RELISE

HOLISTIC ANALYSIS OF SUSTAINABILITY IN HIGHER EDUCATION: A REFLECTION FOR CHANGE[1]

ANÁLISE HOLÍSTICA DA SUSTENTABILIDADE NA EDUCAÇÃO SUPERIOR: UMA REFLEXÃO PARA A MUDANÇA

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ABSTRACT

Currently, educational institutions have been integrating sustainability into higher education courses and their strategic role in transforming society. This effort aligns with the expectations of environmental movements and international organizations regarding the challenges of balancing environmental, social, and economic issues. Thus, the objective is to understand how sustainability is implemented in the policies and curriculum of higher education courses at IFRO. The research is descriptive and utilizes a qualitative method through the analysis of secondary data. The results indicate that sustainability is incorporated into the institution's internal documents, but not consistently and not in a clear manner. Some courses offer sustainability education prominently, while others show low adherence to the subject. In conclusion, suggestions for future research are provided, along with contributions to the revision of internal policies and alignment with other sustainability strategies such as the Sustainable Development Goals (SDGs).

Keywords: sustainability, SDGs, education for sustainability, educational policies, federal institute of education.

RESUMO

Atualmente as instituições de ensino têm integrado a sustentabilidade nos cursos do Ensino Superior e no seu papel estratégico de transformação da sociedade. Esse esforço corresponde às expectativas dos movimentos ambientalistas e de organismos internacionais quanto aos desafios para equilibrar as questões

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ambientais, sociais e econômicas. Assim, tem-se o objetivo de compreender como a sustentabilidade é implementada nas políticas e na formação dos cursos superiores do IFRO. A pesquisa é descritiva e utiliza o método qualitativo, através da análise de dados secundários. Os resultados apontam que a sustentabilidade está inserida nos documentos internos da Instituição, mas não em todos e não de forma clara. Alguns cursos oferecem educação para a sustentabilidade de forma incisiva, enquanto outros apresentam uma baixa adesão ao tema. Ao final, são apontadas sugestões de pesquisas futuras, e contribuições para a revisão das políticas internas e alinhamento com outras estratégias para a sustentabilidade, como os Objetivos de Desenvolvimento Sustentável-ODS.

Palavras-chave: sustentabilidade, ODS, educação para a sustentabilidade, políticas educacionais, instituto federal de ensino.

INTRODUCTION

In the last five decades, sustainability and sustainable development have gained prominence on the agenda in various institutional actions around the world (BANSAL; GREWATSCH; SHARMA, 2021; BIANCHIM et al., 2021; ERGENE; BANERJEE; HOFFMAN, 2020; GALLELI et al., 2022; LOZANO; BARREIRO-GEN, 2021; MEBRATU, 1998; TREVISAN et al., 2023). In this sense, some guiding documents mark processes of change in human attitudes toward problems related to sustainability, such as the 1972 UN Conference on the Human Environment and the WCED report (known as the Brundtland Commission - Our Common Future) (BRUNDTLAND, 1987).

Environmental problems, related to climate change, economic growth combined with increasing social inequalities, population growth unaccompanied by public policies, among others, can be analyzed from the perspective of sustainability (GOLD; HAHN; SEURING, 2013; KATES et al., 2001). This theme has been constructed and explained over the past decades based on the support of the sustainability tripod, constituted by three pillars: economic, environmental, and social (BOCKEN et al., 2014; ELKINGTON, 1997; SANT'ANNA; SILVA; LEONEL, 2019).

Advances have already been made in sustainability practice at the personal and/or organizational level; however, more practical actions would be necessary, such as actions related to the protection of the Brazilian Amazon. Some literature indicates that organizations are reacting to social pressures from various stakeholders (SILVIA et al., 2011) contributing to the creation of sustainable businesses (BOONS; LÜDEKE-FREUND, 2013; BORLAND et al., 2016), sustainable innovation (VARADARAJAN, 2017), sustainable entrepreneurship (PLOUM et al., 2017), circular economy (JABBOUR et al., 2019), corporate social responsibility (CSR) (BANSAL, 2005; HAHN et al., 2018) and Environmental, Social, Governance (ESG) (CORT; ESTY, 2020). However, the relationship of humans with nature needs to be considered beyond the anthropocentric perspective in organizations (KRENAK, 2019), since sustainability must be embedded in the social context of life. Therefore, we propose rethinking this relationship from the educational process practiced in professional training courses.

In this sense, Higher Education Institutions (HEIs) are understood as key institutions in the transformation of society through knowledge and the strengthening of debate on sustainability (BAYAS ALDAZ et al., 2020; GALLELI et al., 2021; LATTU; CAI, 2020; STERLING, 2010). Universities, through education, have significant importance in embedding sustainability within society (ALSHUWAIKHAT; ADENLE; SAGHIR, 2016; BRADFIELD, 2009; SANT'ANNA; SILVA; LEONEL, 2019; TASDEMIR; GAZO, 2020), whether in training professionals with skills and knowledge in sustainability who work in various segments of society or in producing knowledge and innovations that may contribute to generating less impact on the ecosystem (BRUNDIERS et al., 2021; FRANCO et al., 2019).

Thus, we ask ourselves: how have HEIs contributed to a more sustainable future? What strategies are being adopted for sustainability

teaching? What policies have been created to support the inclusion of sustainability in higher education? Therefore, the objective is to understand how sustainability is implemented in the policies and training of higher education courses at the Federal Institute of Education of Rondônia (IFRO).

The article presents a case study analyzing the policies and courses of IFRO. For this, document analysis strategies are adopted (pedagogical projects, resolutions, notices), as well as observational research, since the researchers are staff working within the academic structure of the HEI. The choice of the institution is justified by its location in the Amazon region and for offering courses of different modalities, from high school, technical, undergraduate, and postgraduate, making it an interesting and unprecedented case study in the literature (YIN, 2016). The article contributes to the literature by providing a holistic analysis of how sustainability is embedded in courses and organizational strategies of an institution located in the Amazon (DOTTO et al., 2019; IBRAHIM et al., 2017; MACHADO et al., 2016; PACHECO et al., 2019; PALMA; PEDROZO; ALVES, 2019; ROHRICH; TAKAHASHI, 2019).

Beyond this introduction, the article is composed of the second section, dedicated to the theoretical review on sustainability and an overview of the current state and its challenges for organizations. The third section discusses the application of sustainability in higher education. The fourth section presents the results and discussions, mapping how the studied HEI adopts sustainability in its course curricula, and the final section brings the research conclusions, recommendations, and future study perspectives.

SUSTAINABILITY: URGENCIES AND STRATEGIES

Planet Earth is undergoing major transformations due to environmental, social, and economic problems largely caused by human action, which has affected the conditions of life. These issues have been discussed for decades

through documents such as the WCED report (known as the Brundtland Commission - Our Common Future) (BRUNDTLAND, 1987) and academic and environmentalist works that have brought sustainability onto the radar of organizations (BANERJEE; ARJALIÈS, 2021; CARRIN, 2024; CARSON, 1962; GLADWIN; KENNELLY; KRAUSE, 1995; MEBRATU, 1998; ZOLLO; CENNAMO; NEUMANN, 2013).

This increase in human awareness reflects the growing scarcity of natural elements necessary for life (ZAMORA-POLO; SÁNCHEZ-MARTÍN, 2019), and has demanded the creation of sustainable development strategies within organizations. Thus, the economic development model that generates value from its businesses is under strain (HAHN et al., 2015; HENGST et al., 2019), requiring changes aimed at achieving greater balance in the so-called sustainability tripod (economic, social, and environmental). In other words, the core activities of organizations need to contribute to solving problems related to sustainability through their professionals.

As organizations need to incorporate sustainability through vision, decision-making, technological innovation, or some other strategy (ZOLLO; CENNAMO; NEUMANN, 2013), the great challenge presented is how to involve the entire society in this incorporation. In other words, how to promote a culture of transformational and ecocentric strategies among professionals, with the perspective of changing the understanding of organizational value-generating activities in relation to ecological sustainability (BONN; FISHER, 2011).

It is in this context that we understand the role of Higher Education Institutions can be relevant in the strategy to promote this social transformation. The literature has contributed to this phenomenon by offering different strategies for organizations to implement sustainable practices in education (BOKOLO, 2020; BØRSEN et al., 2020; FABRICIO; NOGUEIRA; MORTEN, 2017; IBRAHIM et al., 2017; TASDEMIR; GAZO, 2020). In this regard, the United Nations (UN)

proclaimed, through resolution 59/237, the period 2005-2014 as the Decade of Education for Sustainable Development (DESD) (UNESCO, 2005) and more recently launched the Sustainable Development Goals and the 2030 Agenda (UNDP, 2015). All these documents reinforce the strategic role that education for sustainability has in changing the current economic, social, and environmental development model (SIDIROPOULOS, 2018), as well as pointing to sustainable development as an emergency to be included in institutional policy agendas (AGBEDAHIN, 2019; FLEIG; NASCIMENTO; MICHALISZYN, 2021) and in the training of professionals in higher education.

Sustainability embedded in higher education can provide strategies in professional practice that meet expectations for reducing or solving environmental, social, and economic problems that threaten the ecosystem of planet Earth (SHEPHARD, 2015; TASDEMIR; GAZO, 2020). Franco et al. (2019) define sustainability as an act driven by different stakeholders (governments, industry, educational institutions, and civil society) for the transformation of social, environmental, and economic problems. This reflects the breadth of social pressure for sustainable positioning of organizations.

SUSTAINABILITY IN HIGHER EDUCATION

The urgency imposed by the discussion on sustainability demands changes in institutional policies and practices and curricula in higher education, in order to align the practices of educational institutions with the parameters of the global sustainable agenda, more appropriate to the local reality. As Boron, Murray, and Thomson (2017, p. 38) indicate, the goal of courses “oriented around ‘sustainability’ is to support the practical realization of a sustainable future for industry, business, and society.”

Brazil has been a pioneer over the last decades in enacting legislation that considers environmental concerns, such as Law No. 6,938/1981, which

provides for the National Environmental Policy, where environmental education must be present at all educational levels (BRASIL, 1981). This was further reinforced in the 1988 Federal Constitution (BRASIL, 2017a) and in more specific legislation such as Law No. 9,795/1999, which establishes environmental education in the curriculum of educational institutions (BRASIL, 1999).

Despite these advances, in practice these laws have had little practical impact on higher education training in Brazil, since these regulations address only the Environmental part of the sustainability tripod. This makes it difficult to articulate with social and economic aspects and reflects the limited progress in environmental issues in Brazil and worldwide. Against this context, the question that requires deeper theoretical exploration is: What competencies and skills and how have Higher Education Institutions (HEIs) developed such aspects in the training process of learners? (BRUNDIERS et al., 2021). Thus, we need to outline some implications of this context related to pedagogical-institutional issues of HEIs and to issues in the field of sustainability.

Regarding pedagogical-institutional issues of HEIs, it is noted that they may present difficulties related to aligning professional training objectives and profiles with the social and environmental needs that stakeholders consider most urgent (WANG; SOMMIER; VASQUES, 2022). In addition, there may be discrepancies in aligning the competencies required by the labor market from graduates, sustainability competencies, and professional technical competencies. Finally, as a structural problem in training, HEIs may present flaws or absence of teacher training aimed at preparing professionals for sustainability (BRUNDIERS et al., 2021).

Such institutional difficulties are possibly aggravated by the diffuse and ambiguous profile surrounding the sustainability area. It is diffuse because the sustainability field has a multidisciplinary characteristic and ambiguous because the term itself lacks a more concise definition (GALLELI; FREITAS-MARTINS;

TELES, 2021; MEBRATU, 1998). Perhaps the diffuse condition favors a fragmented understanding of sustainability, generating different concepts, which contributes to a scattered and immature view to implement it in higher professional training (WIEK; WITHYCOMBE; REDMAN, 2011). Meanwhile, the ambiguity produced by the varied concepts of sustainability tends to hinder its development into a strong performance of sustainability in higher education processes.

These perspectives are corroborated by the literature by considering sustainable development a complex issue, with a breadth of perspectives, and therefore the absence of a unique and consolidated concept (FRANCO et al., 2019; KATES et al., 2001), the little importance attributed to the subject by some areas of knowledge (RAMPASSO et al., 2018), still incipient teacher training (FAN; YU, 2017), and lack of adequate teaching materials for professional training (ROWE, 2007).

Education for sustainability aims to enable the transformation of academics into citizens engaged in their professions in a sustainable manner, so that they are capable of developing solutions to strengthen commitment to social justice, ethics, and ecological integrity, combined with solutions inherent to the economic perspective (MICHEL, 2020). Given this scope, Brazilian HEIs have sought to insert sustainability into the pedagogical projects of courses in different disciplines (KOMIYAMA; TAKEUCHI, 2006), in teaching practice and educational didactics, and in institutional policies aiming at a change in organizational culture (SANT'ANNA; SILVA; LEONEL, 2019; TASDEMIR; GAZO, 2020; VISWANATHAN, 2012). The intention is to offer transformative training in the student's life beyond acquiring technical knowledge and information, aimed at daily professional practice in favor of sustainability.

Many experiences have already been practiced in national and international HEIs, pointing paths and contributions for a more sustainable world

(ADENLE et al., 2021; ALSHUWAIKHAT; ADENLE; SAGHIR, 2016; BIANCHIM et al., 2021; FILHO, 2011; GALLELI; FREITAS-MARTINS; TELES, 2021; IBRAHIM et al., 2017; LATTU; CAI, 2020; LOZANO GARCÍA; KEVANY; HUISINGH, 2006; MACHADO et al., 2016; SANT'ANNA; SILVA; LEONEL, 2019). This path positions HEIs as strategic actors for a direction toward sustainability (ELMASSAH; BILTAGY; GAMAL, 2020).

STUDY METHOD

In this article, we develop a descriptive case study (YIN, 2016) that seeks to identify how sustainability is revealed in the guiding documents of institutional actions and pedagogical actions. We understand that this holistic analysis in the Higher Education Institution (HEI) offers distinct insights that the literature has not yet covered, enhancing the potential to discover "what causes what," as researchers seek to understand the factors that may explain different outcomes" (BANSAL; SMITH; VAARA, 2018, p. 1190). For this, the following documents were mapped and analyzed:

Chart 1: Analyzed documents

Document	Document orientation
Institutional Development Plan (PDI)	Outline the institutional objectives and the didactic-pedagogical, administrative, and financial autonomy in order to develop research, innovation, and extension actions.
Institutional Research Program	Gather the calls for proposals focused on scientific and technological initiation.
Institutional Extension Support Program	Bring policies for the development of Extension at IFRO aimed at encouraging active and permanent faculty, as well as substitute faculty and students of the institution, to carry out Extension activities.
Course Pedagogical Projects (see chart 5)	Organize information about curricular, didactic-pedagogical development, research and extension, as well as structural and infrastructure aspects for course implementation.

Source: Research data

We began our analysis with the Institutional Development Plan (PDI), describing the mission, vision, and values. This document outlines the strategic

planning and institutional policies of the institution. Next, the strategic projects, theoretical-methodological principles guiding the academic practices of the Higher Education Institution (HEI), and the sustainability policy were analyzed. The following topic of the description included the teaching, research, and extension policies, with greater detail on sustainability aspects contained in the pedagogical projects of the higher education courses.

The documents were found on the institution's online portal[4], made available for free access by the academic community and society in general. For greater data validity, the policy descriptions were cross-checked with documents issued by the institution related to the subject of this study, such as public notices, news, and reports. This verification strengthened the description presented in the study.

To support the analysis, in addition to specialized literature and institutional documents, we consulted legislation, specifically Decree No. 7,746 of June 5, 2012 (BRASIL, 2012), later amended by Decree No. 9,178 of October 23, 2017 (BRASIL, 2017b), which establishes criteria and practices for promoting sustainable development by federal institutions. Among the guidelines, we highlight: a) low impact on natural resources such as flora, fauna, air, soil, and water; b) preference for technologies and raw materials of local origin; c) more efficient use of natural resources, such as water and energy; d) development and implementation of Sustainable Logistics Management Plans (PLS); e) sustainability practices and rationalization of the use of materials and services; and f) implementation of actions for dissemination, awareness, training, and evaluation of the sustainability management plan.

The data collected from websites and institutional documents were analyzed through Bardin's content analysis (2011) consisting of the following steps: pre-analysis of the material, observing which institutional documents

[4] https://portal.ifro.edu.br/

provide support to respond to the proposed objective; exploration of the documents through reading, categorization, and coding of the data; and finally, processing the results through inferences and interpretation by the authors. Our analysis of sustainability in the selected documents resulted in four main categories: Institutional policy guidelines, Extension activities, Research activities, and Teaching activities of undergraduate courses.

The analysis of sustainability in these processes allows us to classify the HEI within the ‘mapping of views on sustainable development’ by authors Bill Hopwood, Mary Mellor, and Geoff O’Brien (2005). The authors created a map organizing three viewpoints: the status quo view, where the organization believes sustainable development can be achieved without social, economic, or ecological changes; the reform view, where the organization takes a critical stance and admits the need for subtle and organic social and environmental changes while preserving fundamental aspects of the mainstream environmental, social, and economic; and the transformation view, in which the organization reflects on the full attainment of sustainability, demanding radical changes by actors in culture, routines, environmental and social dynamics, and even in the economic structure.

This mapping allows reflection and understanding of the fluid environment in which the perspectives of people and/or organizations can shift between the status quo and transformation views. In this study, we used this conceptual framework to identify the institution’s view on sustainability through the analysis of its institutional documents. Such mappings emerge in academia as support to provide parameters for monitoring the view and, therefore, the intention regarding sustainability development in organizational activities. This is also an academic effort to reduce certain ambiguities generated by the variety of understandings about how to implement sustainable development (HOPWOOD; MELLOR; O’BRIEN, 2005).

Study context

The chosen Higher Education Institution (HEI) is a public autarchy that has been operating in the Brazilian Amazon region for just over 15 years in both face-to-face and distance education modalities and offers courses at the high school, professional technical, undergraduate (technologist, bachelor's, and teaching degree), and postgraduate lato sensu and stricto sensu levels. Therefore, it is an institution engaged in teaching, research, and extension (BRASIL, 2008). It holds didactic-pedagogical, administrative, and financial autonomy.

At the time of this research, IFRO offered a total of 27 undergraduate courses distributed across nine different campuses, including four bachelor's degrees (Agronomic Engineering, Animal Science, Control and Automation Engineering, and Architecture and Urbanism); four teaching degrees (Biological Sciences, Mathematics, Chemistry, and Physics); and seven technology undergraduate courses (Environmental Management, Commercial Management, Public Management, Systems Analysis and Development, Agribusiness, and Computer Networks). Some of the courses are offered simultaneously at more than one campus (IFRO, 2024).

The HEI provides professional training for different fields of knowledge. On one hand, this fragmentation hinders the consolidation of curricular guidelines to be adopted in all courses, since each professional field will adopt different practices in its curricula. On the other hand, it offers greater inclusion of the theme in different areas of knowledge (GALLELI et al., 2021) and becomes an interesting case study for understanding the phenomenon under study.

The analysis of pedagogical documents was limited to the Pedagogical Course Projects (PPCs) of the face-to-face undergraduate courses, as it is believed that this is the fundamental training base that establishes the professional profile to act in society. Excluded from this analysis were the

distance education undergraduate courses, as they have a different structure that favors more teaching through digital platforms and less focus on research and extension activities.

RESULTS AND DISCUSSION

Sustainability in the Institutional Policy Guidelines of the HEI

The Institutional Development Plan (PDI) analyzed was approved in the second half of 2023, with validity from 2023 to 2027, and was constructed through a participatory process involving the academic community (professors, students, and educational managers) and external members (parents, businesspeople, consultants, and community leaders). The document contains the strategic objectives and goals of IFRO for the period 2023-2027 to be implemented in all units of the institution (IFRO, 2024).

The mission of IFRO guides to “promote professional, scientific, and technological education of excellence, through the integration of teaching, research, and extension, focusing on the formation of citizens committed to human, economic, cultural, social, and sustainable environmental development” (IFRO, 2024, p. 175). This strategy is aligned with the competencies demanded by the market to respond to the challenges of sustainability (BRUNDIERS et al., 2021; MICHEL, 2020). It appears to be a strong indication of the institutional intentionality that sustainability is embedded in the organization's raison d'être. By adopting the sustainable development approach in institutional documents, the organization paves the way for the creation of meaning, based on routines, interconnections, and actions that can consolidate into concrete action in the training of people.

From the institutional mission, three strategic objectives and performance indicators are derived, as shown in Table 2.

Chart 2: Panel of Outcome Perspective Indicators

Strategic objective	Indicators
Sustainable regional development	Employment Rate; Course Effectiveness Rate; Evolution of Offered Vacancies;
Training citizens capable of transforming social reality	Success Rate; Dropout Rate; Retention Rate;
Innovative solutions for scientific, technological, and productive advancement	Volume of Incubated Enterprises; Graduation Rate of Incubated Enterprises; Rate of Technologies Transferred to Society.

Source: Adapted from IFRO, 2024.

It is observed that the objectives are aligned with the mission of the HEI, but the proposed indicators do not measure ways to achieve environmental and social sustainability. This is a situation frequently faced by HEIs (ADENLE et al., 2021; ALSHUWAIKHAT; ADENLE; SAGHIR, 2016; BOKOLO, 2020; SANCHEZ et al., 2018). The indicators seem vague and do not promote the evaluation of sustainability practices. Faced with this bottleneck, it is necessary for managers and policymakers to reflect on how to assess sustainability in the training of citizens capable of transforming society through proposed indicators.

In the PDI, we identified the portfolio of strategic projects, which are prioritized for the HEI's budget execution. The portfolio contains a total of 18 projects that address the following areas: Communication Policy; Strengthening Institutional Identity; Strengthening Management; Modernization of Management; Qualification, Training, and Valuing of Staff Program; Optimized Budget; Transparent Budget; Planning to Grow, among others (IFRO, 2018a). Analysis of the project descriptions reveals concern with consolidating organizational management structures and strategies, and a lack of clarity regarding the promotion of sustainability as an institutional practice. This is reinforced by the lack of integration of sustainability elements (sustainability and rationalization practices, environmental education, sustainable logistics) from environmental legislation (such as Decree No. 7,746/2012 and Decree No. 9,178/2017) in the institutional document.

The PDI states the philosophical and methodological principles guiding academic practices and points the way for the development of student training aligned with the curricula and methodologies practiced in the courses (TASDEMIR; GAZO, 2020). Chart 3 presents the HEI's principles.

In the document's detail, we find that general and broad guiding principles are described, without a specific focus, thus identifying the absence of sustainability as a guiding principle (WIEK; WITHYCOMBE; REDMAN, 2011). In this regard, Rowe (2007) points out that HEIs need to be at the forefront of advocating sustainability; they cannot abstain from environmental and social problems or wait for stronger direction from other organizations.

Chart 3. Theoretical-methodological principles guiding the academic practices of the HEI

Theoretical-methodological principles	Flexibility to establish training pathways that allow for rich and diverse dialogue within;
	Integration of different levels of basic education and higher education, professional and technological education;
	Offering continuing education as an aspect arising from the dynamics of the productive reality;
	Promoting the addition of work preparation and discussion of related principles and technologies to academic training;
	Use of active teaching methodologies to develop students' critical, ethical, supportive, and creative attitudes
	Implementation of technologies connected to various theoretical-practical knowledge fields;
	Opportunity for reflection on the diversity of contemporary Brazilian society;
	Pedagogical proposals of courses constructed from the perspective of disciplinary and interdisciplinary interaction;
	A curriculum that articulates transdisciplinary projects and disciplinary actions.

Source: Adapted from IFRO, 2024.

Teaching policies, for example, need to be oriented toward sustainability, as they have a direct impact on the offering of their courses. The teaching policies for professional education at IFRO are described in chart 4.

A detailed analysis of IFRO's teaching policies reveals terms that may or may not be related to the practice of sustainability; however, the lack of clarity allows teaching practices to be randomly organized and implemented by people with diverse conceptions. The lack of positioning on sustainability weakens

practices and the emergence of a sustainable culture in teaching, to the detriment of practices more focused on the economic aspect of the labor market.

Chart 4. Policies Defined for the teaching of Professional and Technological Education (PTE)

Polícies for Professional and Technological Education at IFRO	Social Inclusion: framing Professional and Technological Education (PTE) based on recognizing demand arising from the exclusion of thousands of people from training processes;
	Productive Inclusion: establishing PTE in a broader space that does not only meet the demands of the more advanced production sectors;
	Recognition of intrinsic connections between Basic and Higher Education, between human, scientific, cultural formation, and professionalization, and between General and Professional Education;
	Structuring courses with training pathways articulated with a certification system that facilitates mobility and professional development;
	Offering courses respecting regional diversities and peculiarities, focusing on training a reflective, critical, creative person committed to social aspects;
	Promoting, in the teaching and learning process, a set of skills and competencies that enables knowledge building aimed at transforming reality;
	Meaningful integration between theory and practice through curricular organization that includes interventions and experiences allowing the interrelation of essential theoretical and practical knowledge, fostering professional training and student autonomy;
	Articulation of social demands from the labor market into professional education curricula, with courses organized allowing flexibility for local specificities;
	Articulation of the principles and proposals contained in the pedagogical project with institutional management and with the processes of monitoring and continuous evaluation of the training provided;
	Understanding work as an educational principle.

Source: Adapted from IFRO, 2024.

Following the analyses, sustainability was identified as described more clearly and concisely in the chapter addressing the pedagogical principles (IFRO, 2024, p. 59–60):

> Education for environmental sustainability aims to promote awareness and responsibility for the environment, its preservation and conservation, with the responsible use of natural resources focused on sustainable development, awareness about consumerism, the use of renewable energies, proper disposal of solid waste, the adoption of sustainable practices in different types of work and professional, industrial, and business activities, and the protection of biodiversity.

Despite this topic, it was observed that the economic aspect is summarized in the guideline ‘resources.’ The passage assumes that education for environmental sustainability is intrinsically positive, without questioning the structural and political challenges involved in its implementation. However, it is

essential to ask: who defines what is "responsible use" of "natural resources"? Who has access to renewable energies and sustainable technologies? The approach adopted could explore these questions to avoid a superficial view in the HEI's main institutional document.

The literature shows that the term 'development' is often associated with a linear and Western vision of progress, which can reproduce colonial logics of exploitation and domination. In this sense, education for sustainability at IFRO should consider how the material conditions of the population influence the possibility of engagement with environmental practices. It is fundamental to reflect on who benefits and who is harmed by current development models.

If we consider that IFRO is located in the Amazon biome, it is concluded that this strategic location could be aligned with the implementation of clearly disseminated sustainable practices and culture in all its strategic planning processes. However, it is observed that, globally, the economic perspective has received greater interest in organizations (BORLAND et al., 2016). This prioritization has been criticized in academia since excessive focus on the economic aspect significantly impacts the preservation and conscious use of natural resources (JONES, 2011). Thus, education for sustainability must incorporate and value local knowledge and Southern epistemologies, recognizing that there is no single way to interact with nature, but rather multiple practices and worldviews that can contribute to environmental preservation.

Thus, we verify that the internal policies of each operational segment of the analyzed HEI are not aligned with the sustainability position present in the organizational mission. The lack of clarity of sustainability throughout the description of the strategic planning weakens and disarticulates the creation of sustainable practices in organizational routines and in the provision of teaching, research, and extension services. However, it cannot be denied that HEIs have signaled actions to integrate sustainability into their mission, planning, curricula,

and research, encompassing the entire academic experience (MUHAMMAD et al., 2020; ROWE, 2007). In the specific case of the analyzed HEI, this process has already begun in the outline of institutional strategies at the macro level, but greater alignment of policies is still necessary to promote involvement and commitment to sustainable practices in all institutional segments (FLEIG; NASCIMENTO; MICHALISZYN, 2021).

The wording of the document contains significant advances compared to previous versions of the strategic planning (IFRO, 2014, 2018a). However, the development of indicators to measure progress towards better sustainability practices, including social and environmental dimensions, is still necessary (ADENLE et al., 2021; BOKOLO, 2020; SANCHEZ et al., 2018). When analyzing the current PDI in light of the classification by Hopwood, Mellor, and O'Brien (2005), it is observed to fall within a reformist perspective. This means that IFRO recognizes the existence of environmental, social, and economic problems critical to the survival of planet Earth but adopts the position that such challenges can be reformed and solved gradually over time.

Sustainability in teaching, research and extension activities

When analyzing the policies related to **extension activities**, it was found that sustainability is addressed tangentially, which weakens the articulation between the development of teaching and its application in the external community. This aspect is evidenced in the extension policy:

> The objectives of extension activities should be aimed at the development of society, interaction between staff and the external community, articulation between IFRO and other public and private institutions, companies, and entities, integration with teaching and research, technological production and cultural dissemination, induction of regional development, socioeconomic and environmental sustainability, priority service in favor of social inclusion, and encouragement of the generation of innovative businesses and products (IFRO, 2024, p. 78).

Although sustainability is mentioned, extension activities guided by these directives demonstrate a limited institutional commitment to its implementation in organizations and communities external the HEI. This scenario suggests the need for a more structured and effective approach to ensure university extension contributes concretely to strengthening sustainability at local and regional levels.

Extension activities are conducted through public calls – such as Public Notice No. 14/2020 – aimed at strengthening traditional communities and environmental sustainability; through events such as Environment Week, Environmental Management Week, and short-term initial and continuing training courses, such as the Sustainable Action Workshop. Our analysis identified several extension actions related to sustainability, demonstrating that despite the absence of explicit mention of sustainability in the policies described in the Institutional Development Plan (PDI), IFRO's extension services are strongly aligned with its institutional mission. In this sense, short-term extension courses, alongside technical and professional training, can contribute to broadening the debate on sustainability, especially in courses whose curriculum matrix shows less adherence to the theme (TASDEMIR; GAZO, 2020).

In analyzing **research** policies in the PDI and the Institutional Research Program (PIP), no guiding directives for sustainability were identified. Considering that scientific research drives knowledge advancement, it becomes essential to reflect on incorporating technological innovation with low environmental impact in research processes, regardless of the knowledge area (FRANCO et al., 2019; SANDRA et al., 2015).

The inclusion of sustainability in institutional research practices also reinforces the importance of conducting specific studies on the topic. Sustainability research aims to understand the interactions between nature, organizations, and society, as well as the dynamics needed to guide these relationships toward sustainable trajectories (KATES et al., 2001). Social

progress in this field will require the promotion of comprehensive and goal-oriented research addressing humanity's concrete problems.

The analyses indicate that the absence of guiding norms in institutional documents does not imply the inexistence of scientific research on sustainability. In the collected data, research groups focused on the theme were identified, such as: Challenges and Prospects for a More Sustainable City; Renewable Energy; Amazonian Borders: Societies, Technology, and Cultures; Agrotechnology in the Amazon; Social Technologies Serving Traditional Peoples in the Southern Amazon; and Innovation and Sustainability of the Amazon. However, is understood that these initiatives result from the voluntary engagement of professionals whose academic background is related to the area.

In the **teaching** domain, we found that all Pedagogical Project of Courses (PPCs) describe the HEI's environmental education policy. This policy aims to build social value judgments and competencies for environmental appreciation. The PPCs follow the guidelines of the National Environmental Education Program, which orient transversal and interdisciplinary approaches, spatial and institutional decentralization, socio-environmental sustainability, democracy and social participation, and the improvement and strengthening of education and environmental systems and others interfacing with environmental education.

In the regulatory context, Law 9,795/1999, which establishes the mandatory inclusion of environmental education in higher education courses, holds significant relevance (BRASIL, 1999). However, upon analyzing the PPCs, it was observed that in some courses, such as Chemistry and Physics, the law is mentioned in a merely formal manner, limited to bibliographic references. This aspect may indicate difficulties in effectively implementing environmental education in teaching.

Chart 5 presents IFRO's undergraduate courses and the subjects that align with sustainability themes.

Chart 5. Sustainability in graduate courses' PPCs at IFRO

Couses	Subjects with sustainability themes
Bachelor's Degree in Biological Sciences (IFRO, 2018b)	Socio-environmental Education; Community and Ecosystem Ecology; Human Rights and Education for Diversity; Entrepreneurship and Sustainable Development (**elective**)
Bachelor's Degree in Mathematics (IFRO, 2018c)	Environment and Sustainability (elective); Natural Resources and Environment (**elective**)
Bachelor's Degree in Chemistry (IFRO, 2019a)	Socio-environmental Education; Human Rights and Education for Diversity
Bachelor's Degree in Physics (IFRO, 2017a)	Human Rights and Education for Diversity; Energy and Environment
Technologist Degree in Environmental Management (IFRO, 2016a)	Ecology and Biodiversity; Introduction to Environmental Management; Professional Ethics and Citizenship; Energy Resources and Environment; Basic Climatology; Atmospheric Emissions; Recovery of Degraded Areas; Integrated Management Systems; Socio-environmental Education; Licensing and Environmental Impact Assessment
Technologist Degree in Systems Analysis and Development (SAD) (IFRO, 2019b)	Ethics, Society, and Sustainability
Technologist Degree in Public Management (IFRO, 2016b)	Environmental Management and Social Responsibility; Multiculturalism and Human Rights (**elective**); Regional Development
Technologist Degree in Agribusiness (IFRO, 2016c)	Environment and Sustainability; Ethics, Society, and Culture
Technologist Degree in Commercial Management (IFRO, 2021a)	Innovation and Business Sustainability; Multiculturalism and Human Rights (**elective**)
Technologist Degree in Computer Networks (IFRO, 2021b)	-
Agronomic Engineering (IFRO, 2017b)	Ecology; Ethics and Citizenship; Agroecology; Geoprocessing; Soil and Water Management and Conservation
Animal Science (IFRO, 2017c)	Ecology; Management of Waste and Effluents in Confined Livestock; Agroforestry Systems; Policy and Economics of Natural Resources and Agro-environmental Conflicts
Control and Automation Engineering (IFRO, 2016d)	Environmental Sciences
Architecture and Urbanism** (IFRO, 2017d)	Environmental and Urban Studies; Environmental Comfort; Sustainability in the Built Environment; Urban and Regional Planning

Source: Research data.

The Environmental Management, Agronomic Engineering, Animal Science, and Architecture and Urbanism courses have more than four subjects focused on sustainability. A more detailed analysis reveals that the Animal

Science course divides its curriculum matrix into three concentration areas, one of which is Environmental Sustainability. In the Architecture and Urbanism course, the principles of sustainability are described clearly and directly through specific objectives and the expected competencies and skills of the course graduate.

On the other hand, the Chemistry, Physics, Public Management, Biological Sciences, and Agribusiness courses have only two subjects related to sustainability in their mandatory curricula. However, in the Public Management, Biological Sciences, and Agribusiness courses, there is room for deeper engagement with this theme. The Agribusiness course, for example, could explore innovative perspectives on food production and productive processes, closely linked to environmental challenges (GOLD; HAHN; SEURING, 2013). In the Biological Sciences course, subjects such as Population Ecology, Plant Anatomy and Morphology, Plant Physiology, Geology, Evolution (IFRO, 2018b) allow an approach to sustainability, although this is not clearly stated in the syllabi. The same situation is observed in the Physics and Chemistry courses, whose syllabi do not clearly demonstrate sustainability content, resulting in partial inclusion of the theme in the environmental dimension.

The Mathematics courses and those in technological areas, such as Computer Networks, Systems Analysis and Development, and Control and Automation Engineering, have one or no mandatory subjects related to sustainability, with the topic, when present, addressed only in elective subjects. However, these subjects may not be offered regularly. Furthermore, in technological courses, it was found that the general objectives of the subjects and the content of the syllabi are not always aligned, which can hinder the performance of the instructors responsible for teaching them. The subjects contain technical content that is often developed in isolation within the course curriculum, compromising the comprehensive training of professionals in the face

of environmental and social challenges. Considering that sustainability is a transversal theme, it is expected that all knowledge areas contribute to promoting sustainable development (ROWE, 2007).

In the Mathematics course, it was observed that the syllabi of elective subjects present outdated paradigms and theories that contribute little to a perspective of change and solving environmental problems applied to the profession. This lag in curriculum updating tends to be more recurrent in courses historically unrelated to sustainability (ROWE, 2007). From this fragmented conception, some courses offer isolated subjects on the topic, limiting the potential discussion of sustainability challenges in the professional field. In this context, sustainability education could be improved through active methodologies, such as problem-based learning and integrative projects (BØRSEN et al., 2020; SOUZA et al., 2024; TASDEMIR; GAZO, 2020).

Another relevant strategy to integrate sustainability into teaching is the adoption of multidisciplinary, transdisciplinary, and interdisciplinary approaches (TASDEMIR; GAZO, 2020). Sustainability can be incorporated transversally into different syllabi or structured as an integrative project where various subjects contribute to solving a common challenge. Such strategies have been identified in some curricula, although without a defined thematic direction.

In general, the Pedagogical Course Projects (PPCs) show concern for inserting sustainability into the course matrix; however, the way this insertion occurs seems disconnected from the comprehensive training of professionals. Thus, there is isolation of the theme in specific subjects without its effective integration into the broader formative process. Another identified aspect is the emphasis on international guidelines for sustainability, such as the Decade of Education for Sustainable Development (DESD) (UNESCO, 2005), the Sustainable Development Goals (FRANCO et al., 2019; GALLELI et al., 2021), and the Triple Bottom Line, which considers the economic, social, and

environmental pillars of sustainability (ELKINGTON, 1997). Although these documents are fundamental for theoretical and political grounding, exclusive emphasis on them may limit the development of a more contextualized approach focused on local and regional specificities.

FINAL CONSIDERATIONS

This analysis aimed to understand how sustainability is being incorporated into the Institutional Plan and the Pedagogical Projects of IFRO's higher education courses through document analysis. For content analysis, the institution's main documents were analyzed: the Institutional Development Plan (PDI) and the Pedagogical Projects of the Courses (PPCs), as well as the Institutional Extension Support Programs (PIE) and the Institutional Research Program (PIP). The analysis was conducted in light of the sustainability views mapping proposed by Hopwood, Mellor, and O'Brien (2005).

The results demonstrate that although sustainability is an institutional concern, its implementation occurs in a fragmented manner among the management, teaching, research, and extension areas. Based on the parameters of the sustainability views developed by Hopwood, Mellor, and O'Brien (2005), we identified that IFRO practices a reformist view. This means the institution recognizes the need for subtle and organic sustainability changes but maintains structural aspects of the current model, without promoting deep institutional transformations.

The reformist view is evidenced by the institution's actions in Extension, such as projects and events that provide academics and society with contact with sustainability knowledge. Additionally, there is significant involvement of research groups in sustainability, involving undergraduate research students. In teaching, the presence of sustainability-related subjects in most courses indicates alignment with international documents.

However, the analysis of the reformist view also identifies that, despite recognizing sustainability as a relevant factor for solving global environmental problems, IFRO does not promote critical institutional changes that could contribute to building an institutional culture based on sustainability. This is evident in the absence of sustainability in strategic objectives and performance indicators.

Furthermore, in both extension and research activities, voluntary and individual practices by faculty, technicians, and students are observed in project execution, without a consolidated structure to ensure project continuity. Without committed professionals to sustainability, these projects may become scarce in the institution.

In teaching, isolated sustainability subjects or disconnected from comprehensive professional training were identified, with outdated syllabus content and little or no approach to sustainability in the Amazonian reality.

Although there has been an increase in the adoption of sustainable initiatives by organizations in recent years, environmental, social, and economic problems continue to grow, and articulation among these three dimensions remains limited, especially in the Amazon region. Therefore, IFRO's institutional and pedagogical processes remain distant from an ideal sustainability model. Thus, it is urgent to integrate sustainability teaching broadly and effectively into professional training.

Political implications

It is recommended that the HEI incorporate sustainability into all institutional policy guidelines, including mission, strategic objectives, goals, and the definition of performance indicators aimed at sustainability in education. Furthermore, sustainability must be present in strategic elements that guide internal policies. Even if, in some cases, these texts do not directly translate into

effective institutional actions toward sustainability, their inclusion in institutional documents promotes reflection and engagement of the academic community, especially when these documents are widely consulted.

It is further suggested to adopt institutional processes that encourage adherence to the Sustainable Development Goals (SDGs) targets to make sustainable practices more visible in institutional routines. In the strategic planning process, defining sustainable competency models that consider both local and global perspectives and are adopted transversally across all higher education courses is fundamental.

Practical implications

Based on the document analysis and identified weaknesses, institutional incentives for projects focused on sustainability are recommended. This can be made possible through specific Extension and Research calls directed at projects addressing environmental, social, and economic issues related to sustainability. Thus, more faculty, technicians, and students can expand their activities in the area, reducing dependence on voluntary and individual practices.

It is also suggested to review the Pedagogical Projects of the Courses (PPCs) aiming to include content addressing social responsibility, social, ecological, and ethical inequalities, as well as sustainability from a critical and applied perspective; interdisciplinary practices and integrative projects providing a holistic view of sustainability challenges in professional training; and active methodologies based on solving real problems faced by people and organizations, alongside recommending teaching materials implementing eco-pedagogical approaches, valuing sustainability in local and regional contexts.

Limitations and future research

Education for sustainability needs to be oriented towards training professionals committed and engaged in a fairer, more sustainable world. The future will only be truly sustainable if there is broad and integrated education for sustainability. This theme has been debated for over three decades; therefore, sustainability should not be seen as a fixed goal to be achieved but as a continuous process of transformation and adaptation.

Future studies can investigate whether HEI graduates have actually incorporated sustainable practices in their professional lives. Questions such as: What aspects of sustainability do graduates take into their professional lives? and What strategies can be improved in sustainability teaching? are relevant to guide future research. Moreover, it would be important to analyze which policies can be developed to consolidate sustainability implementation in higher education.

Future research can expand this analysis by observing how sustainability is implemented in basic and secondary education. Also, since this study was based on document analysis, it is suggested that future investigations analyze the effectiveness of PPC implementation in teaching practice, considering classroom teaching as well as research and extension activities. Another possibility would be to examine the convergence between strategic institutional documents and the perceptions of managers and the academic community regarding sustainability.

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