

Management of education for sustainable development: a study at the Instituto Federal de São Paulo

*Gestão da educação para o desenvolvimento sustentável:
um estudo no Instituto Federal de São Paulo*

*Gestión de la educación para el desarrollo sostenible:
un estudio en el Instituto Federal de São Paulo*

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ABSTRACT

This research explores how the Instituto Federal de São Paulo (IFSP), the largest in Brazil with 37 campuses, implements education for sustainable development (ESD) in alignment with Sustainable Development Goal 4 of the United Nations' 2030 Agenda, which aims to promote inclusive and quality education for all. Using Atlas.ti software to analyze four documents and 76 interviews, the findings indicate multiple ESD initiatives, but also reveal shortcomings in the integration and communication of these actions, suggesting the need for more cohesive management, that is also aligned with the SDGs. It is concluded that, despite the many ESD activities, there is room to strengthen the management of these practices at IFSP.

Keywords: Sustainable Development. Management. Education. Instituto Federal de São Paulo.

RESUMO

Esta pesquisa investiga como o Instituto Federal de São Paulo (IFSP), o maior do Brasil com 37 *campi*, implementa a Educação para o desenvolvimento sustentável (EDS) em alinhamento com o Objetivo de Desenvolvimento Sustentável 4 da Agenda 2030 da Organização das Nações Unidas (ONU), que visa promover a educação inclusiva e de qualidade para todos. Utilizando o *software* Atlas.ti para analisar quatro documentos e 76 entrevistas, os resultados indicam várias iniciativas de EDS, mas também revelam falhas na integração e comunicação dessas ações, sugerindo a necessidade de uma gestão mais coesa e alinhada aos ODS. Conclui-se que, apesar das muitas atividades de EDS, há espaço para fortalecer a gestão dessas práticas no IFSP.

Palavras-chave: Desenvolvimento Sustentável. Gestão. Educação. Instituto Federal de São Paulo.

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RESUMEN

Esta investigación explora cómo el Instituto Federal de São Paulo (IFSP), el más grande de Brasil con 37 campus, implementa la Educación para el Desarrollo Sostenible (EDS) en alineación con el Objetivo de Desarrollo Sostenible 4 de la Agenda 2030 de las Naciones Unidas, que busca promover una educación inclusiva y de calidad para todos. Utilizando el software Atlas ti para analizar cuatro documentos y 76 entrevistas, los resultados indican varias iniciativas de EDS, pero también revelan deficiencias en la integración y comunicación de estas acciones, sugiriendo la necesidad de una gestión más cohesiva y alineada con los ODS. Se concluye que, a pesar de las numerosas actividades de EDS, hay espacio para fortalecer la gestión de estas prácticas en el IFSP.

Palabras clave: Desarrollo Sostenible. Gestión. Educación. Instituto Federal de São Paulo.

INTRODUCTION

One of the global challenges faced in the 21st century is to promote a form of development that is also sustainable for future generations, considering economic, social, and environmental dimensions. The 2030 Agenda of the United Nations (UN), with its 17 Sustainable Development Goals (SDGs) (UNDP, 2016), provides a roadmap for advancing quality education and sustainable environmental practices, requiring a paradigm shift in governmental policies. Education for Sustainable Development (ESD) is an essential element in this global strategy (Dlouhá and Pospíšilová, 2018).

Education, represented by SDG 4 — Quality Education, plays a cross-cutting role across several SDGs (Rieckmann, 2017; Albareda-Tiana *et al.*, 2018). SDG 4 comprises seven targets, among which Target 4.7 underlines the importance of ESD for a balanced and sustainable future.

However, the SDGs face criticism, such as that of Brissett and Mitter (2017), who argue that, without a reorientation of the educational discourse to emphasize social and environmental justice, aligned with Morin's (2000) perspective on complexity, the SDGs may inadvertently perpetuate the status quo.

In Brazil, the Instituto Federal de São Paulo (IFSP) stands out as an agent of transformation, promoting sustainable development through interactive and multidisciplinary pedagogical methods, research on sustainable solutions, and extension programs that connect academia and the community (Rieckmann, 2017), which justifies its selection for this study.

This study aimed to analyze manifestations of ESD within IFSP's management processes and to examine how sustainable development (SD) policies contribute to the implementation of these practices. The Institutional Development Plan (IDP) and three Course Pedagogical Projects (*Projetos Pedagógicos de Curso* — PPCs) were analyzed. Additionally, 76 interviews were conducted.

The research is justified by the urgency of addressing sustainability through education (Wu and Shen, 2016), emphasizing the need for higher education institutions (HEIs) to promote sustainability. The findings are expected to contribute to disseminating actions that highlight the management of ESD and to inspire administrators to implement sustainable practices through education.

THEORETICAL FRAMEWORK

The concept of SD emerged as a response to the growing environmental, social, and economic challenges faced by humanity. Since the publication of the report "Our Common Future" (Brundtland, 1987), SD has become central in discussions on how to balance present needs with the planet's capacity to sustain life in the future.

In terms of the scope of SD dimensions, there is a need for harmonization among economic, social, and environmental aspects. The evolution of this concept reflects an expanded understanding that global challenges are interconnected and require integrated solutions. In this sense, SD has evolved from a purely environmental perspective to a more holistic approach (Scotto *et al.*, 2009).

The distinction between SD and sustainability is significant. Axelsson *et al.* (2012) and Sartori *et al.* (2014) argue that, whereas SD refers to the process of change towards a more sustainable future, sustainability represents the ideal state of that future.

The implementation of the UN 2030 Agenda and its 17 SDGs seeks to balance economic development, environmental sustainability, and social justice at the global level. This effort, aligned with the Triple Bottom Line concept (Elkington, 2012), which emphasizes the three dimensions of sustainability, illustrates the continuous evolution of the concept over time.

These understandings suggest a transition from a vision focused on economic growth to one that values resilience, equity, and environmental sustainability as components of human development, which can be enabled through education.

2030 AGENDA AND THE SUSTAINABLE DEVELOPMENT GOALS

The 2030 Agenda, the result of a global participatory effort (UNDP, 2014; Weybrecht, 2017), with its 17 SDGs, was outlined by the Open Working Group on SDGs (OWG-SDGs), which included the participation of several governments and civil society organizations.

The SDGs are comprehensive and encompass aspects of human and sustainable development, with education (SDG 4) acting as a cross-cutting axis that interacts with other goals to promote sustainable development (UNESCO, 2017). The effectiveness of the 2030 Agenda depends on political commitment and countries' capacity to implement it, requiring multidisciplinary and collaborative approaches to address complex sustainability challenges (Carvalho and Barcellos, 2015).

SDG 4: QUALITY EDUCATION

SDG 4 not only aims to improve the quality of and access to education for all, but also highlights the importance of integrating ESD and global citizenship education into school curricula.

Target 4.7 of the 2030 Agenda emphasizes teaching a holistic view of global challenges, motivating students to actively contribute to a sustainable future (Opazo *et al.*, 2020). This target includes promoting environmental awareness, human rights, gender equality, a culture of peace and non-violence, and the appreciation of cultural diversity.

Brazilian legislation, as reflected in the National Environmental Education Policy (Law No. 9.795/1999), has long endorsed these ideals, promoting a holistic and transdisciplinary approach to ESD and recognizing the importance of integrating these concepts at all educational levels and modalities. Furthermore, the 1988 Federal Constitution and the National Education Plan (*Plano Nacional de Educação* — PNE) 2014–2024 are legislative milestones that support the implementation of these educational goals in Brazil.

Leicht *et al.* (2018) argue that ESD is necessary not only to achieve SDG 4 but all SDGs, underscoring the importance of mainstreaming sustainability across curricula. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has emphasized the need for an education that goes beyond technical skill development, fostering a humanistic education that prepares individuals to face global challenges with empathy, solidarity, and a deep understanding of human rights and sustainability.

The approach proposed by the Education 2030 Framework for Action for implementing SDG 4 (UNESCO, 2016) focuses on scaling up efforts to strengthen the promotion of human rights, peace, responsible citizenship, and SD. This includes educational content that encompasses both cognitive and non-cognitive learning dimensions, preparing citizens to actively contribute to solving global problems.

EDUCATION FOR SUSTAINABLE DEVELOPMENT

ESD goes beyond traditional environmental education, adopting a holistic approach that considers human, social, political, and economic factors. It is a critical tool for understanding and addressing the complexities of SD, emphasizing the interconnection among environmental, social, and economic issues and promoting complex thinking and transdisciplinarity in education (UNESCO, 2005).

The distinction between ESD and Environmental Education (EE) is fundamental. Unlike EE, ESD encompasses not only the human relationship with the natural environment but also sociocultural factors and sociopolitical issues such as equality, poverty, democracy, and quality of life. This holistic approach is essential for addressing challenges rooted in the social, economic, and political systems of SD.

Morin (2000) highlights the need for education that integrates human and environmental issues, promoting a deeper understanding of sustainability. Sterling (2011) points to the importance of transformative learning that emphasizes sustainability in a broad educational context, fostering resilience, equity, and environmental sustainability as fundamental components of human development.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasizes the development dimension as a central element of ESD, implying that SD involves significant social change and the evolution of living conditions beyond mere environmental conservation.

Tilbury (2011) underscores the need to promote learning that transcends university walls, engaging local communities in processes of sustainable change. This focus broadens the scope of ESD and strengthens its applicability and relevance in real contexts, promoting truly transformative education capable of addressing SD challenges.

ESD is an educational process that promotes global social, cultural, political, and economic connections, emphasizing values of solidarity and justice for responsible global citizenship (Tilbury and Wortman, 2004). It is an indispensable pillar for implementing SD strategies on a global scale, fostering an educational approach that is multidimensional, complex, and capable of preparing individuals to face and positively influence the complex sustainability challenges of the contemporary world. ESD therefore has the potential to transform both education and society toward global sustainability (Sterling, 2011).

THE ROLE OF FEDERAL INSTITUTES IN PROMOTING EDUCATION FOR SUSTAINABLE DEVELOPMENT

In the current context of higher education in Brazil, HEIs, including the Federal Institutes of Education, Science and Technology (IFs), play a significant role in promoting ESD. These institutions emerge as key pillars in the production and dissemination of knowledge through research, teaching, and extension (Paiva and Campos, 2018; Silvente, 2018).

The IFs, established by Law No. 11.892 of 2008, represent a landmark in professional and technological education in Brazil, with a focus on excellence and sustainable regional development (Maruyama *et al.*, 2021). These institutes incorporate into their missions and objectives the integration of environmental, social, and economic dimensions, aiming to prepare students not only for the labor market but also for conscious citizenship oriented toward sustainability (Brandli *et al.*, 2015).

The reformulation of education, emphasizing the interconnection among science, culture, and work in order to foster critical and autonomous citizens, has renewed the focus on technology and its practical applications, with the indivisibility of teaching, research, and extension as a foundation for innovation and the democratization of knowledge (Moraes and Kipnis, 2017).

These activities may address community engagement and sustainability case studies, with extension providing opportunities to involve the community through courses, events, and collaborations focused on sustainability. Integrating sustainability concepts into existing curricula and developing new educational programs specifically for ESD are key strategies (Lozano *et al.*, 2019; Leal Filho *et al.*, 2019).

HEIs thus assume a multifaceted role in ESD, recognized not only as generators of economic value and agents of social mobility but also as entities committed to building a fairer world (Lozano *et al.*, 2017). This commitment is reflected in the education of global citizens prepared to face contemporary challenges with a global perspective and social responsibility (Lozano *et al.*, 2019).

COMPLEX THINKING IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

Complexity Theory highlights the distinction between the complex and the complicated, with the former representing phenomena that cannot be reduced to finite, closed models, as discussed by Le Moigne (1990) and Morin (2000). This theory emphasizes reality as a construction of human activity and reflection, marked by uncertainty and unpredictability, challenging simplified thinking and promoting a more comprehensive view of the world (Silveira, 2005).

Complexity is particularly challenging, requiring an approach that recognizes the interconnectedness and interdependence of the various dimensions of reality (Morin *et al.*, 2002). Complexity Theory offers key principles of intelligibility for an integrated view of the universe, encouraging transdisciplinarity and creativity rather than scientific reductionism (Morin, 2000).

Morin (2011) argues that complexity requires a mode of thinking capable of embracing multidimensionality without being constrained by linear or reductionist schemes. The theory proposes a paradigm that values continuous interaction among the multiple aspects of reality, challenging the traditional disciplinary separation and promoting a more holistic and integrated understanding.

In the field of ESD, complexity helps to understand the interconnection among social, environmental, and economic dimensions. Steiner and Posch (2006) highlight the need for an education that responds to the complexity of these interactions, preparing individuals to face global challenges with an integrated and mindful perspective.

Morin (2006) criticizes traditional education for its inability to deal with complexity, promoting knowledge fragmentation and an incapacity to perceive connections among different aspects of reality. He therefore advocates an educational reform that incorporates complex thinking, capable of overcoming fragmentation and promoting a broader and deeper understanding of contemporary challenges.

The need to integrate complex thinking into education is reinforced by the 2030 Agenda, which recognizes the importance of educational approaches that foster a holistic and transdisciplinary understanding of global problems (Leal Filho *et al.*, 2021), in line with Morin's (2006) vision of the essential knowledge for the education of the future (Freitas, 2019; Stecanella and Olsson, 2021).

METHODOLOGICAL ASPECTS

This study analyzed manifestations of ESD within IFSP's management processes, adopting a qualitative, exploratory, and descriptive design, as proposed by Creswell (2014).

Institutional documents included the IDP and the PPCs of three of the institution's 16 programs, selected by accessibility of the sample. In addition, 76 interviews were conducted with IFSP managers and board members, whose accounts offered valuable insights into current practices, challenges, and advances in the implementation of ESD. Dual data collection is recommended by Gil (2007). The analysis revealed significant practices, challenges, and progress in ESD implementation.

Document analysis, a key technique in qualitative research for revealing new dimensions of a topic (Marconi and Lakatos, 2003), was employed to understand how ESD is integrated into teaching, research, and extension at IFSP. Thematic content analysis (Ayres, 2008; Bardin, 2010) supported the identification and organization of patterns reflecting the adoption of ESD in educational management, with ATLAS.ti software used to enable detailed and systematic analysis.

ANALYSIS AND DISCUSSION

IFSP's organizational structure, described in documents such as the IDP and other official records, reflects a commitment to professional and technological education across a wide range of educational modalities. This commitment is evidenced by the extensive research locus encompassing 37 *campi*, detailed in terms of operating authorizations and the start of activities, demonstrating institutional expansion and reach in response to the educational and social needs of the state of São Paulo.

The analysis of 76 interviews with IFSP managers and board members provided an in-depth understanding of perceptions and experiences related to ESD implementation. The statements of interviewees showed that the institution promotes an integrated approach aligning teaching, research, and extension with SD principles, as established in the IDP and the Institutional Pedagogical Project (*Projeto Pedagógico Institucional* — PPI). The IDP, in particular, serves as a strategic instrument that defines the institution's mission, goals, and objectives, underlining the importance of a participatory and democratic process in political-social orientation. The IFSP PPI, as an integral part of the IDP, sets institutional policies for teaching, research, and extension, highlighting the interconnectedness of these areas and the importance of ESD.

INSTITUTIONAL DEVELOPMENT PLAN

The analysis of IFSP's IDP identified 35 subcategories grouped into 12 categories, highlighting the partial adoption of ESD and evidencing a commitment to sustainable practices and to the SDGs of the 2030 Agenda. However, the category "Perspectives," particularly the "final reflections on the theme of ESD," was examined only in the interviews. This methodological decision aimed to capture the deeper perceptions and experiences of managers and board members, providing valuable insights that complement the document analysis.

Chart 1 provides an overview of the main results of the IDP analysis, identifying strengths and opportunities for improvement in ESD implementation at IFSP.

ESD actions and practices in extension — The absence of specific extension programs that integrate transdisciplinarity and complexity into activities suggests considerable room for development. Tilbury (2011) stresses the importance of engaging local communities in sustainability initiatives, promoting learning that transcends the physical boundaries of educational institutions. Existing initiatives to promote sustainable management and support projects of public interest reflect IFSP's capacity to contribute to local SD. These practices echo Morin's (2000) proposals regarding the need for an educational approach that recognizes the complexity and interconnectedness of global challenges.

ESD actions and practices in research — The limited recognition of ESD as a relevant topic for academic research indicates an opportunity to align IFSP's research agenda with global sustainability challenges, a view supported by Sachs (2015), who emphasizes the need for research to contribute to sustainable solutions. Support for scientific and technological initiation programs indicates a commitment to innovative research aligned with ESD guidelines. This alignment suggests underexplored potential to integrate sustainability more explicitly into research, as recommended by Elkington (2012).

Chart 1 – Gaps identified vs. Education for Sustainable Development (ESD) evidence in the Institutional Development Plan (IDP).

Category	Missing subcategories	Present subcategories	ESD evidence
ESD actions and practices in extension	Integration of transdisciplinarity and complexity into extension activities absent. Lack of specific extension programs and courses aimed at promoting ESD in the community.	Meeting community needs and promoting citizenship and sustainability. Community involvement and participation in ESD-related decision-making.	Development of inclusive and sustainable training. Fostering projects with social and environmental impact.
ESD actions and practices in research	Social impact of research and dissemination of ESD research results. Implementation of transdisciplinarity and complexity in research. Partnerships, networks, and community participation in ESD research. Recognition of ESD as a relevant theme for academic research.	Definition, implementation and execution of ESD research lines and projects. Incentives for ESD research.	Support for scientific and technological initiation programs. Promotion of applied research focused on sustainability.
ESD actions and practices in teaching	Attitudes and knowledge about ESD. Perception and understanding of ESD projects and programs. Perception of ESD curricular integration with other disciplines and fields of knowledge.	Identification of faculty training and development actions in ESD. Incorporation of transdisciplinarity and complexity in teaching. Curricular integration of ESD. Partnerships and networks to promote ESD.	ESD training courses for faculty staff. Incorporation of sustainability principles into the curriculum. Development of managerial and entrepreneurial competences related to ESD.
2030 Agenda and SDGs	Relevance of the 2030 Agenda and SDGs.	Knowledge and implementation of the SDGs by the Institute (present in specific, albeit limited, initiatives).	Affirmative action policy and education for human rights. Initiatives aligned with PNE Target 16 and sustainable development legislation.
Complexity in ESD	Conceptual knowledge about complexity.	Understanding and approach to complexity. Development of critical thinking and practical application. Systemic and interdisciplinary integration of ESD.	Transdisciplinary approaches in curriculum and research. Promotion of diversity and inclusion. Initiatives to foster critical and reflective thinking on sustainability.

Source: Prepared by the authors.

ESD actions and practices in teaching — The insufficient integration of ESD into the curriculum and the limited perception of the importance of sustainability in teaching highlight the need for curricular review to incorporate ESD in a transversal and meaningful way, an approach supported by Sterling (2011). Practices such as curricular flexibility and the development of technical, managerial, and entrepreneurial competences indicate a positive movement toward ESD integration.

2030 Agenda and SDGs — The limited implementation of the SDGs underscores the need for a more comprehensive strategy to embed these global goals into IFSP's research, teaching, and extension activities, in line with recommendations by Elkington (2012) and Leal Filho *et al.* (2015). Initiatives aligned with PNE Target 16 and SD legislation indicate recognition of the SDGs' importance.

Complexity in ESD — Recognition of complexity in ESD and the adoption of a transdisciplinary approach reflect the influence of Morin's (2000) theories, which emphasize understanding interconnections and the complexity of sustainability challenges. The IDP analysis reveals a landscape in which significant progress coexists with challenges that must be overcome to better integrate sustainability into education.

Effective inclusion of the SDGs in IFSP's management strategy and curriculum is seen as both a challenge and a major opportunity to strengthen the institution's position as a reference in sustainable education.

The affirmative action policy and education for human rights exemplify IFSP's alignment with global principles of equality, inclusion, and justice, as recommended by UNESCO (2017) for ESD. Strengthening these policies helps ensure that education for sustainability is accessible to all students, reflecting Morin's (2000) perspective on fostering critical awareness and transformative action within complexity and Elkington's (2012) emphasis on sustainability in its social, economic, and environmental dimensions.

The analysis evidenced IFSP's commitment to ESD, while highlighting the need to refine and further develop specific areas for more effective integration. Closer alignment among institutional areas, curricula, and practices and the principles of complexity, transdisciplinarity, and the SDGs not only responds to contemporary demands for sustainability education but also positions IFSP as a reference in promoting a more just, inclusive, and sustainable society.

PEDAGOGICAL PROJECT OF THE BACHELOR'S DEGREE IN ADMINISTRATION

Chart 2 presents the main subcategories identified in the analysis of the Pedagogical Project of the Bachelor's Degree in Administration, highlighting the program's commitment to ESD through multiple integrated dimensions and practices.

The inclusion of the curricular component "Socio-environmental Management" is a direct expression of the educational response to the SDGs (UN, 2015). This approach is reinforced by the emphasis on education that promotes critical awareness and action on environmental and social issues (Araújo, 2017), and that embraces complexity and transdisciplinarity, as suggested by Sartori *et al.* (2014).

The analysis highlighted the need for policies that emphasize diversity and inclusion as integral parts of ESD at IFSP, aligned with the SDGs on Quality Education and Reduced Inequalities, promoting holistic education adapted to the challenges of the 21st century.

PEDAGOGICAL PROJECT OF THE TECHNOLOGY IN TOURISM MANAGEMENT PROGRAM

The analysis of the Pedagogical Project of the Technology in Tourism Management program reveals a conscious incorporation of sustainability elements, covering environmental, social, cultural, ethical, and political aspects. This approach is evidenced by nine main categories and ten subcategories, reflecting alignment with institutional policies, the integration of programs and projects, and a response to normative and coercive pressures.

Chart 2 – Categories and subcategories identified in the Pedagogical Project of the Bachelor's Degree in Administration with a focus on Education for Sustainable Development (ESD).

Main category	Subcategory	Description
Definition of institutional guidelines and policies	Alignment with SDGs	IFSP initiatives and policies aimed at valuing ethnic-racial diversity, aligned with the SDGs.
	Development and implementation of ESD policies	Strategies for the cross-cutting approach to ethnic-racial relations, integrating ESD in a deep and authentic way into the curriculum.
Programs and projects	Thematic areas related to ESD	Inclusion of curricular components addressing ESD-related topics, promoting holistic and transdisciplinary education.
	Articulation with public policies	Integration of national legislation and public sustainability policies into the curriculum, reflecting a practical approach to ESD.
ESD actions and practices in extension	Meeting needs and promoting citizenship and sustainability	Extension activities that contribute to the region's socio-economic and environmental development, promoting citizenship and sustainability
	Partnerships and networks for promoting ESD	Collaboration with external institutions to promote ESD, expanding the impact of sustainability initiatives.
ESD actions and practices in teaching	Attitudes and knowledge about ESD	Training professionals with a holistic and integrated understanding of sustainability challenges, enabling them to act as change agents.
	Incorporation of transdisciplinarity and complexity in teaching	Educational approach that promotes interdisciplinarity and transdisciplinarity, preparing students to face complex sustainability challenges.
	Curricular integration of ESD	Dialogue among curricular components, fostering interdisciplinarity and transdisciplinarity in ESD teaching.
	Partnerships and networks for promoting ESD	Engagement in collaborative networks to strengthen the capacity to promote ESD through education.
Complexity in ESD	Understanding and approach to complexity	Recognition and treatment of the complexity of sustainability challenges in the curriculum, adopting a systemic approach.
	Systemic and interdisciplinary integration of ESD	Efforts to integrate multiple fields of study, promoting an interconnected understanding of sustainable development.
2030 Agenda and SDGs	Knowledge and implementation of SDGs	Integration of SDG principles into educational planning and practices.
	Inclusion of the 2030 Agenda and SDGs in management strategy	Institutional management strategies that reflect the principles of the 2030 Agenda and SDGs, promoting sustainable education.
Understanding of ESD	Definition of ESD	Incorporation and valuing of ESD in the curriculum and pedagogical practices, reflecting an institutional commitment to sustainable development.
	Institutional mission, role and commitment	Alignment of the institution's mission and practices with ESD principles, demonstrating a commitment to sustainability.

Source: Prepared by the authors.

Chart 3 synthesizes the findings of the analysis, highlighting the program's commitment to training professionals capable of acting sustainably and responsibly in the tourism sector.

Definition of ESD guidelines and institutional policies: Involves the strategic alignment of institutional policies and guidelines with the SDGs, highlighting the incorporation of themes such as sustainability, environmental education, and socio-environmental responsibility into the curriculum.

Programs and projects focused on ESD: Demonstrate the existence of initiatives designed to promote ESD, evidencing efforts to integrate sustainability in a cross-cutting and multidisciplinary way.

Complexity in ESD: Associated with sustainability challenges, it is recognized and addressed through an education that fosters critical thinking, interdisciplinarity, and the capacity to apply knowledge in practice.

The integration of ESD into the Pedagogical Project of the Technology in Tourism Management program evidences the need for education that prepares students for contemporary environmental challenges, in line with Morin (2000), who stresses the importance of education that is capable of addressing the complexity of the contemporary world, and Sachs (2008), who highlights the need to balance economic, social, and environmental dimensions to achieve SD.

The incorporation of specific curricular components such as "Environmental Management in Tourism" and the emphasis on a cross-cutting and integrated education reflect Reigota's (2007) and Araújo's (2017) recommendations on the importance of critical and holistic EE. Furthermore, the program's commitment to diversity and inclusion is consistent with SDGs 4 and 10 (Reduced Inequalities), highlighting an institutional approach that recognizes the interdependence and complexity inherent in the concept of SD.

PEDAGOGICAL PROJECT OF THE TECHNOLOGY IN PUBLIC MANAGEMENT PROGRAM

The analysis of the Pedagogical Project of the Technology in Public Management program shows a multifaceted approach to ESD, ranging from curricular integration of themes such as socio-environmental responsibility and environmental education to community engagement and the training of public managers. Chart 4 presents the results categorized by main themes and specific subcategories, highlighting efforts to integrate ESD across multiple thematic areas.

The emphasis of this PPC on themes such as socio-environmental responsibility, human rights, and environmental management reflects a holistic approach to ESD that aligns with UN's (2015) sustainability principles. This comprehensive incorporation of ESD across thematic areas echoes Sachs's (2015) advocacy for education that transcends traditional disciplinary boundaries to confront complex sustainability challenges.

The PPC's focus on community engagement and extension activities highlights IFSP's commitment to applying ESD principles beyond the classroom, fostering a symbiotic relationship between the institution and the broader community. This approach is aligned with UNESCO's (2015) concept of "learning cities," which emphasizes the role of educational institutions in promoting SD within their local contexts. The emphasis on inclusion and accessibility in these activities reflects Freire's (2002) defense of education as accessible to all, promoting social justice and equity as integral components of sustainability.

IFSP promotes ESD through curricular and extracurricular activities, preparing students for sustainable development challenges and underscoring the need for constant evaluation and adaptation in pursuit of transformative and inclusive education.

INTERVIEW ANALYSIS

The data reveal nuances of institutional engagement with ESD across categories and across the groups of council members, campus administrators, and central administration managers

Chart 3 – Categories and subcategories identified in the Pedagogical Project of the Technology in Tourism Management program with a focus on Education for Sustainable Development (ESD).

Category	Subcategory	Description
Definition of guidelines and institutional policies	Alignment of institutional ESD policies and guidelines with the SDGs	Inclusion of contextual units that demonstrate the integration of sustainable practices in tourism, emphasizing sustainability and environmental education as fundamental to professional training.
	Development and implementation of ESD policies and guidelines	Description of how the program incorporates environmental education into different curricular components, evidencing efforts to integrate the curriculum with ESD-related themes.
Programs and projects	Thematic areas related to ESD	Identification of curricular components that directly address ESD, such as Environmental Management in Tourism and Sustainable Tourism, reflecting an integrated and cross-cutting approach to ESD.
Complexity in ESD	Understanding and approach to complexity	Evidence of the incorporation of themes that foster understanding of the complexity of environmental challenges and the need for holistic and integrated approaches in tourism education.
Complexity in ESD	Development of critical thinking and practical application	Description of pedagogical strategies aimed at developing critical thinking and ethical reflection, promoting critical analysis of tourism impacts and the adoption of sustainable practices.
Inclusion of ESD in institutional planning	Planning strategies	Indication of how the program integrates ESD into its planning and pedagogical strategies, including the inclusion of specific curricular components on environmental education and sustainability.
ESD actions and practices in teaching	Incorporation of transdisciplinarity and complexity in teaching	Description of how the program adopts a transdisciplinary and integrated approach, connecting ESD with different fields of knowledge and promoting a holistic understanding of sustainability challenges.
ESD actions and practices in extension	Integration of transdisciplinarity and complexity in extension activities	Evidence of the application of a transdisciplinary and complex approach in extension activities, demonstrating the program's commitment to generating positive community impacts through integrated sustainable knowledge and practices.
Understanding of ESD	Institutional mission, role, and commitment	Discussion of IFSP's commitment to integral and sustainable training, reflecting how the institutional mission aligns with the principles of sustainability and education for sustainable development.
Understanding of ESD	Relevance of ESD	Emphasis on the importance attributed to ESD in the curriculum and pedagogical practices, evidencing the program's understanding of ESD as central to training in sustainable tourism.
ESD actions and practices in research	Recognition of ESD as a relevant theme for academic research	Illustration of how ESD is integrated into academic research, fostering investigation and innovation in sustainability-related topics and reflecting the institution's commitment to applied research and ESD knowledge production.

Source: Prepared by the authors.

Chart 4 – Categories and subcategories identified in the Pedagogical Project of the Technology in Public Management program with a focus on Education for Sustainable Development (ESD).

Category	Subcategory	ESD evidence present
Programs and project	Thematic areas related to ESD	Socio-environmental Responsibility, Environmental Education, Human Rights, Social Inclusion, Environmental Management, and Sustainability.
Articulation with public policies	Professional training and public management	Preparation of public managers for effective and participatory action; emphasis on education in human rights.
	Articulation with public policies	Professional Training and Public Management, Education in Human Rights, Environmental Education and Public Policies, Accessibility, and Social Inclusion.
ESD actions and practices in extension	Meeting needs and promoting citizenship and sustainability in the community	Community engagement, extension programs, inclusive actions, public policies for natural resource management.
Complexity in ESD	Understanding and approach to complexity; conceptual knowledge of complexity; development of critical thinking and practical application	Training of professionals in public management; systemic and integrated view of public management; integration of administrative science with contemporary dynamics; scientific and technological education; inclusive education as a political, cultural, social, and pedagogical practice.
Definition of guidelines and institutional policies	Development and implementation of ESD policies and guidelines	Institutional commitment to inclusive actions in the IDP.
Definition of guidelines and institutional policies	Community involvement; involvement of the academic community in promoting ESD	Definition of technological axes based on public hearings; characterization and objectives of extension activities; integration of environmental education into curricular activities; promotion of and participation in academic, scientific, and cultural events.
Understanding of ESD	Definition of ESD; Relevance of ESD	Scientific and technological education; inclusive education as a political, cultural, social, and pedagogical action; holistic educational approach; focus on sustainable development and environmental responsibility; environmental education and sustainable management.

Source: Prepared by the authors.

(Table 1). The category “Understanding of ESD” shows the highest amount of evidence (288), especially among campus and central administration managers. This is followed by “Complexity in ESD” (252) and “2030 Agenda and the SDGs” (227), indicating strategic focus areas for integrating ESD within the institution.

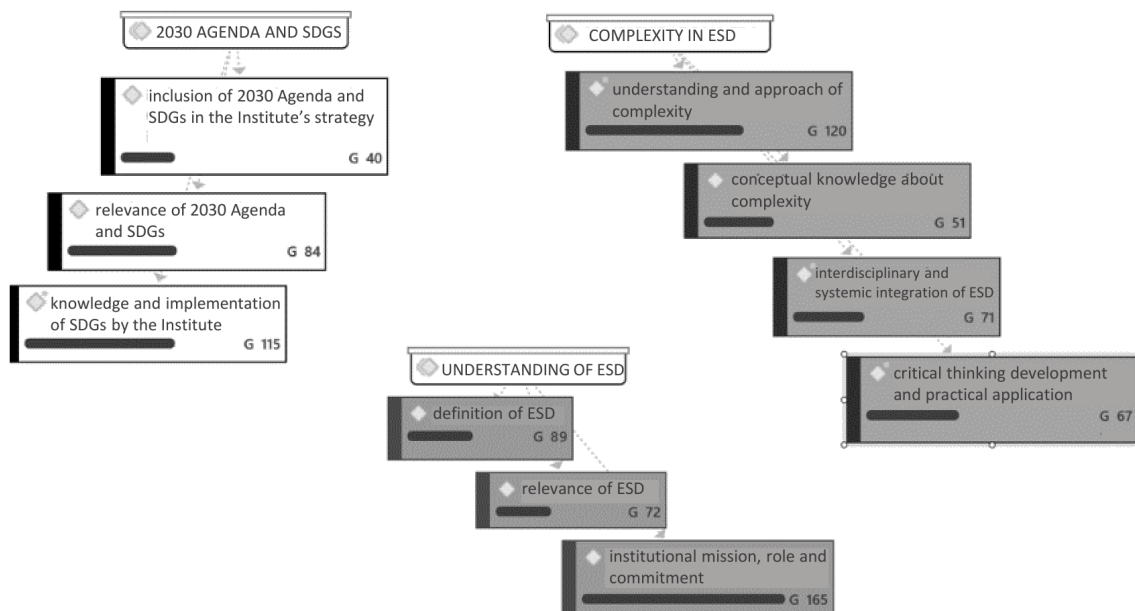
Figure 1 provides a visual representation of the three main categories and their corresponding subcategories, produced using ATLAS.ti software. This tool enabled a detailed and systematic analysis, and the results are visually displayed to facilitate understanding of the relationships among the categories and subcategories identified in the study.

Table 1 – Education for Sustainable Development (ESD) evidence by category and group of council members, campus managers, and central administration.

Main categories	Council members	Campi managers	Central administration	Total
ESD actions and practices in extension	5	20	1	26
ESD actions and practices in research	1	15	0	16
ESD actions and practices in teaching	20	105	5	130
2030 Agenda and the SDGs	46	158	23	227
Complexity in ESD	45	180	27	252
Understanding of ESD	60	192	36	288
Definition of ESD guidelines and institutional policies	37	105	18	160
Inclusion of ESD in institutional planning	36	74	13	123
Perspectives	22	50	8	80
Programs and projects	12	36	11	59
Total	284	935	142	1.361

Source: Prepared by the authors.

Figure 1 – Most representative categories and subcategories in the group of council members, campus managers, and central administration.



Source: Prepared by the authors, with support from ATLAS.ti software.

2030 AGENDA AND THE SDGS

In the subcategory “Knowledge and implementation of the SDGs by the Institute,” participants showed both familiarity and engagement with the 2030 Agenda and the SDGs, as well as difficulties in fully understanding and committing to these goals. Participant P1, for example, expressed

skepticism about achieving the SDGs by 2030 due to obstacles such as pandemics and economic crises, a concern that echoes Araújo's (2017) discussion on the challenges of implementing the SDGs in adverse contexts.

The statements of participants P14 and P16, in turn, pointed to institutional efforts to engage with the SDGs through sustainability committees and the integration of SDG-related content into specific courses, indicating a movement toward awareness and action, in line with Reigota (2007) and Araújo (2017), who emphasize the role of sustainable education in institutional practices.

The analysis showed heterogeneous levels of awareness regarding the 2030 Agenda and the SDGs, highlighting the need for targeted educational strategies and a more cohesive institutional approach to increase their impact.

In the subcategory "Inclusion of the 2030 Agenda and the SDGs in the institute's management strategy," participants described an involvement that ranged from recognition of the SDGs' importance to the identification of implementation challenges.

P2 described continuous engagement with the 2030 Agenda but noted tensions between intentions and actions: *"So we are engaged in this, we're constantly reminded of it because we are in the program"* (P2). P5 stressed the distance between institutional aspirations and everyday practice, reinforcing the need for a more effective integration of sustainability: *"I believe we are still so far, institutionally speaking"* (P5), reflecting the complexity of such integration, as pointed out by Lozano (2008).

P16's account of IFSP's participation in SDG-related initiatives with the local government illustrated progress toward awareness and more effective implementation: *"Recently, IFSP participated in SDGs together with the City Hall and I was one of the articulators, together with the international relations office, which was involved in the SDGs turnaround"* (P16). Such cooperation highlights the critical need for a unified and cooperative strategy for sustainability (UN, 2015).

Meanwhile P7, P18, and P23 mentioned the formation of sustainability commissions at IFSP, indicating an effort to promote this cause. However, as observed by Reigota (2007) and Scotto *et al.* (2009), there is a risk that such commissions may serve more as symbols than as agents of practical change. Bezerra and Bursztyn (2000) also note that these initiatives often end up being merely symbolic within organizations.

P9 emphasized the importance of prioritizing sustainable development in education, echoing the need for concrete actions advocated by the Brundtland Commission (1987). P11 reported efforts to align the Pedagogical Projects of Courses (PPC) with the SDGs, although the expression "take a quick look" suggested that such integration may be superficial: *"Even in the course PPCs, people take a quick look to try to reconcile them, right, in the PPC so that these objectives are indeed included"* (P11).

The analysis indicated that, although efforts exist within IFSP to integrate the 2030 Agenda and the SDGs into its management strategy, the institution still faces significant challenges. The transition from a superficial adoption to tangible and meaningful actions is crucial to align the institution with the demands of global sustainability.

The subcategory "Relevance of the 2030 Agenda and the SDGs" revealed that participants recognize the importance of these goals, particularly regarding quality education. By participating in UNESCO's "Schools 2030" project, IFSP incorporates sustainability into its practices and institutional culture. P2 highlighted that such involvement demonstrates adherence to sustainability principles and the importance of collaborating with global initiatives to achieve the SDGs (UN, 2015; Araújo, 2017).

P8's critique of the Brazilian educational scenario pointed to the discrepancy between the idealization and the reality of education accessible to all. Veiga (2010) addresses the need for inclusive education to promote equity.

P23 underscored the curricular restructuring at IFSP aligned with the SDGs, reflecting a long-term commitment to sustainability — a perspective supported by Leal Filho *et al.* (2018) and Leal Filho *et al.* (2021). P25 emphasized the importance of inclusive education for sustainable development, echoing Bezerra and Bursztyn (2000). P29 highlighted the urgency of integrating the SDGs into educational strategies (Leal Filho *et al.*, 2018; Leal Filho *et al.*, 2023).

Overall, participants' statements revealed awareness within IFSP of the importance of the 2030 Agenda and the SDGs, especially in promoting quality education for sustainable development (Lozano *et al.*, 2015). Despite clear commitment, practical implementation and the integration of these principles into everyday institutional activities remain challenging tasks.

COMPLEXITY IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

In the subcategory "Understanding and approach to complexity," participants underscored the urgency of adapting educational practices to the complexity of the contemporary world. P1 criticized utilitarian and short-term approaches that hinder a more interconnected understanding of reality: *"Sometimes the issue of utilitarianism and immediatism is very strong"* (P1). P2 and P4 highlighted the importance of integrating sustainability and transdisciplinarity into education to address pedagogical challenges and transcend disciplinary boundaries. These views align with Reigota (2007) and Sartori *et al.* (2014), who argue that complex issues such as sustainability require the integration of diverse forms of knowledge. In "Conceptual knowledge of complexity," P45 stressed the need to connect multiple dimensions of knowledge in order to achieve deeper understanding, resonating with Lozano's (2008) emphasis on interacting dimensions of knowledge in the development of complex thinking.

The subcategory "Conceptual Knowledge about Complexity" shows that participants hold diverse perspectives on the notion of complexity. P45 highlights the importance of connecting different dimensions of knowledge to achieve a genuine understanding, resonating with Lozano (2008) regarding the interaction among multiple dimensions of knowledge: *"When you think, when you have the conception of complex thinking, you have several dimensions of knowledge, and from these dimensions, you must establish the connection or articulation among them"* (P45).

The participants emphasized the need for education that addresses complexity in an integrated and interdisciplinary manner, preparing students to understand and effectively interact with an interconnected and constantly changing world.

The analysis of the subcategory "Development of Critical Thinking and Practical Application" highlights the importance of developing critical thinking and practical application within the context of ESD. The ability to question and challenge societal consensus as part of critical thinking is evidenced by P1, who stresses the importance of questioning the major consensuses of society: *"At a given moment, one can and should question the prevailing consensuses of society, right?"* (P1). However, as observed by P2: *"See, it is there in the mission, it is there in the objectives, it is in the statute, it is in the PDI, but as for actually happening in practice, how does that take place"* (P2), there remains a gap between theory and practice in the tangible incorporation of sustainability into educational programs, suggesting the need for a more cohesive management strategy aligned with the SDGs (UN, 2015). P4 underscores the importance of continuously questioning and seeking answers, highlighting the necessity of critical thinking about environmental and social challenges to find innovative solutions: *"Questioning, right, questioning and seeking answers to what is presented, to situations that require responses. So one delves deeper and keeps searching, right?"* (P4). The participants emphasize the need for an adaptive and practice-oriented educational approach that transcends traditional teaching methods, as noted by P38 and P63, aligning with Lozano's (2008) proposals for educational reform.

The analysis of the subcategory “Systemic and Interdisciplinary Integration of ESD” reveals the complexity and importance of such an approach for the effective implementation of ESD. One citation illustrates the breadth of the SDGs, emphasizing the need to address sustainability holistically: *“Everything in order to think, everything toward the SDG objectives — to consume and produce responsibly, to care for the environment as a whole: oceans, climate, atmosphere, forests, cities, everything, the life of animals, everything”* (P2). This perspective underscores the interconnection among all environmental aspects, calling for education that reflects such integration.

Interdisciplinarity is highlighted as an effective approach to ESD, enabling a harmonious fusion of different fields of knowledge: *“So, in subjects where you might think there’s nothing to do, you actually can. That’s what we’re trying to build — the evolution of the topic, right? I think it’s progressing, but yes, it is interdisciplinary, from beginning to end”* (P4). This view is supported by Morin (2000), who emphasizes the potential of interdisciplinarity to foster innovative and robust solutions.

Extension activities are recognized as a key element for ESD, promoting a stronger connection with the community (P44), aligning with Leal Filho *et al.*’s discussions (2018), who highlight the importance of extension work in education. The need for critical reflection on the world is also emphasized (P49), reinforcing Leff’s (2001) arguments on the role of reflective thinking in building a sustainable future.

A transdisciplinary approach is emphasized as essential for addressing complex problems (P54, P63), in line with the discussions of Moraes and Almeida (2012) and Morin (2015) on the importance of transdisciplinarity in tackling contemporary challenges. The complexity of problem-solving is acknowledged, supporting Morin’s (2015) discussions on the need for a multifaceted approach to environmental issues: *“We can imagine a model of education in which several aspects must be managed and addressed. So, even when we speak of the omnilaterality of polytechnic education, we must provide students with multiple perspectives, right?”* (P65).

These reflections illustrate the relevance of an integrated and interdisciplinary approach to ESD aimed at effectively addressing contemporary challenges. This subcategory highlights the necessity of educational reforms that respond to the demands of the 21st century and prepare students for a more sustainable future.

UNDERSTANDING OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

The subcategory “Definition of ESD” shows that participants hold a broad and multifaceted understanding of ESD, highlighting its importance within the educational context. They view ESD holistically, focusing on environmental awareness and critical reflection on social, economic, and environmental interactions.

Participant P1 emphasizes the importance of a critical form of education that goes beyond mere practice assimilation to encourage reflection on societal impacts: *“Education for sustainable development is critical education, right? It is not only concerned with action or with studying, but with critically reflecting on all the impacts this has on society, right?”* (P1). This perspective resonates with Sartori *et al.* (2014), who argue that ESD should serve as an instrument of social transformation, challenging established norms and practices.

P7’s discussion on the dimensions of sustainability emphasizes the need for education that addresses the interconnections among political, social, economic, cultural, and philosophical aspects of life. Sachs (2015) supports this view, expanding the definition of sustainability to encompass a complex network of interactions and interdependencies.

The emphasis on ESD as both a social and environmental transformation tool, as expressed by several participants, reflects ESD’s potential to prepare future generations capable of promoting

meaningful change. Sterling (2011) and Tilbury (2011) highlight ESD as a means to develop a deep understanding of sustainability challenges and empower students to contribute to a more sustainable world.

The analysis of the subcategory “Institutional Mission, Role, and Commitment” within the ESD context reveals that participants recognize IFSP’s commitment to providing free, high-quality, and inclusive public education. This commitment reflects the essence of sustainability as aligned with the UN’s (2015) perspective on the SDGs and Araújo’s (2017) emphasis on inclusive education.

The focus on IFSP’s social and community mission, as expressed by participant P8: *“The Institute was created to serve the underprivileged, and this mission must continue, right? In a school like ours, we have to care deeply for our poorest and most vulnerable people”* (P8) underscores the importance of caring for vulnerable populations, a fundamental principle of sustainable development discussed by Bezerra and Burszty (2000).

While sustainability may already be embedded in IFSP’s institutional culture, its absence from the mission statement may reflect either a disconnection or a missed opportunity to highlight this commitment. This viewpoint finds support in the literature, as Sartori *et al.* (2014) argue that explicitly including ESD in official documents serves as an indicator of institutional commitment and strengthens alignment with broader sustainability goals.

The analysis also revealed challenges in ESD implementation, such as the fragmentation and bureaucratization of sustainability-related practices. The tendency toward bureaucratization without practical materialization, mentioned by P36, and the sectorial approach to ESD, indicated by P43, highlight significant obstacles to effectively and holistically integrating sustainability into the institutional mission. These challenges echo concerns in the literature regarding the need for a more integrated and less fragmented approach to ESD (Lozano, 2008).

The analysis of the subcategory “Institutional Mission, Role, and Commitment” also revealed a complex network of alignments, challenges, and opportunities in the incorporation of ESD at IFSP. Participants’ perceptions reflect the need for educational approaches that are genuinely inclusive, critical, and transformative. At the same time, the analysis pointed to the importance of overcoming bureaucratic barriers and promoting a more explicit and comprehensive integration of sustainability into institutional missions and practices.

The analysis of the subcategory “Relevance of ESD” highlights participants’ recognition of ESD not only as a component of technical and theoretical training but also as an essential commitment to both the environment and society. This view aligns with the UN (2015) and Araújo (2017), who regard education as the key to effective sustainable action.

P3 and P9 address the importance of integrating ESD into educational practices and seeking a balance between economic growth and environmental responsibility. This perspective resonates with Veiga (2010), who emphasizes the multifaceted nature of sustainable development, requiring economic, social, and environmental considerations: *“It is closely linked to education, and it is up to each manager and everyone involved with this theme and topic to increasingly promote such courses”* (P3) and *“it is development with intelligence, right, so that it never runs out and that we can self-manage our own actions, be they economic, environmental, or otherwise”* (P9).

The synergy between institutional vision and mission and sustainability principles, as expressed by P15, suggests that sustainability is seen not merely as a complement but as a core educational value.

P51 and P22 address, respectively, the emergence of sustainability in the 21st century and the notion of collective and intergenerational responsibility, pointing to a growing global awareness of sustainability’s importance. This awareness aligns with Morin (2000) and Scotto *et al.* (2009), who advocate for education oriented toward complexity and global interdependence.

The analysis of the subcategory “Relevance of ESD” also revealed a complex and multifaceted understanding among participants regarding the significance of ESD. They not only acknowledge the need to integrate ESD practically and strategically into educational guidelines, but also recognize the urgency of adopting a more critical and responsible approach to consumption and sustainable development.

Participants’ narratives reveal a deep and multifaceted understanding of ESD, emphasizing its vital role in fostering sustainable social and institutional transformations.

FINAL CONSIDERATIONS

The analysis of the IDP, PPCs, and interviews at IFSP highlights ESD as a central axis, revealing both progress and ongoing challenges in integrating the SDGs of the 2030 Agenda into institutional practices. IFSP’s management demonstrates a clear commitment to incorporating the SDGs into its strategy and curricula, evidencing a holistic and integrated approach to sustainability that permeates several institutional areas; promising initiatives such as the promotion of quality education (SDG 4) and the reduction of inequalities (SDG 10) illustrate actions aligned with these goals, although consolidating this integration demands a systematic strategy that goes beyond nominal inclusion and translates SDG principles into critical, practice-oriented teaching, research, and extension.

Affirmative action policies and education for human rights exemplify IFSP’s alignment with global values of equality, inclusion, and justice recommended for ESD, and strengthening these policies is fundamental to making education for sustainability accessible to all while fostering critical awareness and transformative action. At the same time, the analysis underscored the need to overcome obstacles to more effective ESD integration: targeted strategies to address identified gaps and to reinforce existing practices could significantly expand the institution’s contribution to 21st-century educational challenges; and a closer alignment between policies, curricula, and everyday practices, and the principles of complexity, transdisciplinarity, and the SDGs would tend to consolidate IFSP as a reference in building a more just, inclusive, and sustainable society.

The innovative incorporation of ESD into specific programs, such as Administration and Technology in Tourism Management, reflects a paradigmatic shift in higher education and underscores the role of educational institutions in preparing professionals to contribute actively to a sustainable future.

Despite broad recognition of the relevance of the 2030 Agenda and the SDGs, the practical implementation and daily integration of these principles in IFSP’s routines still emerge as significant challenges, although the evidence gathered points to an institutional vision that understands quality education not only as an end in itself but also as an indispensable means to achieve a fair and sustainable future.

In sum, although there are clear indications of ESD in IFSP’s management, there remains considerable room for improvement: the necessary educational transformation involves strengthening critical thinking, providing education that is relevant and attuned to students’ realities, and equipping educators to adopt comprehensive, interdisciplinary approaches to ESD. This will prepare students to face contemporary challenges and to contribute meaningfully to a more sustainable society.

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