

# EXPLORING MY SUSTAINABLE FOOTPRINT: AN INNOVATIVE JOURNAL-BASED METHOD FOR DEVELOPING SUSTAINABILITY AWARENESS AND HABITS

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## ABSTRACT

Sustainable awareness, defined as the perception and understanding of the importance of caring for the environment and adopting sustainable practices, has gained increasing significance in today's context of environmental challenges. Education plays a pivotal role in promoting this awareness, from early stages to higher education. To achieve a meaningful shift toward more environmentally respectful behaviours, various pedagogical strategies have been explored, with the use of journals proving to be an effective tool for fostering reflection and the development of pro-environmental skills. This text addresses the relationship between sustainable awareness and journaling, analysing its importance in the educational process and in shaping individuals and designers committed to environmental preservation. Additionally, it reviews studies exploring how education and knowledge levels correlate with environmental awareness, highlighting the relevance of higher education in promoting sustainable behaviours. Notably, the implementation of this method over the last two years among multidisciplinary students, from the first to the final year of professional education, has yielded highly favourable qualitative and quantitative results. These results demonstrate deep and positive reflections and compelling data on the utility of journaling in cultivating sustainable habits and awareness. Through this exploration, the emphasis is on the importance of instilling values, attitudes, and pro-environmental knowledge through education and journaling, aiming for a meaningful shift toward a more sustainable and harmonious designed future with nature.

*Keywords: Sustainable awareness, sustainable habits, journal, higher education, professional education, educational innovation*

## 1 INTRODUCTION

The increasing relevance of sustainable awareness, defined as the understanding and consciousness of the importance of environmental care and adopting sustainable practices, is crucial among contemporary environmental challenges. Education plays a pivotal role in nurturing this awareness, starting from early stages and continuing through higher education [1], [2]. Various pedagogical approaches like Problem-Based Learning (PBL), Experiential Learning, Collaborative Learning, Case-Based Learning have been explored to induce significant shifts towards more social, economic, and environmentally friendly behaviours, with journaling emerging as an effective tool for fostering reflection and developing pro-sustainable skills [3].

This paper aims to explore the relationship between sustainable awareness and journaling, emphasizing its significance in education and the formation of individuals committed with sustainability. It will review studies that investigate how education and knowledge levels influence sustainable awareness, underscoring the role of higher education in promoting sustainable behaviours. The text will highlight the importance of instilling pro-sustainable values, attitudes, and knowledge through education and daily practices to drive meaningful change toward a sustainable future.

Key aspects such as knowledge, attitudes, and behavior interact to achieve sustainable practices, including recycling, reducing energy consumption, and using sustainable materials in product design. These practices promote social, economic, and environmental awareness in society. Knowledge involves understanding information about the three pillars of sustainability, attitudes encompass

emotional responses to contextual situations, and behavior refers to actions and responses to the world we live in [4].

Environmental education has been instrumental in promoting sustainable awareness since landmark events like the 1970 "Earth Day." Reports such as the "Meadows Report" and the "Brundtland Report" have contributed to raising global awareness. The "United Nations Conference on Environment and Development" outlined "Agenda 21," stressing the importance of environmental awareness from childhood to adulthood.

Studies by Vicente-Molina, M. A., Fernández-Sáinz, A., and Izagirre-Olaizola, J. analysed the influence of environmental knowledge on pro-environmental behavior among university students from countries with varying levels of economic development (USA, Spain, Mexico, and Brazil). These studies indicate that environmental education influences sustainable awareness, with higher education playing a significant role in enhancing concern for the environment and commitment to environmentally responsible practices. Despite progress, challenges remain in integrating sustainable perspectives across disciplines and within university leadership. [5].

Classroom activities fostering sustainable awareness are crucial for cultivating professionals dedicated to sustainable development. By raising awareness about resource exploitation and the importance of harmony with nature, students are motivated to contribute positively in their respective fields [6].

Moreover, educators must address the social, economic, and environmental damage caused by human activity by implementing educational programs focused on sustainable practices and serving as role models for sustainably friendly habits [7].

Sustainable education serves as the cornerstone for enhancing sustainable awareness in society. Early promotion of sustainable awareness, fostering respect for nature and people, and imparting knowledge for adopting sustainable practices are essential. Higher education plays a critical role in shaping individuals committed to a sustainable future, emphasizing a shift in attitudes and behaviours for the well-being of the planet and future generations.

Since everything that is not Nature is designed by humans, changes in students' personal behaviours towards responsible consumption and environmental awareness can positively influence their ability to design more sustainable products by integrating eco-friendly practices such as selecting renewable or recycled materials, creating durable and repairable designs, minimizing waste and emissions, and considering the full product life cycle. This holistic approach to product design balances functionality, aesthetics, and environmental and social aspects, encouraging innovation and continuous improvement. Through journaling, students can identify opportunities for new ideas and creative approaches to address the environmental and social challenges associated with product production and consumption today.

Further research will delve into the practical application of journaling in fostering sustainable awareness, drawing on insights from various disciplines and educational contexts. Understanding the efficacy of journaling in promoting sustainable behaviours can contribute to developing innovative educational strategies for addressing environmental challenges.

In this research, the dependent variable is **sustainable awareness**, and the independent variable is the **use of the journal** as a tool to improve the teaching-learning process [8].

## **2 METHODOLOGIES**

### **2.1 Educational innovation implementation process**

Within the climate emergency and the global environmental crisis, we are facing, there is a concerted effort within higher education to cultivate students with leadership, innovation, and entrepreneurial competencies. The goal is to foster a culture of environmental sustainability that generates impactful actions.

From a Design perspective, there is a focus on reducing and managing generated waste, trying to achieve Zero Waste [9]. Various initiatives have been undertaken, yielding diverse outcomes from those anticipated. One conclusion drawn is the lack of sustainable awareness within the community. Hence, there is an interest in integrating this activity into educational units to develop the transversal sustainability competence, not only within Design but across all disciplines. The development of a journal is proposed as a learning and reflection method to instil sustainable habits and awareness in students.

The activity presented below takes place over the entire semester, which spans 17 weeks. It has been implemented with 176 students over two semesters: across 7 groups comprising students from higher education, spanning various disciplines and academic levels.

They are asked to make an individual journal where they record everything they do for this educational innovation activity.

- At the beginning of the semester, an initial survey called "MY FOOTPRINT START" (1) is conducted to assess students' familiarity with journaling, sustainable awareness, and habit formation. This survey is specifically designed for this educational innovation.
- As an introduction, students take two existing tests: the Ecological Footprint Measurement (2) and the Slavery Footprint Measurement (3). They record screenshots of their results, providing a baseline for measuring their footprint.
- The next activity is to watch the video (4) that explains in a general way what the SDGs (Sustainable Development Goals) are; this puts the student in context for the next activity.
- The student reads the document "Students as Invaluable Participants in Achieving the SDGs"(5), which is a student action guide created by Tecnológico de Monterrey (Miguel Ruiz Cabañas Izquierdo, Mariajulia Martínez Acosta, and Karina Mayela Ruíz Aguilar) in collaboration with Benjamin Auger (George Mason University) and Mary Lou Coil (State University of New York). The student must choose 3 actions suggested in the guide and carry them out during the semester. The record of these actions must be in the form of a Journal, from the beginning of the semester to the end of it (15 weeks).
- As a reflective part of this Activity, the student is asked to watch the video "The Lightbulb" (6), which talks about planned obsolescence, and read the article "Cradle to Cradle movement" (7), which talks about the circular economy and regenerative design. He/she is asked to write an essay explaining his/her point of view on both topics.
- At the conclusion of his journal, the student redoes the two ecological (2) and slavery (3) tests, recording the results with screenshots. This allows them to compare their results before the Activity with those obtained after it. Based on this and what they have learned and experienced, reflect on what they have achieved in the Activity throughout the semester.
- To quantitatively measure the results of this innovation, a final survey called "MY FOOTPRINT CONCLUSION" (8) is conducted. This survey is specifically designed for this educational innovation and serves as a reflective exercise to raise awareness among students.

The material used to impart sustainability knowledge to students may vary and will be updated over time. Figure 1 below shows a diagram of the methodology used for this activity:

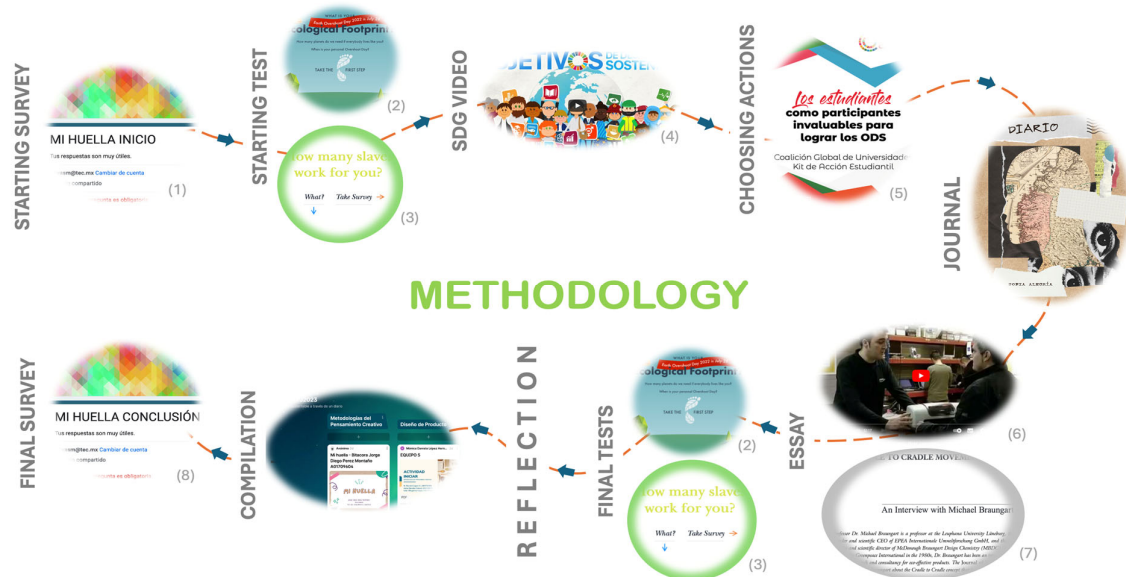


Figure 1. My Footprint Activity Methodology

## 2.2 Evaluation of results

The results of Starting and Final Surveys can be seen in Figure 2, and revealed that for 53.6% of students, keeping a journal is not easy. The main issue reported by students was the lack of consistency and forgetting to record their daily activities. However, reminders helped increase consistency in the record.

- Did you have any problems keeping your Footprint Journal?

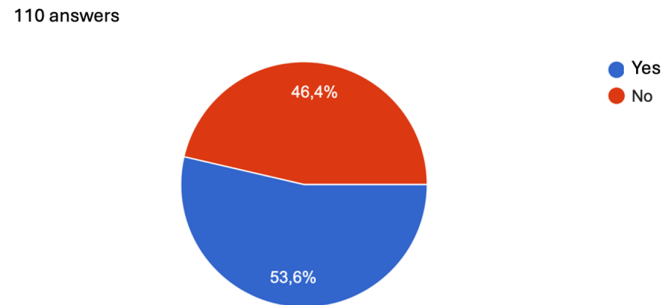


Figure 2. Did you have any problems keeping your Footprint Journal?

89.1% of participants considered that the journal allowed them to become more aware of their habits and helped them develop sustainable habits, and 90% of the students considered that the journal helped them create SUSTAINABLE HABITS, as shown in Figure 3.

- Do you think keeping a journal helped you generate AWARENESS of your habits?
- Do you think the journal helped you create SUSTAINABLE HABITS?

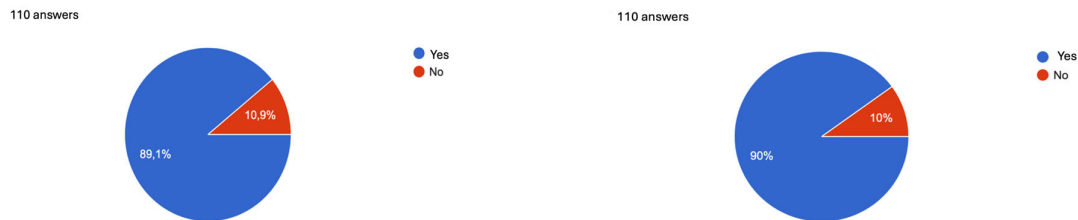


Figure 3. Do you think a journal helped you generate AWARENESS of your habits? /Do you think a journal helped you create SUSTAINABLE HABITS?

Additionally, in Figure 4, the results reflect a reduction in ecological and slavery footprints in 87.3% of respondents, compared to those obtained at the beginning of the activity.

- Did your results of the Ecological and Slavery Footprints improve, comparing the initial with the final tests?

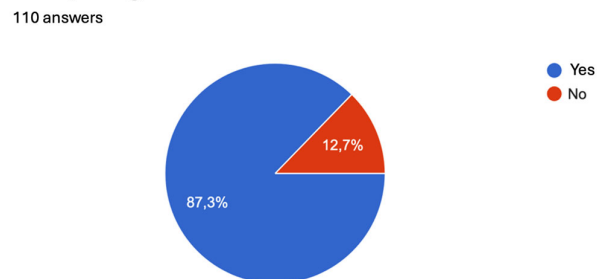


Figure 4. Did your results of the Ecological and Slavery Footprints improve, comparing the initial with the final tests?

Comparing the results of the two surveys, the level of knowledge and sustainability awareness increased. As supported by the theoretical research of this educational innovation, there is an observed relationship between sustainability knowledge and the level of sustainable awareness expressed by students. Figure

5 suggests that the use of the journal facilitated the development of sustainable awareness and habits in most students, increasing 33 percentage points in knowledge about sustainability, 32 percentage points in sustainable awareness and 33 percentage points in sustainable habits.



Figure 5. Quantitative results of My Footprint Activity

Some comments that reflect the qualitative data expressed by the students were:

"... I really **had no idea** how much it affected my actions thinking that I was just one more and that they weren't going to affect." AEN

"I feel like I've **become more conscious** about what I do and how my actions affect the environment." VS

"Like in part one, I kept refilling my bottle on campus and I've already stopped buying water bottles. I think this time it was a little easier, as it **became a habit for me**." CMO

"In conclusion, this **process of self-assessment and change has been transformative**. It has led me to question my choices, reevaluate my priorities, and act on my values. I'm excited to continue this path towards **a more sustainable lifestyle**. IO

### 3 RESULTS AND DISCUSSION

The qualitative and quantitative results from the activity indicate that journaling may effectively fosters sustainable habits and awareness among students. Education is essential for promoting sustainable practices, with higher education playing a crucial role in developing responsible individuals committed to environmental preservation. Journaling helps cultivate a holistic approach to sustainability, impacting students' ability to design more sustainable products by integrating eco-friendly practices.

The "My Footprint Activity" aids in knowledge acquisition, awareness generation, and habit formation. Although underexplored [10], journaling as an educational tool can significantly shift students' learning processes across disciplines. It is flexible and adaptable, suitable for various contexts like environmental education, social sciences, health, engineering, and business, promoting lasting change toward sustainability.

While the study shows positive results, its limitations include potential biases from self-reported data, the short study duration, and external factors influencing outcomes. Future research should address these limitations for a comprehensive understanding of sustainable education's long-term effects.

Quoting Munari, we must see "Design as creation of objects, events and environments inspired by the observation of everyday life and natural phenomena." [11]

### 4 FUTURE WORK

The author aims to continue implementing the journaling activity in all future training units and seeks support for developing a robust application usable by students and the entire Tecnológico de Monterrey community. This entails considering features such as Automatic Reminders, Platform Customization,

User Interface design, Training, and Support to facilitate long-term monitoring and customization for different contexts like Social Sciences, Health, Engineering and Technology, and Entrepreneurship. Such efforts would contribute to fostering sustainable awareness and promoting a healthier, more vibrant world. Additionally, the intention is to survey students constantly to validate its long-term effectiveness. Collecting and analysing data over time can provide a more comprehensive assessment of the long-term impact of journaling activity on students' development of sustainable habits. This process can identify successful areas and opportunities for improvement, correct decision making when designing, informing future environmental education and sustainability initiatives. Long-term evaluation strategies may include monitoring sustainable behaviours, direct observation, tracking sustainability indicators (footprints), and conducting monitoring surveys.

Artificial intelligence (AI) has the potential to enhance the effectiveness of journaling in generating sustainable awareness by offering advanced data analytics, personalized user experiences, increased engagement, and predictive behavior modeling. Integrating AI into the journal activity can promote positive Behavioral changes and foster greater sustainability engagement among users.

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