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UNLOCKING THE POTENTIAL OF ESG AND AI IN HIGHER EDUCATION FINANCE: INSIGHTS FROM A STUDY ACROSS FIVE EUROPEAN COUNTRIES

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Abstract. This paper presents the results of a qualitative study conducted in five European countries (Austria, Slovenia, Poland, Bulgaria, and the Netherlands) as part of the GenESG Erasmus+ project. The research explored how Environmental, Social, and Governance (ESG) content and Artificial Intelligence (AI) tools are integrated into higher education finance programmes. Data was collected through focus groups with academic staff and analyzed thematically. The study identified several systemic barriers to effective ESG and AI integration, including fragmented curricula, limited interdisciplinarity, lack of standardized competencies, and insufficient ethical frameworks for AI use. Nonetheless, good practices were observed, especially in Slovenia and the Netherlands, where project-based and AI-supported pedagogical models are emerging. The findings highlight the importance of practical skills development, ethical guidance, and motivation-enhancing teaching strategies. Recommendations include curriculum standardization, interdisciplinary cooperation, ethical AI integration, and targeted faculty training. The study contributes novel insights into aligning education with the goals of sustainable and digital transformation in Europe's higher education systems.

Keywords: Sustainable Finance; ESG Education; Artificial Intelligence in Higher Education; Curriculum Innovation; Interdisciplinarity; Ethical AI Use

JEL classification code: I23, Q56, O33

1. Introduction

Over the past decade, the fields of sustainable finance and Environmental, Social, and Governance (ESG) factors have become central to business decision-making and regulatory frameworks at both the European and global levels. Increasing pressure from markets, legislation, and civil society is encouraging companies to embed sustainability into their strategies and practices. This development highlights the urgent need to reform higher education (HE) programmes that prepare future financial and business professionals.

At the same time, an intensive digital transformation is underway, in which Artificial Intelligence (AI) plays an increasingly important role – not only in data processing and decision automation, but also in the personalization of learning processes. Despite this, most European HE systems have not yet systematically integrated ESG content with AI tools into cohesive educational strategies. These topics often remain fragmented, supplementary, or confined to postgraduate levels.

The GenESG project – *Sustainable Finance Microlearning with Educational Generative AI* – addresses a key question: How can HE institutions develop the competences needed for a sustainable and digital future? As part of the project, a qualitative study was conducted in five countries (Austria, Slovenia, Poland, Bulgaria, and the Netherlands), using focus groups with university lecturers to examine current ESG teaching practices, the potential use of AI, and perceived competence gaps.

The findings reveal significant mismatches between labour market needs and the content of existing academic programmes. While students express interest in ESG and AI topics, the programmes are often overly theoretical, lacking in practical examples, simulations, or access to modern tools. Simultaneously, educators report the need for support in integrating AI into teaching practice, understanding ESG legislation, and designing interdisciplinary content.

This paper aims to present key findings from the study and provide recommendations for developing innovative teaching models that more effectively integrate ESG and AI into higher education finance curricula. In doing so, the paper contributes to a deeper understanding of the systemic challenges and the transformative potential of aligning educational practice with the goals of sustainability and digitalisation. Furthermore, this manuscript fills a gap in the literature because, to the best of the authors` knowledge, this is the first qualitative study to analyse how ESG and AI are incorporated into finance curricula in Austria, Bulgaria, Poland, Slovenia and the Netherlands.

1.1. Theoretical framework

Over the past two decades, HE has been undergoing profound transformation under the influence of globalization, market pressures, and digitalization. According to Marginson (2004) and Chankseliani et al. (2021), these processes have led to growing stratification within the higher education landscape, where

elite universities dominate the research arena, while diminishing attention is paid to public goods such as equal access, social justice, and institutional responsibility.

In this context, HE institutions are becoming key actors in the implementation of the Sustainable Development Goals (SDGs), which calls for the development of new learning models that equip students with the knowledge and competences needed to address complex environmental, social, and technological challenges (Abad-Segura & González-Zamar 2021; Borsatto et al. 2024; Caputo et al. 2021; Mohiuddin et al. 2022). This involves the intersection of two major trends: the integration of ESG content and the application of AI in HE (Truong and Papagiannidis 2022; Jiang et al. 2022; Beloev et al. 2023).

ESG is more than a new thematic area – it represents a transformation in how we understand the role of businesses, investors, and economists in society. It requires the integration of economics with environmental science, ethics, law, and technology (Turcan and Reilly 2020; Holmes and Porayska-Pomsta 2023). Programmes that include ESG must go beyond the transmission of factual knowledge, promoting critical thinking, the ability to interpret complex data, and the integration of values into the decision-making process (Smith and Fox 2019).

Simultaneously, AI opens new horizons for personalizing learning, decision-making simulations, and real-time assessment—particularly in the context of ESG scenarios (Holmes and Porayska-Pomsta 2023). However, leveraging this technological potential requires the development of digital literacy, ethical standards, and reflective capacities among both students and educators (Jiang et al. 2022; Beloeva and Venelinova 2024). As Edwards and Usher (2001) argue, digital environments challenge traditional notions of knowledge and authority, necessitating a reevaluation of education as an open and participatory process.

Glastra et al. (2004) emphasize that contemporary education must transcend disciplinary boundaries to effectively address challenges such as climate change, digital exclusion, and social inequality. Institutions that implement interdisciplinary approaches – linking, for instance, finance with environmental studies and information technology – are proving to be the most effective in operationalising ESG content.

However, the GenESG research shows that these theoretical ideals are rarely realised in practice. In most participating countries, ESG and AI-related content remains fragmented, confined to elective modules or postgraduate courses, and primarily theoretical in nature. Educators often lack access to adequate tools, training opportunities, or structures for interdisciplinary collaboration, which limits the development of innovative pedagogical approaches (Beiter et al. 2016; Olssen 2006).

Another major barrier is the rigidity of accreditation processes and the lack of institutional incentives for introducing new content or methodologies – an issue further highlighted by Schlegel and Kraus (2023), who describe systemic inertia in the digital transformation of education.

On this basis, it becomes evident that ESG and AI cannot remain peripheral topics but must become pillars of pedagogical and institutional innovation. Such innovation must include project-based learning, collaboration with industry, the use of digital tools, and the development of ethical awareness in digital environments. Otherwise, ESG education risks remaining declarative, without a meaningful impact on the next generation of financial and business professionals.

Considering the systemic and pedagogical gaps identified in the literature, and recognizing the transformative potential of ESG and AI integration in higher education, the study formulated the following research questions to guide its empirical inquiry.

1.2. Research Questions

This study seeks to explore how higher education institutions across five European countries respond to the dual imperative of sustainability and digitalisation by integrating ESG content and AI tools into finance-related curricula. In line with the aims of the GenESG project and building on prior theoretical frameworks, the research was guided by the following questions:

– RQ1: To what extent are Environmental, Social, and Governance (ESG) topics systematically integrated into finance-related higher education curricula across Austria, Slovenia, Poland, Bulgaria, and the Netherlands?

– RQ2: How do higher education lecturers perceive the opportunities and challenges associated with the integration of Artificial Intelligence (AI) tools into ESG-related teaching?

– RQ3: Which ESG- and AI-related competences are considered essential for students in finance programmes, and how are these currently addressed – or neglected – within existing pedagogical practices?

– RQ 4: What systemic barriers (e.g., curricular rigidity, lack of interdisciplinary structures, institutional inertia) inhibit the effective integration of ESG and AI in higher education?

– RQ 5: Which teaching strategies and institutional innovations have proven effective in enhancing student engagement and motivation in ESG education, particularly when supported by AI-based tools?

These questions provide a coherent analytical framework for interpreting the findings of the cross-country focus groups and for identifying future directions for institutional innovation, pedagogical development, and policy design in ESG and AI education.

2. Materials and methods

This study was carried out as the initial research activity within the Erasmus+ project GenESG – Sustainable Finance Microlearning with Educational Generative AI. The empirical investigation was designed to address the research questions outlined in Section 1.2. The aim was to investigate the current state of ESG education in higher education institutions (HEIs) and to explore the integration

of Artificial Intelligence (AI) in teaching sustainable finance across selected EU countries. The study focused on identifying existing pedagogical practices, institutional challenges, and competence gaps, with the ultimate goal of informing future curriculum development and didactic strategies.

A qualitative research design was employed, using focus group interviews as the primary method of data collection. This approach enabled an in-depth understanding of the perceptions, experiences, and expectations of lecturers working in the fields of finance, sustainability, governance, and digital education.

Focus groups were conducted between January and February 2025 in five countries: Austria, Slovenia, Poland, Bulgaria, and the Netherlands. A total of 32 participants were involved, including HE lecturers, researchers, programme managers, and, in some cases, representatives of accreditation bodies. Participants were purposively selected to ensure disciplinary diversity and representation of both theoretical and applied educational practices.

Table 1. Sample and implementation of the multi-market survey

Country	No. of participants	Contractor	Method of implementation	Duration
Austria	5	FH Joanneum	Face to Face	1,5 hours
Slovenia	5	DOBA Business School, Maribor	Face to Face	1,5 hours
Poland	5	Krakow University of Economics	online (Zoom)	2 hours
Bulgaria	12	UNWE and partner universities	online (Teams)	2,5 hours
Netherlands	5	The Hague University of Applied Sciences	Hybrid	2 hours

Source: own elaborations.

Participants had backgrounds in economics, sustainable finance, environmental science, AI, and educational technology. Special attention was given to ensuring the inclusion of individuals with hands-on experience in ESG-related teaching or curriculum design.

Each focus group followed a structured thematic protocol designed to enable comparative analysis across national contexts. The protocol included three key thematic clusters:

1. ESG and sustainable finance in HE curricula – Current teaching methods, integration barriers, industry collaboration

2. Use of AI in ESG education – Tools in use (e.g., chatbots, simulations, quizzes), digital transformation opportunities, educator readiness

3. Competences and skills development – Required ESG and AI-related competences for students and lecturers, ethical implications, and training needs

All sessions were recorded, anonymised, and transcribed for future reference. The data were analysed using content and thematic analysis**.** Coding was carried out in three stages: Deductive coding**,** based on predefined thematic categories aligned with the research protocol; Inductive coding, allowing emergent themes to surface from participant narratives; Cross-case synthesis, comparing similarities, differences, and country-specific priorities. This multi-stage analysis provided a structured yet flexible framework for interpreting a wide range of insights, which are presented in the following section of the paper.

3. Results

The analysis of the focus groups conducted in five countries (Austria, Slovenia, Poland, Bulgaria, and the Netherlands) revealed seven interconnected thematic clusters, offering a comprehensive insight into the current state of ESG and AI integration in higher education (HE). Each section below synthesizes the findings, drawing attention to both shared trends and country-specific contrasts. The analysis was grounded in a three-stage coding process (deductive, inductive, and cross-case synthesis), as outlined in the methodology.

Three dominant codes emerged across all countries: (1) fragmentation of ESG content, (2) lack of AI readiness, and (3) low perceived relevance of ESG among students.

3.1. Integration of ESG in HE programmes

The integration of ESG content in higher education finance programmes across the five participating countries remains limited, inconsistent, and mostly non-systemic, despite growing awareness of its relevance. The most common forms of implementation are optional modules, postgraduate courses, and isolated projects. The systematic integration of ESG into core curricula is rare, and the level of interdisciplinarity varies significantly.

Thematic coding of focus group discussions revealed three dominant challenges to ESG integration: (1) a primarily theoretical framing of ESG topics, (2) absence of practical tools and real-world applications, and (3) insufficient interdisciplinary teaching structures.

Table 2 presents the current integration of ESG in HE programmes by country.

Table 2. Integration of ESG in HE programmes by country

Country	ESG integration in core subjects	Forms of implementation	Degree of interdisciplinarity
Austria	✗	✓ Optional modules, simulations, pilot courses	✗
Slovenia	✗	✓ Projects, cooperation with industry, guest lecturers	~
Poland	~	✓ Postgraduate programmes, analysis of ESG reports	~
Bulgaria	✗	~ Separate subjects, theoretical approaches	✗
Netherlands	~	✓ Minors, project work, SDG calculators	✓

Notes: ✓ = present, ~ = partial, ✗ = not present.
Source: own elaborations.

Key insights show that ESG is most developed in the Netherlands, where project-based minors and tools like SDG calculators support deeper integration. Bulgaria shows the weakest integration, primarily through theoretical modules detached from applied finance. Interdisciplinarity is generally low, although Slovenia and the Netherlands are experimenting with cross-disciplinary teaching formats. Participants from all countries highlighted that ESG is often approached too theoretically. Practical tools such as ESG data platforms, sustainability reporting software, or scenario planning exercises are largely absent in most institutions. In most countries, ESG is taught as an add-on rather than an integral part of risk management or investment education. Pilot efforts in Austria and Poland remain isolated and dependent on individual lecturers. Despite being universally recognised as essential, interdisciplinarity is rarely practiced. Participants from Bulgaria and Poland stressed the lack of co-teaching, joint modules, or project-based learning that crosses disciplinary lines. Good practices exist, particularly in the Netherlands (e.g., SDG Public Minor, THUAS) and to some extent in Slovenia. In Slovenia, there has been a noticeable shift towards project work and business involvement, but these practices remain unevenly distributed across programmes.

In summary, while all countries acknowledge the importance of ESG, its actual implementation in finance curricula is still at an early stage. Progress remains scattered and dependent on motivated individuals rather than structural curricular reform. Comprehensive integration of ESG into core teaching and across disciplines requires coordinated institutional strategies, updated pedagogical models, and support mechanisms for lecturers.

3.2. Key practical skills and competences of students

Building ESG-related competences emerged as a central concern across all five national focus groups. While consensus exists on the types of skills students need, considerable gaps were identified between institutional ambitions and actual teaching practices. Table 3 summarizes the competences identified.

Table 3. ESG-Related Competences and Skills in Student Learning

Country	ESG data analysis	Application of the legislation	Soft skills	Critical thinking	Developing business models	ESG risks
Austria	✓	✓	✓	✓	✓	✓
Slovenia	✓	✓	✓	✓	✓	✓
Poland	✓	~	✓	✓	✓	✓
Bulgaria	✓	✗	~	✓	✗	~
Netherlands	✓	✓	✓	✓	✓	✓

Notes: ✓ = present, ~ = partial, ✗ = not present.
Source: own elaborations.

Austria, Slovenia, and the Netherlands show the most comprehensive skill expectations across all dimensions. Bulgaria struggles with legislative literacy and practical application, due in part to undertrained teaching staff. The importance of critical thinking and communication skills was emphasized in all groups, especially regarding greenwashing detection and stakeholder engagement. Participants emphasized that practical exposure – such as simulations, real ESG audits, and project work with companies – is critical for developing these competences. However, such opportunities remain limited.

Several countries, particularly Austria, Slovenia and the Netherlands, highlight the need for students to be proficient in both basic and advanced tools for collecting, visualizing and interpreting ESG data. Frequently mentioned tools include Excel (with advanced functions), Power BI, Tableau, and access to ESG report databases such as CDP, GRI, Bloomberg ESG, and Refinitiv. Understanding specific ESG indicators (e.g. CO_2 emissions, diversity ratios, pay gaps) must be linked to their practical relevance in investment decision-making, reporting, and compliance environments.

In all countries, participants emphasized that regulatory literacy is foundational for ESG competence. Key frameworks and documents, including the CSRD, EU Taxonomy, SFDR, ISSB standards, and GRI, were commonly cited as essential knowledge areas. Importantly, practical application was seen as lacking, particularly

in Bulgaria, where legal frameworks are often only presented theoretically due to a shortage of qualified staff.

Focus groups in Poland, the Netherlands, and Slovenia particularly stressed that ESG education must foster the ability to design sustainable business models. Students should be able to identify synergies between sustainability and profitability, develop corporate ESG strategies, and understand ESG's influence on long-term financial performance. The ability to assess ESG risks – climate-related, reputational, regulatory – was seen as integral to preparing students for real-world financial roles.

Nearly all groups emphasized the importance of communication with diverse stakeholders, negotiation, interdisciplinary teamwork, and the ability to translate complex ESG findings into understandable outputs. Critical thinking was highlighted as vital for evaluating ESG claims and identifying potential greenwashing. These skills are crucial for bridging the gap between data-heavy ESG reports and strategic communication with investors, regulators, or the public.

Across all countries, there was strong agreement that theoretical instruction is insufficient. Real-world experience is essential for developing effective competence. Recommended approaches include: collaborating with companies on ESG assessments, simulation exercises (e.g., ESG disclosures, sustainable investment decisions), entrepreneurship projects related to sustainability, using digital tools and AI to analyse ESG scenarios, and mentorship programmes with professionals from the ESG sector.

The results also highlighted structural gaps: limited access to quality ESG datasets, lack of digital teaching tools, and missing standards for competence evaluation. To address these gaps, participants called for systemic modules with defined learning outcomes and mechanisms for verifying skill acquisition.

Taken together, the findings suggest that ESG education must evolve beyond declarative content to include competence-based modules, hands-on projects, and access to real-world tools. Without such reform, students will remain underprepared for the strategic and regulatory demands of sustainable finance.

3.3. The role of AI and chatbots in ESG education

The integration of AI tools into ESG education is still in its early stages, with stark differences between countries. While pioneers like the Netherlands and Slovenia demonstrate the potential of AI to transform learning, most institutions face considerable infrastructural, legal, and pedagogical barriers.

Table 4 shows the use of AI functionalities by country.

Table 4. Use of AI Functionalities in ESG Education across Countries

Functionality	Austria	Slovenia	Poland	Bulgaria	Netherlands
ESG decision simulations	✓	✓	✓	~	✓
Quizzes and feedback	✓	✓	✓	✗	✓
Personalising learning	~	✓	✗	✗	✓
Analysis of ESG reports	✓	✓	~	✗	~
Soft skills training with AI	✗	✓	✓	✗	✓
Promptology / question formulation	✗	✓	✗	✗	✓

Notes: ✓ = present, ~ = partial, ✗ = not present.
Source: own elaborations.

The Netherlands and Slovenia lead in experimenting with prompt engineering, simulations, and AI-assisted project work. Bulgaria and Poland face infrastructural and capacity challenges, with limited usage of AI in education. Chatbots are used to simulate ESG decision-making, guide report analysis, personalize content delivery, and develop soft skills.

Key applications include ESG decision simulations, mimicking real-life investment choices under sustainability constraints; guided walkthroughs of ESG reporting frameworks (e.g. GRI, SASB, TCFD); personalised quizzes and feedback systems that adapt to student progress; stakeholder dialogue simulations to build negotiation and communication competences; and promptology – structured training in formulating effective prompts – as a core digital skill.

A standout initiative comes from the Netherlands, where "promptology" is being integrated into coursework. Students are taught to design strategic prompts to elicit accurate, relevant, and ethical responses from generative AI tools. Other institutions use AI to support sustainability-focused project work, benchmark reports, and SDG impact analysis.

Barriers to adoption could be lack of AI-related pedagogical training for faculty; institutional restrictions due to security, privacy, or IP concerns; student misuse (e.g. uncritical copy-pasting, plagiarism); scepticism regarding the reliability of AI-generated content. Several participants expressed a preference for localised, topic-specific chatbots built around verified ESG content. The absence of institutional guidelines and support structures further hinders adoption.

To fully harness the potential of AI in ESG education, focus group participants proposed several strategic measures. These include incorporating prompt engineering into core curricula to help students interact more effectively with

generative AI tools, as well as developing dedicated AI modules tailored explicitly to ESG contexts. Additionally, they emphasized the importance of training lecturers in digital pedagogy and AI ethics, alongside creating institutional guidelines that ensure the responsible use of AI in teaching. Finally, participants recommended the development of faculty-level AI tools through interdisciplinary collaboration, which would support both educators and students in applying AI effectively within ESG education. While enthusiasm for AI is growing, so too are concerns about its uncritical use. Without ethical frameworks and targeted training, AI may reinforce superficial approaches to ESG rather than fostering a deeper understanding.

To ensure that AI supports – rather than undermines – sustainability education, coordinated efforts are required to create standardized frameworks for integration, ethical oversight, and competence development.

3.4. Standardization of ESG Content in HE

Despite growing institutional awareness, ESG education in higher education remains highly fragmented. Without shared standards and frameworks, universities rely on ad-hoc solutions, which hinder consistency, transferability, and quality assurance across programmes and institutions. The lack of standardized ESG content and competencies was a recurring theme across all focus groups. Most initiatives are still individual and isolated, often driven by the enthusiasm of single lecturers rather than coordinated strategies.

The identified needs for improving ESG education include establishing core learning objectives and minimum content standards, as well as developing competence frameworks that are aligned with labour market demands. There is also a strong call for institutional and national-level coordination, including the involvement of higher education quality assurance agencies, and for alignment with international policy frameworks such as the EU Taxonomy and the CSRD. Participants from Austria and Slovenia particularly emphasized the importance of linking ESG curriculum design with occupational standards and advocated for the creation of flexible micro-credentials that can be stacked and recognized across institutions.

One of the key challenges identified was the absence of national guidelines or European reference points to support HEIs in ESG curriculum design. Participants from Bulgaria and Poland highlighted that no strategic guidance or policy exists to structure the integration of ESG within higher education systems. In contrast, Austria and Slovenia are exploring early-stage frameworks.

Suggestions included establishing minimum content standards to cover ESG legislation, analytical methods, sustainability strategies, and soft skills; developing a competence framework to support structured assessment across fields of study; and strengthening European coordination to ensure mutual recognition of ESG modules and encourage the exchange of good practices.

Several focus groups (especially Austria and Slovenia) called for close cooperation with employers and sectoral bodies in developing ESG learning outcomes. Such

collaboration would help ensure relevance to labour market demands, particularly in roles related to ESG reporting, sustainable investment, and risk management.

To move toward more systematic ESG education, participants recommended the creation of national frameworks or guidelines for ESG in higher education, aligned with national qualification structures. They also suggested designing modular ESG units that can be integrated into existing programmes in finance, management, and economics. Additionally, launching pilot standardisation projects to test structured models across diverse institutional contexts and partnering with quality assurance agencies to define criteria for evaluating ESG content and outcomes were proposed. Standardization was viewed not as an end in itself, but as a necessary foundation for developing coherent, transferable, and labour-relevant ESG education. Its successful implementation will require coordinated efforts across academic institutions, regulatory bodies, and industry stakeholders.

3.5. Interdisciplinarity and institutional integration of ESG content

While there is broad consensus on the need for interdisciplinary ESG education, actual implementation remains rare. Institutional fragmentation, departmental silos, and lack of incentives continue to block meaningful cooperation across faculties. All focus groups acknowledged that the complexity of ESG challenges – ranging from climate risk to corporate governance – requires multidisciplinary perspectives and collaborative teaching models. Yet, siloed curricula, rigid accreditation systems, and limited administrative support hinder progress.

Table 5 illustrates selected good practices in interdisciplinary ESG education.

Table 5. Interdisciplinary practices in ESG teaching and institutional support

Country	Joint mentoring	Integrated modules	Cross-faculty projects	Institutional support	Key barriers
Austria	~	✗	~	Limited	Curricular rigidity
Slovenia	✓	✓	✓	Developing	Administrative complexity, lack of incentives
Poland	✗	~	✓	Emerging	Low support for initiatives
Bulgaria	✗	✗	✗	Absent	No cooperation structures
Netherlands	✓	✓	✓	Strong	Scalable but resource-bound

Notes: ✓ = present, ~ = partial, ✗ = not present.
Source: own elaborations.

Good practices include joint mentoring and co-teaching (e.g., economics and environmental law); integrated modules (e.g., ESG and data analytics); and cross-faculty student projects that tackle real-world ESG cases.

The current situation shows fragmentation and siloed delivery. Focus group participants from Slovenia, the Netherlands, and Poland described how programmes often remain confined to their disciplinary origins. ESG is usually framed from a financial or economic perspective, with little input from environmental science, law, or technology. In Bulgaria, some participants noted that ESG is still not clearly understood outside economics departments.

Participants from the Netherlands and Slovenia particularly emphasized that ESG education must go beyond single-discipline teaching. Joint student projects were cited as an effective tool – for example, assessing a company's ESG performance from multiple disciplinary standpoints (financial, environmental, and regulatory). Combined modules linking ESG with informatics, environmental science, or law were also recognized as promising models.

All focus groups pointed to structural barriers: outdated curricula, slow revision cycles, and bureaucratic obstacles to introducing cross-departmental courses. Lecturers often lack authority, resources, or incentives to initiate collaboration.

Proposed solutions include: creating university-wide platforms for joint ESG projects; developing dual-mentorship formats pairing lecturers from different disciplines; providing financial and organizational support for interdisciplinary teaching initiatives.

Interdisciplinary approaches were seen as essential not only for addressing ESG content comprehensively, but also for increasing student motivation and connecting learning with professional realities. Participants noted that such approaches naturally align with project-based learning, industry partnerships, and applied research. Achieving this, however, requires more institutional flexibility, a culture of collaboration, and strategic backing from university leadership.

Interdisciplinary formats not only improve content relevance but also mirror the complexity of real-world ESG challenges, enhancing employability and critical problem-solving skills. Overcoming structural barriers to interdisciplinarity is essential for ESG education to evolve from isolated modules to integrated, transformative learning experiences.

3.6. Ethics of using AI in ESG education

As generative AI tools become increasingly integrated into higher education, concerns around their ethical use are gaining prominence – particularly in fields like ESG, where normative accuracy, transparency, and critical thinking are essential. While most lecturers acknowledged the potential of AI to enhance learning, they simultaneously expressed strong reservations regarding its unchecked use, calling for clear frameworks and pedagogical guidance.

Key risks identified across countries include an over-reliance on unverified or outdated AI-generated content, which can lead to the spread of misinformation. Academic integrity is also at risk, as students may engage in plagiarism or fail to properly attribute AI-assisted work. Furthermore, the use of AI in ESG education can reinforce algorithmic biases, which is particularly problematic in sensitive contexts where fairness, transparency, and ethical considerations are essential.

Participants – especially from Bulgaria, Austria, and Poland—voiced concerns about the factual reliability and methodological transparency of AI tools like ChatGPT. They reported cases where students reproduced persuasive but inaccurate content, submitted superficial ESG analyses lacking critical engagement, and misused AI-generated materials without proper citation.Several focus groups stressed that this risk is particularly acute in ESG education, where students are expected to navigate evolving legal standards, ethical dilemmas, and stakeholder perspectives.

A major concern is the erosion of fundamental academic practices. Lecturers have noted an increasing number of instances where students submit AI-generated essays without disclosure, which undermines independent research and critical writing skills, core academic honesty and transparency, and trust in the authenticity of assessment processes. To address these issues, recommendations included integrating digital literacy and AI ethics into core curricula, developing clear policies on acceptable AI use in coursework, and applying AI-detection tools alongside requiring transparency statements, such as indicating sections generated with AI assistance. Most universities still lack comprehensive institutional guidance on AI use, with decisions often left to individual lecturers, resulting in inconsistent practices. Participants proposed establishing university-wide codes of conduct for responsible AI use, issuing clear guidelines for students on permissible use in academic tasks, and developing frameworks for ethical co-creation between students and AI tools. Looking ahead, several participants—notably from the Netherlands and Bulgaria – expressed interest in developing localized, curriculum-aligned AI chatbots, which raises ethical questions about who defines the input data, how algorithmic transparency is ensured, and how potential biases can be identified and mitigated. To ensure responsible and equitable AI use, focus groups proposed mandatory modules on digital ethics and AI accountability, faculty workshops focused on interpreting and integrating AI into pedagogy, institutional handbooks outlining acceptable AI use in teaching and research, and assessment models that incorporate critical evaluation of AI-generated outputs.

In conclusion, the ethical integration of AI in ESG education requires more than reactive safeguards. It demands a proactive strategy—one that fosters awareness, transparency, and shared responsibility among all actors in the academic ecosystem.

3.7. Student motivation to learn ESG content

While student perspectives were not directly explored in the research design, focus group participants frequently reflected on their students' engagement with ESG content.

Across all countries, lecturers observed that student motivation is uneven and closely linked to how ESG topics are taught and contextualized.

Participants from Bulgaria, Austria, and Poland noted that students often perceive ESG as abstract, secondary, or disconnected from core business disciplines such as accounting or investment. Commonly cited factors included: overly theoretical delivery with few real-world examples; lack of perceived relevance to students' career goals; fragmentation of ESG content, with limited integration across courses; insufficient emphasis on the labour market value of ESG-related skills.

In response to these challenges, participants shared various didactic approaches that have proven effective or are currently being piloted:

– Gamification and role-play: Activities such as ESG investment games, simulations, or competitive sustainability challenges were reported in Slovenia and the Netherlands as engaging methods.

– Project-based learning with real companies: In several countries, collaboration with industry – through mentoring, joint ESG analysis, or capstone projects – was cited as a strong motivator.

– Use of current events: Linking ESG instruction to recent developments (e.g., greenwashing cases, EU policy updates) was seen as increasing immediacy and interest.

– Technology-enhanced learning: AI-supported tasks such as chatbot-guided report analysis and interactive quizzes were highlighted as particularly appealing to younger learners.

Lecturers in Slovenia and the Netherlands reported that connecting ESG to personal beliefs – such as climate justice, social equity, or ethical governance – can significantly enhance student motivation. Discussing ethical dilemmas and allowing students to reflect on their own positions helped create deeper emotional and intellectual engagement. Table 6 summarizes didactic innovations and country-level trends.

Table 6. Didactic innovations for enhancing ESG motivation by country

Country	Gamification	Project work	Practical examples	Using AI	Integrating values
Austria	~	~	✓	✓	✗
Slovenia	✓	✓	✓	✓	✓
Poland	✗	✓	~	~	~
Bulgaria	✗	✗	✗	✗	✗
Netherlands	✓	✓	✓	✓	✓

Notes: ✓ = present, ~ = partial, ✗ = not present.
Source: own elaborations.

Although student motivation was not a direct focus of the study, lecturers' reflections provide valuable insight into how ESG teaching methods affect learner engagement. Their experiences suggest that integrating ESG into real-world contexts, connecting it to personal values, and using dynamic, student-centred methods are key to strengthening motivation. HE institutions that adopt such approaches are more likely to prepare graduates capable of engaging meaningfully with sustainability challenges.

To consolidate the key findings across thematic areas and national contexts, the following section provides a cross-country comparison.

Summary of Cross-Country Trends

The table 7 below summarizes key patterns across the six dimensions discussed, highlighting national strengths, weaknesses, and systemic gaps in ESG and AI integration.

Table 7. Comparative Summary of ESG and AI Integration Trends Across Countries

Dimension	Leading countries	Lagging countries	Notable gaps/trends
ESG Integration	Netherlands, Slovenia	Bulgaria	Largely optional or fragmented inclusion
AI Use	Netherlands, Slovenia	Bulgaria, Poland	Limited digital readiness and staff training
Interdisciplinarity	Netherlands, Austria	Bulgaria, Poland	Structural barriers to cross-departmental cooperation
Competence Development	Austria, Netherlands	Bulgaria	Practical skills and legal knowledge lacking in some settings
Ethical AI Frameworks	Few established policies	All	Urgent need for institutional guidelines and transparency principles
Student Engagement	Netherlands, Slovenia	Bulgaria	Personal values and real-life application increase motivation

Source: own elaborations.

Despite increasing awareness, the integration of ESG and AI in higher education remains fragmented, underdeveloped, and institutionally constrained. Countries such as the Netherlands and Slovenia offer promising examples, particularly in their interdisciplinary and tech-enhanced pedagogies. However, systemic transformation across European HEIs is still needed.

Key gaps persist in curriculum standardization, cross-departmental cooperation, ethical AI implementation, and student engagement. These gaps call for multi-level interventions – combining curriculum innovation, faculty training, digital infrastructure, and governance frameworks – to shift from isolated practices to systemic, future-ready education.

3.8. Responses to Research Questions

RQ1: To what extent are ESG topics systematically integrated into finance-related higher education curricula across Austria, Slovenia, Poland, Bulgaria, and the Netherlands

The study reveals that ESG integration is largely unsystematic and often reliant on individual lecturers' initiatives. Core curricular inclusion is rare; in most countries, ESG appears in the form of optional modules, postgraduate courses, or isolated pilot projects. The Netherlands is leading with project-based minors and interdisciplinary tools (e.g. SDG calculators), whereas Bulgaria shows the weakest implementation, limited to theoretical content in isolated subjects. Slovenia shows emerging practices through industry collaboration and project work, although these remain inconsistent across institutions. Interdisciplinary elements, a key requirement for effective ESG education, are underdeveloped in most contexts. Participants emphasized the lack of coordination and support for embedding ESG systematically into core finance education (see Sections 3.1 and 3.5).

RQ2: How do higher education lecturers perceive the opportunities and challenges associated with the integration of Artificial Intelligence (AI) tools into ESG-related teaching?

Lecturers recognize AI as a tool with significant transformative potential, particularly for enhancing personalization, interactivity, and engagement in ESG learning. Good practices include AI-assisted simulations, chatbot-driven report analysis, and prompt engineering exercises. Slovenia and the Netherlands stand out in this regard. However, many participants also raised concerns about ethical risks, data integrity, and institutional unpreparedness. Common barriers include a lack of training, limited institutional support, unclear policies, and concerns over student misuse (e.g., plagiarism, uncritical use of resources). The divergence in AI readiness across countries is notable, with Bulgaria and Poland facing infrastructure and pedagogical constraints (see Sections 3.3 and 3.6).

RQ3: Which ESG and AI-related competences are considered essential for students in finance programmes, and how are these currently addressed – or neglected – within existing pedagogical practices?

The research highlights a broad consensus on the competencies needed for ESG-literate graduates: ESG data analysis, application of regulation, critical thinking, communication, and the ability to link sustainability to strategic business models. Tools such as Excel, Power BI, and access to ESG reporting databases were emphasised as essential for effective data analysis. However, a significant

gap remains between the identified competences and their actual presence in the curriculum. Practical training and hands-on projects are lacking in most institutions. While Austria, Slovenia, and the Netherlands show more advanced practices, countries like Bulgaria and Poland lag due to capacity constraints and theoretical delivery modes (see Section 3.2).

RQ4: What systemic barriers (e.g., curricular rigidity, lack of interdisciplinary structures, institutional inertia) inhibit the effective integration of ESG and AI in higher education?

Multiple structural barriers were identified across the five countries. These include rigid accreditation systems, limited cross-departmental cooperation, the absence of national standards for ESG education, and the siloed nature of curricula. Even in countries with promising initiatives, such as Slovenia and Austria, administrative complexity and lack of institutional incentives prevent scaling. The lack of standardized ESG frameworks exacerbates fragmentation. Participants called for national-level guidelines, modular ESG units, interdisciplinary mentoring schemes, and institutional platforms to support integration. Multidisciplinary teaching, while widely endorsed, is rarely realized due to bureaucratic and logistical constraints (see Sections 3.4 and 3.5).

RQ5: Which teaching strategies and institutional innovations have proven effective in enhancing student engagement and motivation in ESG education, particularly when supported by AI-based tools?

Focus groups identified several strategies that enhance student engagement: gamification, project-based learning, collaboration with real companies, the use of current events, and AI-enhanced tools (e.g., chatbots and quizzes). The integration of ESG into personally meaningful topics, such as climate justice or social equity, also increases motivation. The Netherlands and Slovenia again lead in innovative didactic approaches. Conversely, in countries like Bulgaria, lack of pedagogical innovation contributes to low student motivation. The findings suggest that engagement improves significantly when students can connect ESG learning with real-world relevance and digital interactivity (see Section 3.7).

4. Discussion

4.1. Synthesis of findings

The findings of this study highlight more than just a skills or knowledge gap – they reveal deeper systemic misalignments between the goals of sustainable and digital transition and the institutional practices of higher education. Across the five countries, ESG and AI are increasingly recognised as essential themes, yet their curricular integration remains fragmented, optional, and inconsistently supported.

This disconnect is not merely operational but conceptual. As Edwards and Usher (2001) argue, the university is no longer a closed system of authoritative knowledge

production but a contested space that must respond to rapidly evolving socio-technical environments. Similarly, Glastra, Hake and Schedler (2004) stress that disciplinary boundaries must be transcended if education is to respond meaningfully to global challenges such as climate change, digitalization, and inequality.

The data suggest that despite growing awareness among faculty, integration efforts often depend on individual lecturers rather than coordinated institutional strategies – what Olssen (2006) terms the "neo-liberal fragmentation" of academic responsibility. Countries such as the Netherlands and Slovenia show promising examples of interdisciplinary and AI-supported ESG teaching. However, even there, systemic obstacles such as outdated curricula, rigid accreditation frameworks, and lack of ethical guidelines for AI remain unresolved. This reflects what Mohiuddin et al. (2022) identify as a key challenge for higher education – namely, the need to reconfigure pedagogical frameworks in response to sustainability imperatives, rather than simply updating content. Similarly, de Castro and Fitó-Bertran (2022) emphasize that meaningful ESG education depends on the development of interdisciplinary and data-informed pedagogical models that reflect the complexity of real-world sustainability challenges and prepare students to make informed decisions in dynamic contexts.

Moreover, the pedagogical potential of AI tools – such as generative chatbots or learning analytics – requires careful ethical and methodological consideration. As Holmes and Porayska-Pomsta (2023) point out, AI in education is only as effective as the human values and pedagogical models embedded within it. Without such grounding, the risk of reinforcing superficiality or bias in ESG teaching is real. Familiarizing educators with artificial intelligence systems represents a key step in introducing modern educational practices and innovations. It not only prepares them for the future but also opens up exceptional opportunities for the development and improvement of the educational process (Beloev et al. 2024).

Finally, these findings also affirm the crucial role of critical thinking, reflection, and value-based reasoning in ESG education. As Smith and Fox (2019) emphasise, competence in sustainability is not just about knowledge acquisition, but also about the ability to navigate ambiguity, assess competing claims, and make ethically grounded decisions.

In this sense, the integration of ESG and AI is not just a pedagogical innovation but a test of higher education's ability to reimagine its mission: from knowledge delivery to the co-construction of societal transformation. As Turcan and Reilly (2020) suggest, this requires not only new content but new institutional logics.

4.2. Critical Reflection on Systemic Gaps

The results of this study highlight four interrelated systemic gaps that constrain the effective integration of ESG and AI in higher education. These are not isolated deficiencies, but overlapping challenges that reinforce one another and demand comprehensive, institutional responses.

(1) Lack of standardization

In the absence of harmonized national or European ESG guidelines, programme development remains fragmented and dependent on individual initiative. While flexibility is important, higher education institutions urgently need structured recommendations on core learning outcomes, content scope, and competence-based assessment models. Without this foundation, ESG education lacks comparability, coherence, and credibility – both within institutions and across countries.

(2) Weak interdisciplinary integration

The traditional disciplinary architecture of universities continues to obstruct collaboration across faculties. ESG, by its nature, requires integration across finance, environmental science, law, and data analytics. Yet existing administrative procedures, accreditation rules, and siloed funding mechanisms limit such integration. Furthermore, the development of interdisciplinary approaches is harmed by a lack of mechanisms for assessing learning outcomes. This is not only a curricular issue but also an institutional governance challenge that must be addressed through cross-departmental incentives, flexible structures, and leadership support. Particularly considering that a lot of educational initiatives are still merely token efforts that rely on so-called virtue signalling (Alenezi & Alanazi 2024).

(3) Unclear ethical frameworks for AI use

The rapid uptake of AI tools in the classroom has outpaced the development of corresponding ethical and pedagogical guidelines. This creates uncertainty for both lecturers and students – particularly in ESG-related education, where critical thinking, transparency, and normativity are central. Since there are currently no ethical guidelines or regulations governing the use of AI, it is imperative that clear guidelines can be established for shared accountability and the preservation of academic integrity (Airaj 2024; Qadhi et al. 2024; Wach et al. 2023). HEIs must move beyond ad hoc approaches and develop institution-wide policies on the responsible use of AI, including training for staff and co-created norms with students.

(4) Low student motivation and engagement

If ESG is presented in abstract or disconnected ways, students struggle to relate it to their academic and professional aspirations. This reduces the transformative potential of ESG education. The findings underscore the importance of engaging students through value-based, problem-oriented, and technologically enriched formats that make sustainability personally relevant. As such, student motivation should not be treated as a downstream issue, but as a design principle of pedagogical innovation. Particularly since students might find it challenging to delve deeper into ESG principles due to a lack of real-world applications and practical experience. Therefore, addressing the issue of motivation necessitates integrating sustainability into worthwhile projects whose effects on society and the environment are evident to students (Vítečková & Houdek 2025).

Crucially, these gaps are not independent – they intersect and reinforce one another. For example, a lack of standardized ESG competences makes interdisciplinary cooperation harder, while fragmented curricula often fail to activate student interest. Addressing them in isolation risks superficial reform; tackling them in concert opens the path to structural transformation.

4.3. Recommendations

Based on the findings of this study, targeted recommendations can be made to higher education institutions and policy makers. These recommendations aim to address the structural, pedagogical, and conceptual gaps identified, and support the development of a more coherent and future-oriented ESG and AI integration strategy.

Higher education institutions should begin by embedding mandatory ESG modules into core curricula across disciplines such as economics, management, and finance. In addition to content, pedagogy must evolve – incorporating problem-based, project-based, and simulation-based methods that foster critical thinking and real-world application. Cross-departmental collaboration should be actively supported through joint courses with dual mentoring and the creation of interdisciplinary microcredentials that are applicable across different programmes. Moreover, institutions should establish regular workshops for both students and lecturers focused on the responsible and ethical use of AI in academic and professional contexts.

Policy makers have a key role to play in enabling systemic change. It is essential to develop national-level guidelines or recommendations for ESG education, co-created with input from universities, industry stakeholders, and student representatives. ESG indicators should be embedded into accreditation and quality assurance frameworks for study programmes, reinforcing their importance institutionally. Funding mechanisms must prioritise interdisciplinary development projects that connect ESG content with technology, legal frameworks, environmental science, and societal issues. Additionally, governments should ensure academic institutions have access to ESG databases and digital tools necessary for modern teaching.

5. Conclusion

This paper has explored the current state of ESG and AI integration in higher education finance programmes across five European countries. Through qualitative analysis of focus group discussions with academic staff, it identified systemic gaps in standardisation, interdisciplinarity, ethical preparedness for AI, and student motivation. These gaps are not isolated but deeply interconnected, reinforcing structural inertia and limiting the transformative potential of sustainability education.

Moving forward, future research should continue to investigate the pedagogical effectiveness of various ESG teaching methods, including gamification,

simulations, and partnerships with industry. Comparative studies are necessary to investigate how AI tools impact students' understanding of ESG content and their ability for critical engagement. Longitudinal studies could provide insights into the employability and professional impact of graduates with ESG competencies. Finally, new tools should be developed to assess ESG literacy and competence acquisition across different educational contexts, enabling institutions to monitor and improve their academic strategies.

Tackling these challenges requires more than curricular reform – it calls for a reimagining of institutional structures, pedagogical cultures, and value systems. Strengthening interdisciplinary collaboration is not just a curricular adjustment but a necessary condition for fostering systems thinking and innovation in ESG education. By aligning educational practices with the complex demands of sustainable and digital transformation, higher education can play a decisive role in shaping competent, ethical, and future-ready professionals.

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