Integrating environmental social and governance values into higher education curriculum

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Article Info

ABSTRACT

This paper proposes a framework for integrating environmental, social, and governance (ESG) principles into higher education institutions. The framework consists of six components: curriculum integration, research and innovation, campus operations, community engagement, leadership and governance, and assessment and reporting. Each component is supported by eight implementation strategies that provide practical guidance for institutions looking to advance their sustainability efforts. The proposed framework is informed by a literature review that highlights the importance of ESG considerations in higher education, the challenges and opportunities associated with integrating sustainability into higher education institutions, and the role that institutions can play in promoting sustainable development. The framework is also supported by case studies that illustrate how institutions have successfully implemented sustainability initiatives and the benefits that have accrued as a result. The proposed framework has the potential to make a significant contribution to the advancement of sustainability in higher education institutions and promote sustainable development in the broader community. It is hoped that the framework will be useful to institutions, policymakers, and other stakeholders interested in promoting sustainability in higher education.

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1. INTRODUCTION

In recent years, the recognition of sustainability's significance has grown across various domains of our lives, including the realm of education [1], [2]. Higher education assumes a crucial role in equipping future generations with the necessary tools to confront the challenges posed by sustainable development [3]–[5]. In this regard, the integration of environmental, social, and governance (ESG) principles into the curriculum becomes indispensable [6]–[8]. Therefore, the objective of this paper is to present a comprehensive framework for incorporating ESG principles into higher education that cultivates the competencies essential for sustainable development.

A survey conducted among 434 universities worldwide revealed that 81% of these institutions are actively engaged in developing a sustainability strategy. Regarding student perspectives on sustainable employment, 65% of students expressed their willingness to forgo a portion of their salary in order to work for

an environmentally responsible employer. The commitment to carbon neutrality is evident as more than 500 higher learning institutions have publicly declared their dedication to this goal [9].

In terms of student perceptions of environmental sustainability within colleges and universities, a survey encompassing 114 institutions found that 59% of undergraduates classified their respective institutions as "somewhat" environmentally sustainable. However, less than a quarter of students regarded their college as highly sustainable, with 16% perceiving it as moderately sustainable, and 2% considering it not sustainable at all. Student interest and actions related to sustainability are notable. 45% of students took environmental sustainability into account when deciding on their college enrollment, although only 12% stated that it significantly influenced their choice of institution. Moreover, a high percentage of students (85%) believe that it is at least somewhat important for their campus to prioritize sustainability. Additionally, concerns about climate change are prevalent among students, with 81% expressing worry to some extent. Furthermore, a considerable proportion of students (61%) attending colleges that have not divested from fossil fuels indicated their willingness to engage, or definitely engage, in activities aimed at persuading their institution to divest. Lastly, 50% of students expressed the desire for their institution to prioritize sustainable energy use and sources [10].

Sustainability represents a critical concern in higher education due to its pivotal role in preparing students to confront contemporary challenges [4], [5], [11], [12]. Urgent attention is required to address issues such as climate change, biodiversity conservation, and sustainable resource management [13], [14]. It is essential to educate students about these challenges, fostering environmental awareness and a sense of responsibility. Moreover, an education system that integrates ESG principles also emphasizes social responsibility, inclusivity, diversity, governance, and ethical leadership [15], [16].

The significance of integrating sustainability into the curriculum cannot be overstated. Higher education institutions bear the responsibility of imparting knowledge, skills, and values that enable students to address the challenges of sustainable development [16], [17]. Empirical research has underscored the importance of sustainable development strategies that incorporate ESG principles in the context of declining birth rates and concerns over carbon emissions [18]. Additionally, a novel conceptual framework has emerged, which systematically analyzes the integration of environmental sustainability within study programs and curricula [19]. This framework underscores the significance of such integration for cultivating future experts and leaders [11].

This paper aims to provide a comprehensive framework for integrating ESG principles into higher education curricula. The focal point of this framework is the project method, a globally recognized learning strategy that facilitates the acquisition of competencies necessary for sustainable development. The paper will offer an extensive overview of the current state of sustainability in higher education, emphasizing the importance of integrating ESG principles into the curriculum. Furthermore, it will delve into the project method as a viable framework for achieving this integration. In addition, practical recommendations will be provided for educators and administrators seeking to incorporate ESG principles into their curricula. To conclude, this paper aspires to make a valuable contribution to the ongoing discourse surrounding sustainability in higher education. By presenting a framework for integrating ESG principles into the curriculum, this paper aims to inspire educators and administrators to take proactive steps toward a more sustainable future.

2. RESEARCH METHOD

Sustainability is a critical issue in higher education, and integrating ESG principles into the curriculum is essential for preparing students to address the complex sustainability challenges of the future [20], [21]. This paper proposes a framework for integrating ESG principles into higher education, which includes an interdisciplinary approach, real-world applications, stakeholder engagement, continuous improvement, leadership and governance, and education for sustainability. The three pillars of ESG are environmental, social, and governance. Environmental principles focus on the conservation and preservation of natural resources, such as reducing carbon emissions and promoting sustainable practices. Social principles emphasize the importance of social responsibility, including diversity, equity, and inclusion. Governance principles focus on the accountability and transparency of institutions, such as board composition and executive compensation. These principles intersect with sustainability by acknowledging the interconnectedness of economic, social, and environmental systems.

This study employs a qualitative research approach, specifically conceptual framework development [22], to explore the integration of ESG principles into higher education. The research methodology involves

a comprehensive literature review, case studies, and content analysis to develop a framework consisting of 6 components and 8 implementation strategies. The authors draw on their expertise and a thorough review of relevant literature to propose the framework and suggest implementation strategies. This qualitative approach allows for a deeper exploration of the topic, providing a foundation for future research and offering practical recommendations for integrating ESG principles into higher education. The following subsections discuss the proposed framework for integrating ESG principles into higher education components along with the implementation strategies.

2.1. Framework components

Figure 1 depicts the proposed framework for integrating ESG principles into higher education, a circular and iterative model comprising six interconnected components. The framework includes an interdisciplinary approach, real-world applications, and stakeholder engagement to provide a holistic understanding of ESG issues and develop applicable skills. It also incorporates continuous improvement, ensuring the framework remains effective and adaptable to emerging trends. Leadership and governance support and prioritize ESG integration, while education for sustainability fosters a values-based education that promotes sustainability and social responsibility, empowering students to become active global citizens.

2.1.1. Interdisciplinary approach

Sustainability is a multifaceted issue that requires an interdisciplinary approach. The framework advocates for incorporating ESG principles into various subjects and disciplines, rather than treating sustainability as a standalone topic. For instance, business courses can incorporate ESG principles into their curriculum by discussing sustainable business practices, such as reducing waste and promoting diversity.

2.1.2. Real-world applications

Providing students with real-world applications of ESG principles is crucial for preparing them for future sustainability challenges. Case studies, project-based learning, and collaborations with local communities can help students understand the practical implications of ESG principles. For example, students can work on projects that assess the carbon footprint of their campus and develop strategies to reduce it.

2.1.3. Stakeholder engagement

Stakeholder engagement is essential for integrating ESG principles into higher education. Faculty, students, staff, and community members should be involved in the process of promoting sustainability and ESG principles. For instance, students can participate in sustainability-focused student organizations, while faculty can integrate ESG principles into their teaching practices.

2.1.4. Continuous improvement

Continuous improvement is critical for achieving sustainability practices that align with ESG principles. Regular assessments and monitoring of progress can help institutions identify areas for improvement and track their progress over time. For example, institutions can track their energy consumption and water usage to identify opportunities for reduction.

2.1.5. Leadership and governance

Leadership and governance play a vital role in promoting sustainability and ESG principles in higher education. Commitment from senior leadership and the establishment of sustainability committees or offices can help promote sustainability practices and ensure their integration into the institution's strategy. For instance, institutions can establish a sustainability committee that includes representatives from various departments to oversee sustainability initiatives.

2.1.6. Education for sustainability

Education for sustainability is essential for equipping students with the knowledge, skills, and values necessary to address sustainability challenges in their personal and professional lives. The framework advocates for incorporating sustainability into the curriculum to promote education for sustainability. For example, institutions can offer courses that focus on sustainable development and social responsibility.

2.2. Implementation strategies

Figure 2 illustrates the various implementation strategies that can help institutions successfully integrate ESG principles into their curriculum. These strategies include integrating ESG concepts into existing courses, as well as developing new courses that focus specifically on ESG issues. Additionally, institutions can form collaborative partnerships with other organizations, provide professional development opportunities for faculty and staff, and engage with students and the broader community to promote ESG awareness and action. Furthermore, institutions can establish a culture of continuous improvement, regularly assessing and refining their ESG integration efforts, and demonstrate their commitment to transparency by reporting on their progress.

2.2.1. Integrating environmental, social, and governance into existing curriculum

Institutions can seamlessly integrate ESG principles into their existing curriculum by incorporating sustainability and social responsibility into various courses and subjects. For example, business courses can be enhanced by exploring the significance of ESG principles in investment decisions, such as the impact of environmental and social factors on long-term financial performance. Similarly, environmental science courses can delve into the governance aspects of sustainability, examining the role of policy and regulations in addressing environmental challenges.

2.2.2. Developing new courses

Institutions can also develop innovative new courses and programs that place sustainability and ESG principles at the forefront. For instance, a sustainability-focused minor or certificate program can offer students a unique opportunity to specialize in sustainability, equipping them with the knowledge and skills to address complex environmental, social, and governance challenges. Additionally, institutions can create standalone courses that explore specific aspects of ESG, such as sustainable investing, environmental policy, or social entrepreneurship, providing students with a deeper understanding of these critical issues.

2.2.3. Collaborative partnerships

Collaborative partnerships between higher education institutions, industry, government, and civil society organizations can promote sustainability and ESG principles by fostering a culture of mutual learning and knowledge sharing. For instance, institutions can partner with local businesses to develop sustainable practices and provide students with practical experience, such as internships or research projects that focus on reducing carbon footprint, implementing renewable energy sources, or developing sustainable supply chains. Additionally, these partnerships can also facilitate the development of innovative solutions to pressing environmental and social challenges, such as climate change, inequality, and social injustice, by bringing together diverse stakeholders with unique expertise and perspectives.

2.2.4. Professional development

Professional development opportunities are crucial for faculty and staff to enhance their understanding of ESG principles and their ability to integrate them into their teaching practices. The framework advocates for providing professional development opportunities that focus on sustainability and ESG, such as workshops, conferences, and training programs. These opportunities can help faculty and staff learn about new sustainability trends, best practices, and technologies that can be incorporated into their teaching practices.

2.2.5. Student engagement

Engaging students in sustainability and ESG initiatives is essential for promoting sustainability practices and principles. The framework suggests involving students in sustainability-focused projects, events, and organizations. For example, institutions can establish student-led sustainability projects, such as recycling programs, energy conservation initiatives, or sustainable gardening projects. These projects can help students develop leadership skills, learn about sustainability practices, and contribute to the institution's sustainability efforts.

2.2.6. Community engagement

The framework emphasizes the importance of engaging with the local community to promote sustainability and ESG principles. Institutions can collaborate with local organizations, businesses, and government agencies to develop sustainability initiatives that benefit the community. For example, institutions can partner with local schools to develop sustainability education programs, collaborate with businesses to promote sustainable practices, or work with government agencies to develop policies that support sustainability.

2.2.7. Continuous improvement

The framework stresses the importance of continuous improvement in sustainability practices and ESG principles. Institutions should regularly assess their sustainability performance, identify areas for improvement, and implement changes that align with their sustainability goals. Continuous improvement can help institutions reduce their environmental impact, improve their social responsibility, and enhance their governance practices.

2.2.8. Reporting and transparency

The framework advocates for transparency and reporting in sustainability and ESG practices. Institutions should regularly report on their sustainability performance, including their progress toward their sustainability goals, their environmental impact, and their social responsibility initiatives. Reporting and transparency can help institutions demonstrate their commitment to sustainability and ESG principles, and can also help stakeholders hold institutions accountable for their sustainability performance.

By following these steps, higher education institutions can integrate ESG principles into their curriculum and promote sustainability practices that align with their values and mission. The framework provides a comprehensive approach to sustainability and ESG that can be tailored to the unique needs and context of each institution. Integrating ESG principles into higher education is crucial for promoting sustainability practices and preparing students to address future sustainability challenges. The proposed framework provides a comprehensive approach that can be tailored to the unique needs and context of each institution. By following this framework and employing the suggested implementation strategies, higher education institutions can play a significant role in advancing sustainability and equipping students with the necessary tools to create a more sustainable future.
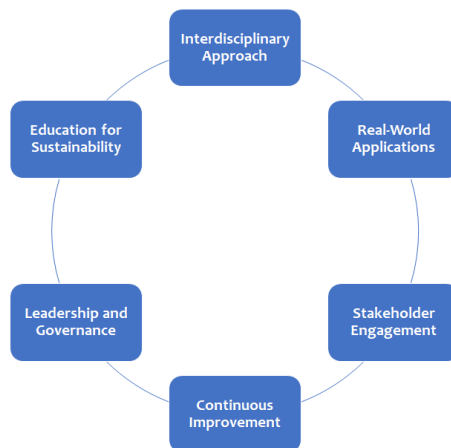

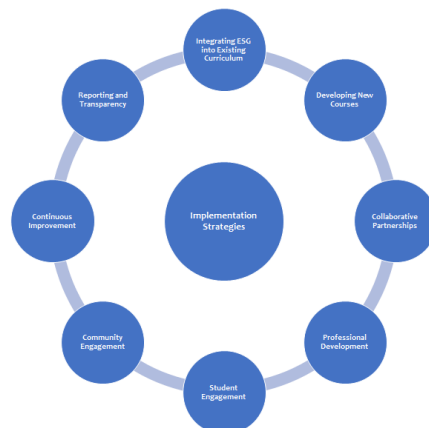Figure 1. The proposed framework for integrating ESG principles into higher education

Figure 2. Framework implementation strategies

3.   RESULTS AND DISCUSSION

This section aims to provide an in-depth analysis of the results obtained from the study and initiate discussions related to the integration of ESG principles into higher education. The section is divided into two subsections: framework components and implementation strategies, each focusing on different aspects of the research findings.

3.1.   Framework components

This section delves into the practical application of the framework's components in real-world settings. To illustrate the feasibility and effectiveness of integrating ESG principles, each component of the framework is accompanied by two concrete examples of how institutions have successfully incorporated ESG principles into their curriculum, operations, and community engagement. These examples provide tangible demonstrations of how the framework's components can be adapted and implemented in diverse educational contexts.

3.1.1. Interdisciplinary approach

The adoption of an interdisciplinary approach has proven to be an effective means of addressing complex sustainability issues. By designing courses that explore the interconnectedness of social, economic, and environmental dimensions, students gain a comprehensive understanding of sustainability. Additionally, inviting guest speakers from various fields enriches the learning experience by incorporating diverse perspectives.

a. Example: a course on sustainable development brings together students from different disciplines such as environmental science, business, sociology, and engineering. This collaborative learning environment emphasizes the interconnectedness of social, economic, and environmental systems.

b. Example: a project-based learning experience tasks students with designing a sustainable community, requiring the integration of knowledge from disciplines such as architecture, urban planning, and environmental science.

3.1.2. Real-world applications

Engaging students through real-world applications ensures their understanding of sustainability extends beyond theory. By incorporating case studies, simulations, and projects that involve real data, scenarios, or stakeholders, students are better equipped to apply their knowledge and skills in practical settings.

a. Example: a course on renewable energy includes a hands-on project where students design and install solar panels on a local community center, providing them with firsthand experience in sustainable energy solutions.

b. Example: a business course incorporates a project where students collaborate with a local company to develop a sustainability plan and implement practices that reduce waste and increase efficiency, enabling them to address real-world sustainability challenges.

3.1.3. Stakeholder engagement

Involving relevant stakeholders in the teaching and learning process enhances the educational experience and fosters a sense of shared responsibility towards sustainability. External experts, practitioners, and community members can contribute to co-creating, co-teaching, and co-evaluating courses. Moreover, encouraging students to engage with diverse stakeholders through surveys, interviews, and workshops facilitates a holistic understanding of sustainability.

a. Example: a sustainability-focused service-learning course partners students with local communities to work on projects such as habitat restoration, energy audits, and sustainable agriculture. This collaboration empowers students to address sustainability challenges within real communities.

b. Example: a course on sustainable transportation collaborates with a local transit agency to design and implement a public transportation system that reduces carbon emissions, providing students with an opportunity to engage with stakeholders and make a tangible impact.

3.1.4. Continuous improvement

Monitoring, evaluating, and continuously improving teaching and learning practices is crucial for the successful integration of ESG principles. Feedback, assessment, and reflection tools enable educators to measure and enhance learning outcomes, pedagogical approaches, and student satisfaction. Benchmarking, accreditation, and certification tools further facilitate improvement by comparing performance against best practices and standards.

a. Example: a university-wide recycling program encourages students, faculty, and staff to reduce waste and increase recycling rates. Regular audits and assessments identify areas for improvement, ensuring the program remains effective.

b. Example: a course on sustainable building practices includes a hands-on project where students work with a local construction company to design and build a sustainable building that meets LEED certification standards. This project provides valuable feedback for continuous improvement.

3.1.5. Leadership and governance

Demonstrating sustainability leadership and governance within institutions is vital for fostering a culture of sustainability. Aligning course objectives, content, and assessment with the institution's vision, mission, and values on sustainability showcases a commitment to sustainability. Participation in sustainability committees, networks, and initiatives further supports and advocates for sustainability policies and actions.

a. Example: a university sustainability committee comprises representatives from various departments, student organizations, and local community groups. Regular meetings and discussions facilitate the implementation and monitoring of sustainability initiatives.

b. Example: a presidential sustainability fellowship program provides funding and support for students to work on sustainability projects and research, highlighting the institution's commitment to nurturing future sustainability leaders.

3.1.6. Education for sustainability

Fostering sustainability competencies and values in students is a fundamental outcome of integrating ESG principles into higher education. Developing and assessing learning outcomes that reflect sustainability knowledge, skills, attitudes, and behaviors is crucial. Pedagogical methods that enhance sustainability awareness, critical thinking, creativity, collaboration, communication, and action further contribute to education for sustainability.

a. Example: a course on sustainable food systems educates students about the environmental, social, and economic impacts of food production and consumption. Hands-on learning experiences such as gardening and cooking promote sustainability competencies and values.

b. Example: a course on sustainable development includes a module on climate change, teaching students about the science, impacts, and mitigation strategies associated with climate change, fostering sustainability knowledge and critical thinking.

The implementation strategies will provide flexibility in integrating ESG principles into higher education, fostering a culture of sustainability, and equipping students with the knowledge, skills, and values necessary to address sustainability challenges. Through an interdisciplinary approach, real-world applications, stakeholder engagement, continuous improvement, leadership and governance, and education for sustainability, higher education institutions can effectively promote sustainability in the classroom.

3.2. Implementation strategies

This section explores a framework for integrating ESG principles into higher education, focusing on sustainability in the classroom. By examining case studies and initiatives, we can gain insights into effective implementation strategies for incorporating sustainability principles into the educational curriculum and campus operations.

3.2.1. Integrating environmental, social, and governance into existing curriculum

A case study of this strategy is the Sustainable Business Strategy course offered by Harvard Business School Online [23]. This course teaches students how to align their business goals with ESG principles, and how to create value for their stakeholders and society. The course uses real-world examples of companies that have successfully integrated ESG into their core business strategy, such as Unilever, IKEA, and Natura. The course also provides students with tools and frameworks to assess the ESG performance of their own organizations and identify opportunities for improvement.

3.2.2. Developing new courses

A case study of this strategy is the Master of Science in Sustainability Management program offered by Columbia University [24]. This program is designed to equip students with the knowledge and skills to address the complex challenges of sustainability in various sectors and industries. The program offers a variety of courses that cover topics such as climate change, energy, water, waste, urban planning, corporate social responsibility, and sustainable finance. The program also requires students to complete a capstone project that applies the concepts and methods learned in the courses to a real-world sustainability problem.

3.2.3. Collaborative partnerships

A case study of this strategy is the Global Network for Advanced Management (GNAM), which is a network of 32 leading business schools from around the world that collaborate to offer students and faculty opportunities to exchange ideas and learn from each other on global issues [25]. One of the initiatives of GNAM is the Global Network Week, which is a week-long program that allows students to travel to another member school and participate in a course on a specific topic. Some of the topics offered in the past include sustainability, social entrepreneurship, innovation, and leadership. The program enables students to gain exposure to different perspectives and cultures and to build connections with peers and faculty from other schools.

3.2.4. Professional development

A case study of this strategy is the Certificate for Leadership for Sustainability offered by Texas A&M University-Central Texas which is offered both online and on-campus and is accredited by the Association to Advance Collegiate Schools of Business (AACSB) [26]. This program is designed to help business educators enhance their knowledge and skills in teaching and researching sustainability topics. It is designed to assist those committed to a more sustainable world in developing the leadership for sustainability knowledge, skills, and perspective they need to understand and address these environmental and social challenges and build companies that meet the needs of society while delivering economic returns to financial stakeholders.

3.2.5. Student engagement

A case study of this strategy is the Net Impact organization, which is a global community of students and professionals who are committed to using their skills and careers to make a positive impact on the world [27]. Net Impact has chapters in more than 400 universities and 150 cities and organizes events, programs, and campaigns that address various social and environmental issues, such as climate change, poverty, diversity, and human rights. Net Impact also provides students with resources, opportunities, and networks to help them pursue their passions and goals in sustainability.

3.2.6. Community engagement

A case study of this strategy is the sustainability and social innovation (SASI) initiative at the University of California, Los Angeles (UCLA) [28]. This initiative aims to foster collaboration and innovation among students, faculty, staff, and community partners to address the most pressing sustainability challenges in Los Angeles and beyond. Some of the projects and activities of SASI include the Sustainable LA Grand Challenge, which is a research and action plan to achieve 100% renewable energy, 100% local water, and enhanced ecosystem health in Los Angeles by 2050; the Social Enterprise Academy, which is a program that trains and mentors students and community leaders to launch and grow social enterprises that create positive social and environmental impact; and the sustainability action research, which is a program that engages students in conducting research and implementing solutions for sustainability issues on campus and in the community.

3.2.7. Continuous improvement

A case study of this strategy is the sustainability tracking, assessment & rating system (STARS), which is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance [29]. STARS covers four main categories: academics, engagement, operations, and planning & administration. Each category consists of several subcategories and indicators that reflect the best practices and standards of sustainability in higher education. STARS also provides institutions with a rating (bronze, silver, gold, or platinum) based on their scores, and a platform to share and compare their results and achievements with other institutions.

3.2.8. Reporting and transparency

A case study of this strategy is the global reporting initiative (GRI), which is an international organization that provides guidance and standards for organizations to report on their economic, environmental, and social impacts [30]. GRI helps organizations to communicate their sustainability performance and impacts to their stakeholders and the public, and to improve their accountability and transparency. GRI also supports the integration of sustainability reporting into the mainstream reporting practices and regulations of organizations. Some of the benefits of using GRI include enhancing reputation, building trust, attracting investors, reducing risks, and increasing efficiency.

4.   CONCLUSION

This paper has presented a comprehensive framework for integrating ESG principles into higher education institutions. The framework encompasses six key components, including curriculum integration, research and innovation, campus operations, community engagement, leadership and governance, and assessment and reporting. Supported by eight implementation strategies, this framework provides practical guidance for institutions seeking to enhance their sustainability efforts. Based on a thorough literature review, this framework recognizes the significance of ESG considerations in higher education and addresses the challenges and opportunities associated with sustainability integration. Additionally, the framework is supported by real-world case studies that demonstrate the successful implementation of sustainability initiatives and the resulting benefits.

By adopting this proposed framework, higher education institutions can make substantial contributions to advancing sustainability. Through the integration of ESG principles into all aspects of their operations, institutions can reduce their environmental impact, promote social responsibility, and enhance governance and leadership practices. This holistic approach enables institutions to play a vital role in fostering sustainable development and equipping students with the necessary skills for the 21st century.

Moving forward, there are multiple ways in which the proposed framework can be applied and implemented. Institutions can utilize the framework to assess their current sustainability efforts, identify areas for improvement, and develop comprehensive sustainability plans. Furthermore, the framework can be instrumental in monitoring and evaluating progress towards sustainability goals. By embracing this framework and prioritizing sustainability, higher education institutions can become catalysts for change and contribute significantly to a more sustainable future. Through the collective efforts of institutions, students, faculty, and staff, we can create a transformative impact on society and ensure a better world for future generations.

REFERENCES

[1]   M. T. Fuertes-Camacho, M. Graell-Martín, M. Fuentes-Loss, and M. C. Balaguer-Fàbregas, "Integrating sustainability into higher education curricula through the project method, a global learning strategy," *Sustainability*, vol. 11, no. 3, p. 767, 2019, doi: 10.3390/su11030767.

[2]   M. Obrecht, Z. Feodorova, and M. Rosi, "Assessment of environmental sustainability integration into higher education for future experts and leaders," *Journal of Environmental Management*, vol. 316, p. 115223, Aug. 2022, doi: 10.1016/j.jenvman.2022.115223.

[3]   M. Bataeineh and O. Aga, "Integrating sustainability into higher education curricula: Saudi Vision 2030," *Emerald Open Research*, vol. 1, no. 3, p. 19, Dec. 2023, doi: 10.1108/EOR-03-2023-0014.

[4]   V. Simmons, A. Serafin, A. Stampone, and L. A. Rayeski, "Integrating ESG into the accounting curriculum: insights from accounting educators," *Issues in Accounting Education*, vol. 39, no. 2, pp. 85–106, May 2024, doi: 10.2308/ISSUES-2022-080.

[5]   I. Fialho, M. Cid, and M. Coppi, "Grounding and improving assessment in higher education: a way of promoting quality education," *Frontiers in Education*, vol. 8, p. 1143356, May 2023, doi: 10.3389/feduc.2023.1143356.

[6]   J. E. Dmochowski, D. Garofalo, S. Fisher, A. Greene, and D. Gambogi, "Integrating sustainability across the university curriculum," *International Journal of Sustainability in Higher Education*, vol. 17, no. 5, pp. 652–670, Sep. 2016, doi: 10.1108/IJSHE-10-2014-0154.

[7]   H. Yu, P. Chen, H. Wang, Y. Yuan, and Z. Feng, "Application of an environmental, social and governance (ESG) course to enhance the knowledge of sustainable finance of international Chinese college students in Thailand," *Journal of Higher Education Theory and Practice*, vol. 22, no. 11, pp. 45–56, Sep. 2022, doi: 10.33423/jhetp.v22i11.5411.

[8]   W.-K. Chiu and B. Y. F. Fong, "Recent trends of research and education in ESG and sustainability," in *Environmental, social and governance and sustainable development in healthcare*, Singapore: Springer Nature Singapore, 2023, pp. 99–112, doi: 10.1007/978-981-99-1564-4_7.

[9]   J. Lindner, "Essential sustainability in higher education statistics in 2024," *worldmetrics.org/*, 2023. Accessed: Jan. 13, 2024. [Online]. Available: https://zipdo.co/statistics/sustainability-in-higher-education/

[10]   M. Ezarik, "Actions and hopes of the sustainability-focused student," *insidehighered.com*, 2023. Accessed: Nov. 30, 2023. [Online]. Available: https://www.insidehighered.com/news/students/academics/2023/01/02/sustainability-actions-students-take-and-want-their-colleges

[11]   R. Lozano, M. Merrill, K. Sammalisto, K. Ceulemans, and F. Lozano, "Connecting competences and pedagogical approaches for sustainable development in higher education: a literature review and framework proposal," *Sustainability*, vol. 9, no. 10, p. 1889, Oct. 2017, doi: 10.3390/su9101889.

[12]   M. J. Sá and S. Serpa, "The COVID-19 pandemic as an opportunity to foster the sustainable development of teaching in higher education," *Sustainability*, vol. 12, no. 20, p. 8525, Oct. 2020, doi: 10.3390/su12208525.

[13]   G. Sonetti, M. Brown, and E. Naboni, "About the triggering of UN sustainable development goals and regenerative sustainability in higher education," *Sustainability*, vol. 11, no. 1, p. 254, Jan. 2019, doi: 10.3390/su11010254.

[14]   W. L. Filho *et al.*, "Sustainable development goals and sustainability teaching at universities: falling behind or getting ahead of the pack?," *Journal of Cleaner Production*, vol. 232, pp. 285–294, Sep. 2019, doi: 10.1016/j.jclepro.2019.05.309.

[15]   E. C. Johnson Jr., J. H. Stout, and A. C. Walter, "Profound change: the evolution of ESG," *Business Lawyer*, vol. 75, no. 4, pp. 2567–2607, 2020.

[16]   D. A. M. Sánchez, A. G. Laso, J. L. C. Mustelier, and J.-L. P. y Alfaro, "Integrative learning toward social responsibility in teaching engineering: 'sustainable development goals: quality education,'" in *Handbook of research on operational quality assurance in higher education for life-long learning*, W. Nuninger and J.-M. Châtelet, Eds. IGI Global, 2020, pp. 27–55, doi: 10.4018/978-1-7998-1238-8.ch002.

[17]   T. McCowan, *Higher education for and beyond the sustainable development goals*. Cham: Springer International Publishing, 2019.

[18]   Y.-K. Chan and M.-Y. Hsieh, "An empirical study on higher education C-ESG sustainable development strategy in lower-birth-rate era," *Sustainability*, vol. 14, no. 19, p. 12629, Oct. 2022, doi: 10.3390/su141912629.

[19]   K. Brundiers *et al.*, "Key competencies in sustainability in higher education—toward an agreed-upon reference framework," *Sustainability Science*, vol. 16, no. 1, pp. 13–29, Jan. 2021, doi: 10.1007/s11625-020-00838-2.

[20]   N. Danila, "Herding behaviour in ESG stock index: evidence from emerging markets," *Global Business Review*, p. 09721509231199300, Oct. 2023, doi: 10.1177/09721509231199300.

[21]   A. Diab and A. M. Eissa, "ESG performance, auditor choice, and audit opinion: evidence from an emerging market," *Sustainability*, vol. 16, no. 1, p. 124, Dec. 2023, doi: 10.3390/su16010124.

[22]   E. Gregory, "Methodological challenges for the qualitative researcher: the use of a conceptual framework within a qualitative case study," *London Review of Education*, vol. 18, no. 1, pp. 126–141, 2020, doi: 10.18546/LRE.18.1.09.

[23]   HBS Online, "Sustainable business strategy course," *HBS Online*. Accessed: Nov. 30, 2023. [Online]. Available: https://online.hbs.edu/courses/

[24]   Columbia University, "Master of science in sustainability management," *sustainability.ei.columbia.edu*. Accessed: Nov. 30, 2023. [Online]. Available: www.sustainability.ei.columbia.edu

[25]   A. Wigmore-Álvarez, M. Ruiz-Lozano, and J. L. Fernández-Fernández, "Management of university social responsibility in business schools. An exploratory study," *The International Journal of Management Education*, vol. 18, no. 2, p. 100382, Jul. 2020, doi: 10.1016/j.ijme.2020.100382.

[26]   Texas A&M University - Central Texas, "Certificate for leadership for sustainability," *tamuct.edu*. Accessed: Nov. 30, 2023. [Online]. Available: https://www.tamuct.edu/degrees/certificates/leadership-for-sustainability-certificate-graduate.html

[27]   Net Impact, "Net impact," *Net Impact*. Accessed: Nov. 30, 2023. [Online]. Available: https://netimpact.org/

[28]   UCLA Sustainability, "Sustainability at UCLA brings together a community of students, faculty, and staff," *UCLA Sustainability*. Accessed: Nov. 30, 2023. [Online]. Available: https://www.sustain.ucla.edu/

[29]   L. E. Doocy, A. Zarmehr, and J. T. Kider Jr, "A critical review of the effectiveness of the sustainability tracking, assessment & rating system (STARS) framework on campus sustainability," in *Proceedings of Building Simulation 2021: 17th Conference of IBPSA*, Sep. 2021, pp. 629–635, doi: 10.26868/25222708.2021.31030.

[30]   S. Narula *et al.*, "Applicability of industry 4.0 technologies in the adoption of global reporting initiative standards for achieving sustainability," *Journal of Cleaner Production*, vol. 305, p. 127141, Jul. 2021, doi: 10.1016/j.jclepro.2021.127141.

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