
**Soil education as a contribution to the debate on SDGs in the discipline of Pedology,
Geography course at FCT/Unesp, Presidente Prudente campus**

**La educación del suelo como contribución al debate sobre los ODS en la disciplina de
Pedología, curso de Geografía de la FCT/Unesp, campus Presidente Prudente**

**A educação em solos como contribuição ao debate dos ODS na disciplina de Pedologia,
curso de Geografia da FCT/Unesp câmpus de Presidente Prudente**

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Abstract

In 2015, the United Nations' 17 Sustainable Development Goals (SDGs) were launched globally to address the negative impacts of human activities on the environment. However, limited investments hinder their implementation. Environmental Education plays a key role in raising awareness of these issues and supporting the SDGs. Among innovative approaches, soil-based "eco-paint" combines art, soil conservation, and sustainability. This article describes a practical experience from the Pedology course in the Geography Licentiate and Bachelor's programs at FCT/UNESP, Presidente Prudente. The use of eco-paint served as a pedagogical tool to promote Soil Education and environmental awareness, offering an alternative learning approach to enhance understanding and encourage sustainable practices.

Keywords: eco-paint; active methodology; art; pedology

Resumen

En 2015, los 17 Objetivos de Desarrollo Sostenible (ODS) de la ONU se lanzaron a nivel mundial para abordar los impactos negativos de las actividades humanas en el medio ambiente. No obstante, la falta de inversiones dificulta su implementación. La Educación Ambiental es clave para sensibilizar sobre estos problemas y respaldar los ODS. Entre los enfoques innovadores, la eco-pintura a base de suelo combina arte, conservación del suelo y sostenibilidad. Este artículo relata una experiencia práctica del curso de Pedología en los programas de Licenciatura y Bachillerato en Geografía de la FCT/UNESP, en Presidente Prudente. El uso de eco-pintura se empleó como herramienta pedagógica para promover la Educación en Suelos y la conciencia ambiental con enfoques escolares alternativos.

Palabras clave: ecotinta; metodología activa; arte; pedología.

Resumo

Em 2015, os 17 Objetivos de Desenvolvimento Sustentável (ODS) da ONU foram implementados globalmente para enfrentar os impactos ambientais negativos causados pelas ações humanas. Contudo, a falta de investimentos compromete seu cumprimento. Nesse contexto, a Educação Ambiental desempenha um papel crucial ao sensibilizar a sociedade para os problemas ambientais, alinhando-se aos ODS. Entre as metodologias inovadoras, destaca-se o uso de ecotinta à base de solo, que alia arte, valorização do solo e práticas sustentáveis. Este artigo relata uma experiência prática realizada na disciplina de Pedologia, nos cursos de Licenciatura e Bacharelado em Geografia da FCT/UNESP, em Presidente Prudente, utilizando ecotinta como ferramenta pedagógica para promover a Educação em Solos e a conscientização ambiental em abordagens escolares alternativas.

Palavras-chave: ecotinta; metodologia ativa; arte; pedologia.

Introduction

In 2015, as a result of the United Nations Summit on Sustainable Development held in New York, the United Nations (UN) Sustainable Development Goals (SDGs) were implemented worldwide. These items, which make up the “2030 Agenda”, are the basis of a document launched jointly by more

than 190 countries, establishing 17 goals and 169 targets focused on the planet, people and prosperity, covering topics such as poverty eradication, food security and agriculture, health and education (Ministry of Environment and Climate Change, 2022).

According to the Agenda, by the year 2030, the government, society, universities, the private sector and all citizens should collectively commit to establishing “a more just, economically viable and environmentally sustainable society” (Moura et al., 2020, p. 1). However, despite the sine qua non condition for the survival of all living beings, advances are questionable. Furthermore, on a planet predominantly taken over by urbanization, the depletion of fossil fuels and climate change, the Anthropocene civilization model, a scientific concept popularized in the 2000s by chemist Paul Crutzen, is what prevails (Nunes et al., 2023). In this sense, environmental assets, transformed and/or negatively impacted by human actions, are contemplated in the UN SDGs, but the outlook is discouraging, since there are no massive investments and large-scale actions to comply with them (UN, 2024). In addition, there are conflicts of interest between hegemonic groups; the lack of oversight to ensure that environmental legislation is effectively complied with at the most different scales; corruption, which diverts millions from public coffers to the detriment of, among other aggravating factors. The materialization of these statements may be in the soil system, par excellence, alive, or should be. A fragile outer layer of the Earth's surface with a record of human interference in the Anthropocene (Costa et al., 2019), the result of cultivation, usually conventionally for the production of commodities; buildings and other urban structures; sanitary engineering works, among other interventions. On this subject, despite SDG 15, “Life on land”, between 2015 and 2019, at least 100 million hectares of productive land in the world were degraded per year (UN, 2024), while, in the Brazilian case, there is no data on combating desertification and soil degradation, a goal to be achieved by the year 2030 (Brazil,

2024). Furthermore, it is important to highlight the role of climate change, which is responsible for altering the fundamental functions of the soil, directly and indirectly, which becomes sterile and incapable of meeting the demands of an increasingly ascendant society, in which more than 800 million people face food insecurity (Saath; Fachinello, 2017), while, in the future, climate extremes could drag another 3 billion people into poverty (Exame, 2024). In this context, considering the fact that society is an active element in the implementation of the SDGs, Capeche (2010, p. 7) points out that “environmental education has proven to be fundamental in raising awareness among the population about the negative environmental impacts observed in our daily lives”. Thus, one of the actions to draw students' attention, to raise awareness about environmental problems and the role of the SDGs, whether in formal or informal learning environments, is represented by artistic activity, which can be personified in the use of soil to create eco- or geo-ink, a social practice capable of “contributing to the appreciation and conservation of soil” (Vital et al., 2018, p. 146). This material, being an unconventional way of approaching soil teaching, can assist in more in-depth studies on the subject, which is superficially portrayed in Brazilian schools (Mugger; Sobrinho; Machado, 2006). For Leinfelder (2022), new transdisciplinary and transformative formats in education allow for the participation, discourse and reflection necessary for a change towards a more just Anthropocene, if that is possible in the current economic context. Eco-ink has minimal environmental impact, is of good quality and durability, and is a non-toxic material, with a cost 30% lower than that of conventional paint (Vital et al., 2018). Its composition is limited to water, glue, and soil, and when used as a didactic-pedagogical resource, it implies artistic democratization related to teaching (Moreno; Perusi; Nunes, 2023) and favors the teaching-learning relationship, concerning “soil education as an integral part of environmental education” (Bento et al., 2011, p. 615).

Thus, the objective of this work is to present an experience report on an active and practical methodology developed during a class in the Pedology discipline, offered in the Bachelor's and Undergraduate courses in Geography at the Faculty of Science and Technology of the São Paulo State University "Júlio de Mesquita Filho" (FCT/UNESP) Presidente Prudente Campus, based on the production and application of soil-based eco-ink as a resource for soil education, encouraging learning and raising awareness about sustainable practices.

Materials and methods

The Pedology discipline, an optional subject, is regularly offered in the third year of the Bachelor's and Undergraduate Degree in Geography courses at FCT/UNESP Presidente Prudente Campus. Within the context of the Program of Activities and Improvement in Teaching in Higher Education (PAADES), in accordance with UNESP Resolution No. 14, of April 18, 2022, on October 25, 2023, the aforementioned discipline offered the class "Education in soils", in which the main concepts related to the importance of learning this topic in school and academic environments were addressed, based mainly on the presentation of the UN SDGs and the non-agricultural use of soil. The students then participated in a creative activity, which consisted of producing artistic representations using soil paint on sulfite paper or craft paper. To create the eco-ink, the students used different types of colors, coming from the remains of samples of Red Latosol, Yellow Argisols, Nitosols, Quartzene Neosols, etc., used in research conducted at the Laboratory of Sedimentology and Soil Analysis (LabSolos) of the FCT/UNESP; for the black ink, charcoal was used. Independently, the 26 participating students divided themselves and, sitting on the classroom floor, each small group received a recycled margarine tub or a disposable cup, school glue, water and sheets of

paper. After each piece of work was dried, it was pasted on an “improvised bulletin board” in the room where the class was taught (photos 1, 2 and 3).

Photo 1 - Process of creating drawings by one of the groups of students



Source: Moreno (2023)

Photo 2 - Collage of drawings on the classroom wall



Source: Moreno (2023)

Photo 3 - Result of the practical activity: all the drawings displayed on the “improvised wall” at the back of the classroom



Source: Firmino (2023)

Results and discussion

The practical activity, proposed in the second part of a Pedology class, provided a moment of knowledge creation through creativity, playfulness and participation of students, teachers and PAADES interns from the Geography course at FCT/UNESP. Inserting, in the school context, transformative methodologies that are in line with the students' diverse realities allows access to knowledge that is sometimes distant, such as, for example, the artistic and non-agricultural use of soil. During the activity, it was noticed that the students portrayed, in their creations, natural components, struggles of social movements and even religious elements; In this regard, it is clear that artistic expressions tend to connect to people's most sensitive memories.

Thus, the use of eco-ink as a strategy for teaching and learning in soils can be attached to the study and awareness of the UN SDGs, especially number 15,

which concerns the health of the land as a condition for maintaining life. Furthermore, it can awaken the creative side of individuals and represents a sustainable way of working with education in the Anthropocene (Leinfelder, 2022), which should not be seen neutrally or uncritically.

Final Considerations

It is essential that students adopt an appropriate practical language about the unprecedented geological moment that the Earth is going through, being able to understand their responsibility in the face of current environmental challenges.

The seventeen Sustainable Development Goals, yet another strong call for human awareness after the obsolete Millennium Goals, can only be achieved if their means is education. In this sense, SDG 15 stands out, focused on soil conservation, which is of fundamental importance for maintaining life, not only human life, but all ecosystems on the planet.

Attention is drawn to the need for initiatives that encompass soil conservation measures in conjunction with the aforementioned SDG, since, in Brazil, there is no data on combating desertification and soil degradation, a goal that should be achieved by the year 2030. Thus, creative and playful activities, such as painting with eco-ink, present themselves as a didactic form of extension and transposition of knowledge and knowledge about the need to know and value the soil on which one walks.

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