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# Infusion of sustainability into higher education institutions: Case of a sustainable campus network in Chile

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**Abstract**

This study seeks to explore the perceptions and strategies concerning the infusion of sustainability in higher education among lecturers who are part of a Chilean sustainable campus network (n=61). Data were collected through an online self-administered questionnaire. Three primary dimensions were explored: Competence approach, Silo approach, and Lecture training. Findings revealed a widespread consensus regarding the significance of incorporating sustainability-related competencies into curricula, although variations existed in preferred strategies for achieving this goal. The study underscored the necessity for enhanced lecturer training in sustainability content and advocated for the inclusion of sustainability criteria in assessment systems. By offering an in-depth analysis of current perceptions and practices, this research contributes to a comprehensive understanding of the challenges and opportunities associated with infusing sustainability into higher education.

**Keywords:** Sustainability development; Active learning; Curriculum; Transformative change; Higher education.

## Introduction

In recent years, the debate surrounding the most effective approach to integrate sustainability into university curricula has intensified. One approach advocates for the infusion of sustainability principles across existing courses, emphasizing interdisciplinary collaboration and holistic understanding (Moore, 2006; Barber *et al.,* 2014; Žalėnienė & Pereira, 2021; Vera, 2022). In spite of recognizing its importance, evidence suggests that the integrated approach remains weakly implemented within educational systems (Vera, 2017). Thus, the infusion of sustainability principles into higher education curricula is paramount for fostering a sustainable future. However, this endeavor has its challenges and complexities (Kirwan *et al.*, 2022).

In fact, achieving successful integration of sustainability in higher education necessitates a transition from emphasizing teaching to prioritizing learning, along with adopting a multidisciplinary approach that encompasses the environmental, economic, and social dimensions of sustainability [5]. However, numerous obstacles exist at various levels that hinder the successful contribution of Higher Education Institutions (HEIs) to sustainability effort, mainly, disciplinary silos and lack of lecturer training (Byrne & Mullally, 2016; de Waal *et al.,* 2017; Vera, 2022; Parry, S. & Metzger, 2023). Without addressing these challenges and enacting fundamental changes within the academic realm, universities could lose their pivotal role in research, knowledge dissemination, and be incapable of shaping future leaders equipped to tackle sustainability challenges.

As a result, disciplinary silos persist firmly entrenched, with individuals primarily recognizing value solely within their respective disciplinary boundaries [6], [7]. Rather than operating in isolated silos, collaboration and learning from colleagues who specialize in other disciplines are essential for integrating sustainability issues effectively (Low & Phillipson, 2009; Vera, 2022). To understand this concept, 'the term silo' originates from grain silos, which separate different types of grain (Parry, & Metzger, 2023). Thus, it serves a metaphor for the segregation between various disciplines or departments within a Higher Education Institution (IES). This entrenched perspective limits interdisciplinary collaboration and hampers the ability to appreciate the contributions and insights offered by other fields.

In contrast to the European context, the majority of Chilean IES has leaned towards a disciplinary or silo approach, where sustainability is addressed, in a fragmented manner (Kirwan *et al.*, 2014; Saez de Camaraldoia *et al.,* 2021; Vera, 2022; Parry & Metzger, 2023) through specialized courses that do not facility a more holistic approach to integrate sustainability in Higher Education.

Unfortunately, this approach falls short of infusing sustainability as a cross-cutting competence throughout the curriculum - a key aspect advocated by the competence approach. By failing to engage all faculty members in active learning methodologies centered on sustainability, universities could miss the opportunity to cultivate a broad understanding and application of sustainability principles among students.

*Methodological strategies for integrating sustainability*

Below are some methodological strategies for infusing sustainability in a comprehensive and holistic manner:

- ***Infusion of sustainability themes across all courses:*** Incorporate concepts, such as, systems thinking, energy flow, cycles, natural resources, interactions, flourishing, cultural influences, and resilience (Figure 1). It is also recommended to give examples and cases related to sustainability in all subjects, regardless of their discipline. This strategy may include discussions on current environmental, social, and economic issues, as well as sustainable solutions that fit into different disciplines.
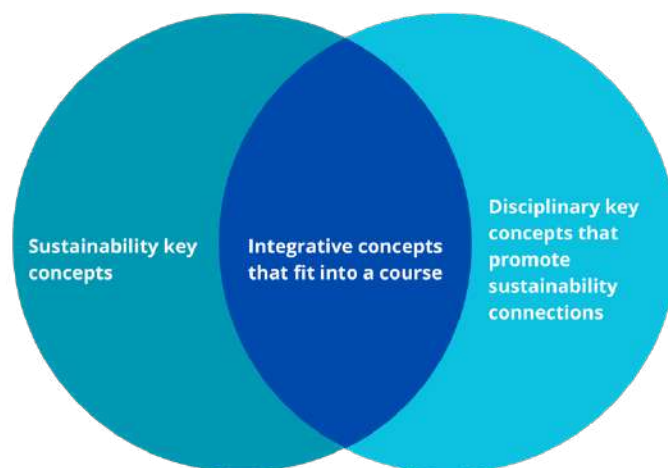


*Figure 1:* Curricular integration of sustainability key concepts

- ***Development of generic competencies:*** Design active learning activities that foster critical thinking, problem-solving, teamwork, and effective communication, with a focus on applying these aspects to sustainability challenges. These competencies should be integrated in all university curricula. This strategy may be implemented through learning outcomes that contribute to the meta-profile of all higher education programs, including specific and generic competencies.

- ***Interdisciplinary projects:*** Encourage projects that require collaboration between different disciplines to address complex sustainability issues. This strategy allows students to see how various fields of knowledge can contribute to comprehensive solutions. This strategy may include Project Based Learning (PBL), Service-Learning (S+L), and Collaborative Online International Learning (COIL).

- ***Hands-on experience:*** Organize practical activities such as field projects, internships, or community service programs, where students can apply sustainability concepts learned in the classroom to real-world situations, thereby contributing to a positive change in the community. Learning by doing, as a prominent aspect of experiential learning, emphasizes the value of practical, hands-on experiences in the learning process.

- ***Use of technology and multimedia resources***: Utilize technological tools and multimedia resources to create interactive and engaging learning experiences on sustainability. This may include simulations, role-playing games, educational videos, and Artificial Intelligence (AI) tools for sustainable development.

- ***Promotion of reflection and action:*** Foster critical reflection on values and attitudes towards sustainability, as well as motivation for individual and collective engagement and action to address environmental and social challenges. Exploring sustainability as flourishing is highly recommended.

By implementing these strategies, effective infusion of sustainability into the curriculum can be achieved, providing students with the skills and knowledge necessary to address current and future challenges in a holistic and sustainable manner.

## Materials and methods

The objective of the research was to explore the perceptions and strategies concerning the infusion of sustainability among Chilean lecturers. For this purpose, the researcher employed a quantitative method, with a non-experimental, descriptive design.

*Participants*

Participants were eligible for the study if they were members of a Chilean sustainable campus network and were lecturing in national HEIs. The sample of the study consisted of 61, 49 men (80.3%) and 12 women (19.7%), with an average age of 51 (SD = 8.4). Participants completed a self-administered questionnaire through a WhatsApp group.

*Instrument*

Data were collected through a questionnaire consisting of 15 closed-ended questions, with values ranging from 1 = Strongly Disagree to 5 = Strongly Agree. This instrument was validated by a panel of expert judges and then refined based on the feedback received. For analysis purposes, the questionnaire has been organized into three dimensions: Competence approach, Silo approach and Lecturer training. The self-administered questionnaire was completed through a WhatsApp group managed by a sustainable campus network that aims to promote sustainability in higher education in Chile.

## Results

Table 1 presents the findings of a survey aimed at exploring the perceptions of lecturers regarding the infusion of sustainability into the higher education curriculum. The survey comprised 15 questions designed to evaluate different facets of sustainability infusion and its influence on student engagement in active learning. The mean and standard deviation values offer insights into the average ratings provided by participants and the degree of consensus or variability in their responses.

*Table 1:* Survey results

| Questions | n | Mean | SD |
|---|---|---|---|
| 1. Sustainability should be infused, as a cross-cutting competence, by lecturers, in all disciplines and degrees. | 61 | 4.98 | 0.13 |
| 2. Introduction to Sustainability should be a mandatory course in all curricula. | 61 | 3.33 | 1.47 |
| 3. Generic competencies, such as teamwork, problem-solving, and others, help to infuse sustainability into the curriculum. | 61 | 4.72 | 0.49 |
| 4. To infuse sustainability into the curriculum, it is necessary to reinforce system thinking and holistic approach in teaching practice. | 61 | 4.52 | 0.89 |
| 5. It is necessary to include sustainability competencies in undergraduate and postgraduate curricula. | 61 | 4.70 | 0.49 |
| 6. Sustainability should be infused in the curriculum through specific courses by specialists. | 61 | 3.44 | 1.42 |
| 7. From a comprehensive approach, it is necessary to include sustainability criteria in assessment systems for learning. | 61 | 4.20 | 1.24 |
| 8. Lecturer training in sustainability content is key to its inclusion in teaching practice. | 61 | 4.64 | 0.66 |
| 9. To generate an attitudinal change, it is critical to introduce sustainability through active learning strategies. | 61 | 4.67 | 0.68 |
| 10. Extra-curricular sustainability can be complemented through student training in the form of seminars, service-learning, etc. | 61 | 4.49 | 0.65 |

| | | | |
|---|---|---|---|
| 11. It is necessary to leave space in the curriculum to include subjects on sustainability. | 61 | 3.75 | 1.04 |
| 12. Mechanisms of social interaction are needed to enhance the role of Higher education in achieving sustainable development. | 61 | 4.74 | 0.51 |
| 13. To generate an attitudinal change, it is critical to introduce sustainability through specialized courses in the curriculum. | 61 | 3.61 | 1.11 |
| 14. Sustainability, as a competence, involves stimulating creativity, critical thinking, reflection, and self-learning in students. | 61 | 4.67 | 0.68 |
| 15. Sustainability, as a competence, involves integrating technical concepts in disciplinary subjects. | 61 | 3.98 | 0.79 |

The results of the study show that Cronbach's Alpha is quite high: 0.80 for the 15 items. They also reveal a mixed perspective on the integration of sustainability into higher education curricula. On one hand, there is strong support for the idea that sustainability should be incorporated as a cross-cutting competence across all disciplines, as indicated by the high mean score of 4.98 for Question 1. Similarly, there is recognition of the importance of including sustainability competencies in undergraduate and postgraduate curricula, as evidenced by the mean score of 4.70 (Question 5). Implementation of active learning strategies is also perceived as relevant for sustainability infusion, as shown by the mean score of 4,67 (Question 9). Moreover, lecturer training in sustainability content (Question 8) is highlighted as crucial for its effective inclusion in teaching practice, with a high mean score of 4.64 for Question 8. These findings suggest a widespread acknowledgment of the significance of sustainability education in higher learning institutions.

On the other hand, there are areas where the survey responses indicate room for improvement. For instance, the relatively low mean score of 3.33 for Question 2, regarding the integration of   sustainability as a mandatory course in all curricula. Overall, while there is evident recognition of the importance of sustainability education, these results highlight the need for further exploration and consensus-building to effectively integrate sustainability principles into higher education curricula.  Table 2 shows the summarized results of the study, according to the dimensions defined by the researcher.

*Table 2:* Summarized results by dimension

|  | Competence approach | Silo approach | Lecturer training |
|---|---|---|---|
| Mean | 4.53 | 3.51 | 4.55 |
| Standard deviation | 0.79 | 1.26 | 0.81 |
| Cronbach's Alpha | 0.79 | 0,79 | 0.78 |

The results in Table 2 reveal contrasting perspectives among lecturers regarding sustainability integration into higher education curricula. While there is strong agreement on the importance of interdisciplinary infusion, reflected in the Competence approach (M= 4.53; SD= 0.79; $\alpha$=0.79), some lean towards a more disciplinary Silo approach (M= 3.51; SD= 1.26; $\alpha$= 0.78). Additionally, the emphasis placed on Lecturer training highlights its crucial role in curriculum integration (M= 4.55; SD=0.81; $\alpha$= 0.78). However, the variability in responses suggests the need for further exploration and targeted interventions to address underlying concerns.

## Conclusions

The results of the study present a nuanced view of the integration of sustainability into higher education curricula among university lecturers. While there is strong consensus on the importance of incorporating sustainability as a cross-cutting competence across all disciplines, including, undergraduate and postgraduate curricula. Evidenced by high mean scores, some areas require attention and improvement. The relatively low mean score for the necessity of an introduction to sustainability as a mandatory course in all curricula suggests a lack of consensus on this approach, while lower scores for allocating space in the curriculum for sustainability subjects and introducing specialized courses indicate potential challenges or resistance. The results highlight the discrepancy between the Competence approach, emphasizing interdisciplinary integration, and the Silo approach, advocating for more compartmentalized methods. In addition, the findings underscore the importance of Lecturer training in sustainability content while also indicating a need for further exploration and consensus-building to effectively integrate sustainability principles into higher education curricula.

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