students and professors to experience and discuss themes of sustainability and the environment inside and outside the classroom, increasing their awareness and knowledge concerning sustainability and innovative practices. Also inspiring local communities and influencing their development.

According to the interviewees, the main sustainable practices implemented at Unisul's campuses relate to solar energy generation, energy efficiency programs, waste management, rainwater collection and water reuse, the development of a hydroponic food garden, innovative research and learning environments through research centers, laboratories, innovation labs and students' enterprises.

Based on the international scientific literature and the interviewees' discourse analysis, this research presents some recommendations for sustainable campuses and development in universities. Moreover, ethics, transparency, and multidisciplinary are fundamental principles that must be pursued by HEIs to achieve sustainable development.

- **Recommendation 1:** The construction of sustainable buildings and the renovation of existing buildings with sustainability standards.
- **Recommendation 2:** The creation of creative and collaborative environments, also enabling innovation and active learning environments.

- **Recommendation 3:** The promotion of events such as conferences, seminars and workshops focused on raising awareness on sustainable development and the sharing of sustainable initiatives and practices.
- **Recommendation 4:** The establishment of collaborations and networks among HEIs and other stakeholders, including the promotion of community outreach.

If successfully implemented and adapted to each HEI's reality, these recommendations support the transformation of the university into living labs open to the community. It, therefore, promotes local and regional sustainable development generating innovations, learning, knowledge sharing, and empowering both internal and external communities to engage with the university and its initiatives. Sustainable buildings reduces the environmental footprint of universities, while increasing the awareness of the students, faculty and the local community; collaborative environments encourage group thinking, multidisciplinary efforts and stimulate innovations; events promote sharing of knowledge, experiences, initiatives, while also encouraging partnerships and networks; multistakeholder collaborations and networks contribute to produce innovations and initiatives that improve sustainable development.

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