From knowledge to action: Embedding green competencies in Higher Education

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HEI GreenPath

Shaping HEI environment for a sustainable tomorrow

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List of Abbreviations

CER	Corporate Environmental Responsibility
COP	Conference of the Parties
CSR	Corporate Social Responsibility
DBL	Discussion-Based Learning
ESD	Education for Sustainable Development
ESG	Environmental, Social, Governance
EU	European Union
ExL	Experiental Learning
GIS	Geographic Information Systems
HEI	Higher Education Institution
HSS	Humanities and Social Sciences
ITIL	Information Technology Infrastructure Library
LMS	Learning Management Systems
NGOs	Non-profit organizations
OECD	Organisation for Economic Co-operation and Development
OERs	Open Educational Resources
PbBL	Problem-Based Learning
PKA	Polish Accreditation Committee
PjBL	Project-Based Learning
PPP	Public-Private Partnerships
SDGs	Sustainable Development Goals
STEM	Science, Technology, Engineering, and Mathematics
UML	Urząd Miasta Lublin (Lublin City Office)
UNEP	United Nations Environment Programme

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UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNFCCC	United Nations Framework Convention on Climate Change

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Introduction

As the world navigates escalating environmental crises and societal transitions, Higher Education Institutions (HEIs) are uniquely positioned to lead the shift toward sustainability. While green skills have traditionally been associated with STEM (Science, Technology, Engineering, and Mathematics) disciplines, this publication underscores the transformative potential of the Humanities and Social Sciences (HSS) in advancing sustainability goals. These disciplines provide essential perspectives on ethics, social justice, cultural narratives, and human behavior—dimensions critical to achieving meaningful and inclusive environmental change.

This publication is part of the *HEI GreenPath* project, which aims to reshape academic environments by embedding green competencies across HSS education. It advocates for a holistic and interdisciplinary approach that integrates sustainability into curriculum content, teaching methods, evaluation practices, and institutional structures. Through evidence-based analysis, best practices, and practical frameworks, this document offers guidance for HEIs to cultivate ecologically responsible, socially aware, and action-oriented graduates.

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Chapter 1: Understanding green skills in humanities and social sciences

1.1 Overview and Objectives

As the world faces mounting environmental challenges, the need to rethink how we approach sustainability has never been greater. This chapter looks at the role of green skills within HSS, moving beyond the usual focus on technical fields. By drawing on critical thinking, cultural awareness, and a sense of social responsibility, these disciplines help shape the way we understand and respond to environmental issues. The following pages explore how blending these perspectives with practical know-how can better prepare students and professionals to tackle the complex realities of our changing world.

1.1.1 Overview of the chapter's purpose

This chapter aims to provide a fundamental understanding of how green skills are integrated within HSS, emphasizing their indispensable role in sustainable development, ethical leadership, social and environmental justice, and environmental awareness and responsibility. By moving beyond the traditional association of green skills with technical and STEM fields, the chapter highlights the unique and complementary contributions of HSS disciplines in shaping policies, cultural narratives, and societal behaviors toward sustainability. It underscores the necessity of interdisciplinarity, arguing that the complex challenges of sustainability require the blending of technical expertise with socio-cultural, ethical, and historical perspectives. Furthermore, the chapter examines the importance of integrating HSS perspectives into STEM education and practice, as this is crucial for developing holistic green skills and driving meaningful cultural and societal transformation. Ultimately, the chapter positions the integration of green skills in HSS as a vital strategy for preparing students and professionals to address global environmental challenges in ways that are not only scientifically sound but also socially just, culturally sensitive, and ethically responsible.

1.1.2 The interdisciplinarity of green skills and their relevance in humanities and social sciences

In the field of education, Ashby and Exter (2019) define interdisciplinarity as the combination of knowledge from multiple disciplines to address issues too complex for a single field. This approach is vital today, as many global challenges demand solutions that cross disciplinary boundaries. Basu et al. (2017) highlight that interdisciplinarity enables students to gain broader perspectives and skills beyond their primary academic fields, fostering interest in diverse disciplines and promoting innovative solutions. Exposure to different ways of thinking sparks curiosity and helps students connect ideas that might

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otherwise remain isolated. Moreover, interdisciplinary learning enhances graduate employability, problem-solving, communication, and teamwork skills—competencies highly valued in today's workplace (Power & Handley, 2017; Nissani, 1997).

Interdisciplinarity in education is essential for addressing sustainability challenges, which require integrated solutions blending technical expertise with socio-cultural understanding (Josa & Aguado, 2021; Leal Filho et al., 2021). Environmental issues are not purely technical; they are shaped by social habits, cultural values, and economic structures. HSS fields, including art, history, literature, economics, political science, sociology, and psychology (Evans et al., 2007), provide insight into the human dimensions of sustainability. STEM disciplines, on the other hand, deliver the scientific knowledge and technological innovations necessary for environmental progress. Thus, while STEM advances sustainability through technical solutions, HSS ensure these efforts are ethically sound, socially just, and culturally appropriate (Sharma et al., 2023). Integrating HSS and STEM is essential for building holistic green skills, enhancing students' critical thinking, adaptability, and ability to apply sustainability concepts in diverse, real-world contexts (Marcone, 2022; Tejedor et al., 2018).

1.2 Defining key green skills relevant to humanities and social sciences

1.2.1 Explanation of green skills and their significance

Green skills encompass the knowledge, abilities, values, and attitudes necessary to develop and support a sustainable, environmentally responsible society (European Training Foundation, 2023; Green Skills for Green Future Project, 2021). While often associated with technical and STEM fields, these skills are equally crucial in HSS, shaping policies, ethics, behavior, communication, and cultural transformation toward sustainability (Nwafor, 2024; Kwauk & Casey, 2022).

Despite their significance, "green skills" remain a complex concept to define. A key point of ambiguity is whether the term should refer exclusively to skills directly linked to green processes and functions (such as environmental restoration) or if it should also encompass broader skills that can be applied to sustainability efforts (such as green software engineering). Organizations such as the United Nations Industrial Development Organization (UNIDO), the European Union (EU), and the Institute of Environmental Management and Assessment—a professional body focused on sustainability—adopt the broader definition, which is also the perspective taken in this chapter (Economist Impact, 2023).

The United Nations Framework Convention on Climate Change (UNFCCC) defines green skills as "the technical expertise, knowledge, and abilities necessary for effectively

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utilizing green technologies and processes in professional settings". These skills encompass a broad range of competencies, including values and attitudes that support sustainable decision-making in both professional and personal environments (Lal 2024).

Given the inherent ambiguity in defining green skills broadly, it is essential to establish a clear framework that differentiates between the various types of green skills. Economist Impact (2023) has set out a working definition that classifies green skills into three broad categories:

1. **Soft skills:** These are non-technical and non-vocational competencies essential for excelling in green jobs. Examples include creativity and environmental awareness.
2. **Cross-sectoral skills:** These are skills applicable across multiple industries, enabling environmentally friendly processes and functions. Examples include sustainability reporting and environmental impact assessment.
3. **Sector-specific skills**: These refer to expertise in green technologies or specialized methods that improve the environmental performance of a specific activity. Examples include solar panel installation and green retrofitting.

By distinguishing between these categories, a more structured approach can be taken to understanding, developing, and implementing green skills across different sectors and industries.

1.2.2 Differentiating technical vs. non-technical green skills

In the literature, there is widespread agreement that green skills should be seen as practical, hands-on competencies rather than solely theoretical knowledge. Auktor (2020) and Vona et al. (2015) define them as technical and operational abilities involving scientific and experience-based knowledge, analytical thinking, and the use of machines, tools, and services.

However, green skills also encompass empathy, solidarity, and empowerment to address social inequalities (Fuchs, 2024). Studies and pilot programs confirm the relevance of these broader competencies in education through deliberative problem-solving (Affolderbach, 2022; Mayer et al., 2021), collaborative sharing (Affolderbach & Médard de Chardon, 2021), cooperative models (Klagge & Meister, 2018), and community-led eco-social enterprises (Schmid, 2019).

Technical Green Skills: These are specialized competencies required for the development, implementation, and maintenance of green technologies and infrastructure. For example, expertise in renewable energy technologies includes the installation, operation, and maintenance of solar panels and wind turbines.

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Non-Technical (Soft) Green Skills / Sustainability Management Skills): These refer to strategic and managerial abilities that facilitate the integration of sustainability principles into business models, policy development, and community-based initiatives (Lal, 2024; UNESCO-UNEVOC, 2022).

In the context of HSS, green skills focus on fostering sustainability, ecological responsibility, and environmental awareness while addressing social, cultural, and ethical dimensions. These disciplines play a vital role in interpreting, communicating, and implementing sustainability principles within society. By integrating green skills, HSS contribute to policy-making, advocacy, media, education, and community engagement, ensuring that sustainability is not only a scientific or technical pursuit but also a deeply embedded social and cultural value.

Key green skills relevant to HSS include:

Critical Ecological Thinking

Critical ecological thinking stands as a fundamental green skill in HSS, requiring individuals to analyze environmental issues through social, political, and ethical lenses. Research highlights that Education for Sustainable Development (ESD) is most effective when students can see the relevance of sustainability challenges in their own lives and careers (Sharma et al., 2023). Developing this skill and integrating it into HSS curricula enables students to critically assess policies, advocate for equitable solutions, and make informed decisions about complex environmental issues (Shutaleva, 2023; Vaughter, 2016).

- **The ability to analyze environmental issues from multiple perspectives.**

This means considering not just the scientific dimensions of an issue, but also its social, economic, and cultural implications, recognizing the deep interconnections between human societies and the natural world (Houser, 2024).

- **Understanding the social, political, and economic dimensions of sustainability.**

Environmental problems are rarely isolated; they are shaped by political decisions, economic systems, and societal values. Addressing them requires examining how social and political structures influence both environmental outcomes and the distribution of current and future environmental benefits and burdens (Meinhold et al., 2014; Dillard et al., 2009).

- **Connecting ecological concerns with human behavior, ethics, and historical trends.**

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The roots of many environmental challenges lie in patterns of human behavior and historical development. Ethical reasoning and historical context are essential for understanding why certain practices persist and how change can be achieved (Houser, 2024).

- **Applying systems thinking to understand interconnected environmental and social issues.**

Systems thinking encourages a holistic view, allowing individuals to see environmental problems as part of larger, dynamic systems where changes in one area can have far-reaching impacts elsewhere (Hynes et al., 2020).

Sustainability Literacy

Sustainability literacy refers to the capacity to holistically understand, critically evaluate, and apply sustainability-related knowledge across environmental, social, and economic dimensions. Sustainability literacy goes beyond just having knowledge about environmental, economic, or social justice topics; it requires both the readiness and capacity to thoughtfully and personally engage with the complexities and conflicts that arise from the interdependence of these systems. This literacy is foundational in promoting holistic thinking, problem-solving, and action to support the long-term well-being of both human societies and ecological systems (Stibbe, 2009; Colucci-Gray et al., 2006).

- **Understanding principles of sustainability, including environmental, social, and economic dimensions.**

The environmental dimension of sustainability focuses on maintaining the integrity of natural ecosystems and biodiversity, while the social aspect of sustainability emphasizes equity, human rights, community well-being, and cultural diversity. The economic dimension of sustainability ensures that economic systems support long-term stability, resource efficiency, and fair distribution of wealth (Stibbe, 2009).

- **Recognising the interdependence of human and ecological systems**

Sustainability literacy encourages viewing the world as a complex, interconnected system. This includes understanding feedback loops, ecological thresholds, and human dependency on nature (Fischer et al., 2015).

- **Applying sustainability concepts to policy, governance, and community engagement**

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Sustainability literacy supports active citizenship through informed participation in governance, policy formation, and community-based activism. Key components include recognizing power dynamics, supporting participatory governance, and integrating Indigenous and local knowledge systems (Barnaud et al., 2018; Hill et al., 2012).

Sustainability Ethics, and Policy-Making

Sustainability ethics are essential green skills within HSS, shaping how societies respond to environmental challenges by embedding ethical principles into decision-making. This involves moving beyond technical or economic metrics to prioritize equity, justice, and long-term ecological health (Thought Collective, 2023; Kibert et al., 2012). Integrating these ethical considerations into university curricula equips graduates with the critical thinking needed to address complex issues like climate justice and intergenerational equity (Green Skills for Green Future Project, 2021; Dierking & Falk, 2016). These competencies empower professionals across sectors to drive meaningful change and ensure that sustainability initiatives are both effective and socially responsible (Nurasa et al., 2024; Thought Collective, 2023).

- **Understanding and applying ethical principles to sustainability-related decision-making.**

Ethical frameworks like environmental justice and intergenerational equity must guide policy design. For instance, the EU emphasizes fairness in policy implementation, ensuring marginalized communities are not disproportionately burdened by environmental harms (European Commission, 2019). Tools such as ethical audits and stakeholder deliberation help policymakers weigh trade-offs between economic growth and ecological preservation (Varazzani et al., 2022).

- **Assessing the social justice implications of environmental policies.**

Environmental policies often deepen inequalities if not carefully designed. Research shows low-income groups are more likely to live in polluted areas and lack access to green spaces, exacerbating health disparities (Rigolon et al., 2018; Wolch et al., 2014). Policies must address these inequities through targeted investments and participatory decision-making, as seen in the EU's adoption of environmental justice as a guiding principle (European Environment Agency, 2022; European Commission, 2019; Pye et al., 2008).

- **Creating policies that balance economic growth with environmental protection.**

Achieving this balance demands innovative approaches like green technology investment and circular economies. Land-use planning and pollution regulations further ensure

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economic activities do not compromise ecological integrity (Ayenew Birbirsa & Ayalew Worku, 2022; INTOSAI Working Group on Environmental Auditing (WGEA), 2020).

- **Encouraging institutions and businesses to adopt corporate social responsibility (CSR) and ethical governance.**

Corporate governance frameworks emphasizing transparency and accountability are critical. Companies integrating ESG (Environmental, Social, Governance) criteria into operations show improved stakeholder trust and long-term resilience (Kim, 2023; Kulova & Nikolova-Alexieva, 2023). Policies mandating CSR reporting, such as the EU's Sustainable Finance Disclosure Regulation, incentivize businesses to align profit motives with societal well-being (Cochran et al., 2024; European Parliament, 2024).

Environmental Justice and Advocacy

Environmental justice focuses on ensuring that marginalized communities do not bear a disproportionate share of environmental harm. Historically, low-income and racial minority groups have faced higher exposure to pollutants and limited access to clean resources (Pellow & Brulle, 2005). It intersects with sustainability when equitable access and inclusive decision-making are prioritized. Advocacy tools like grassroots mobilization and litigation have effectively influenced policy and institutional frameworks (Holifield et al., 2009), while a multi-scalar approach—linking local action to global awareness—strengthens inclusive sustainability efforts (Walker, 2012). Equipping citizens with civic and scientific tools supports justice-centered environmental governance (Amerasinghe et al., 2008).

- **Recognising how environmental problems disproportionately impact marginalised communities.**

Environmental degradation often affects marginalized groups more severely due to their limited political and economic power. These communities are more likely to live near hazardous waste sites, polluting industries, and degraded land—exposing them to higher health risks (Pellow & Brulle, 2005). Studies show that these patterns are systemic and rooted in structural inequalities, rather than random occurrences (Gonzalez, 2015).

- **Advocating for equitable access to natural resources and sustainable development.**

Environmental advocacy entails ensuring that everyone, regardless of socioeconomic status, has fair access to clean air, water, energy, and green spaces. This also includes representation in environmental decision-making processes and development strategies. Equity-based advocacy seeks to embed justice into sustainability frameworks, making

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sure growth doesn't come at the cost of human dignity or ecological degradation (Schlosberg & Carruthers, 2010).

- **Understanding the historical and cultural dimensions of environmental injustice.**

Environmental injustice is not only a contemporary issue; it is deeply connected to historical patterns of colonialism, segregation, and economic exploitation. Many environmental harms today are continuations of older practices that disempowered communities based on race, class, and geography (Holifield et al., 2009). Recognizing these cultural and historical contexts is essential for creating meaningful and inclusive environmental solutions.

- **Using legal, social, and political tools to fight for environmental rights.**

The environmental justice movement employs a diverse toolkit that includes litigation, public protests, community organizing, and lobbying for policy reform. Legal strategies can involve challenging discriminatory zoning laws, while political tools may include mobilizing voter blocks or influencing environmental legislation (Amerasinghe et al., 2008). Advocacy becomes most effective when these tools are used in combination and are community-led.

Civic Engagement in Sustainability

Civic engagement is another important green skill in HSS, enabling communities to co-develop sustainable futures. Through participation in policymaking, public education, and dialogue, civic engagement empowers individuals to shape their environment responsibly. It is also a core mechanism for inclusive and resilient sustainability transitions (Edelenbos et al., 2020).

- **Promoting community-driven sustainability initiatives.**

Community-led sustainability projects play a key role in achieving local environmental goals. These grassroots efforts often respond faster and more effectively to context-specific ecological needs and have been shown to foster long-term commitment to sustainable practices (Anthony Jr., 2024).

- **Encouraging participation in public debates, protests, and policy discussions.**

Active participation in democratic processes—through protests or policy consultations—drives inclusive governance. Deliberative participation enhances transparency and accountability, and strengthens trust in institutions (Menon & Hartz-Karp, 2019).

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- **Educating the public on green practices, sustainable living, and responsible consumption.**

Environmental education fosters sustainable behavior by informing citizens about climate, consumption, and waste. Hands-on learning experiences amplify community awareness and action (Ardoin et al., 2023).

- **Facilitating dialogues between governments, non-profit organizations (NGOs), and citizens.**

Multi-stakeholder dialogue builds trust, coordinates actions, and integrates local knowledge into policymaking. It ensures sustainability agendas reflect real needs (Warburton, 1998).

Cultural and Historical Awareness

Sustainability is shaped not only by science and policy but also by cultural memory and heritage. Humanities disciplines illuminate how history, identity, and indigenous knowledge influence environmental perceptions and practices. By recognizing cultural diversity and historical complexity, sustainability efforts can become more inclusive, resilient, and meaningful (Naranjo et al., 2024).

- **Examining how cultural practices and historical contexts shape environmental attitudes and actions.**

Societies interact with nature in culturally specific ways. Past agricultural methods, religious traditions, and community customs inform how groups perceive ecological responsibility. Integrating this understanding helps avoid one-size-fits-all sustainability models (Naranjo et al., 2024).

- **Incorporating traditional ecological knowledge and indigenous perspectives in sustainability efforts.**

Indigenous ecological knowledge, developed over centuries, provides sustainable land management solutions that align with biodiversity protection. Recognizing these systems alongside scientific approaches enhances policy relevance and local legitimacy (Berkes, 2018).

- **Promoting cultural sensitivity in environmental communication and action.**

Sustainability messaging must consider cultural beliefs, languages, and identities to be effective. Culturally sensitive communication builds trust, especially in marginalized or

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indigenous communities, and increases participation in environmental programs (Cox & Pezzullo, 2016).

Cultural and Artistic Expression for Sustainability

Cultural and artistic expression plays a unique role in making sustainability relatable. Through literature, film, heritage, and indigenous art forms, complex ecological ideas become emotionally resonant and locally meaningful. Such practices foster intergenerational knowledge-sharing and can inspire environmental stewardship in culturally embedded ways (Lerski, 2025).

- **Using art, literature, film, and media to communicate sustainability messages.**

Creative media—films, murals, theater—bridge science and public emotion. They make ecological crises visible and urgent, especially when conventional data fails to move audiences (Louson, 2018).

- **Creating narratives that inspire environmental awareness and change.**

Narratives grounded in place, identity, and memory can awaken ecological consciousness. Storytelling tied to lived environments connects people emotionally to their ecosystems and promotes sustainable behavior (Du Plessis & Postlewaight, 2024).

- **Preserving cultural heritage in sustainable ways.**

Sustainability must include safeguarding tangible and intangible cultural heritage, from architecture to songs. These traditions encode ecological relationships and are part of community resilience (Chan, 2018).

Research and Analytical Skills

Research and analysis underpin the capacity to evaluate, refine, and innovate sustainability practices. In the HSS context, these skills help interpret human behavior, institutional impact, and policy effectiveness using both qualitative and quantitative data (Mumpuni et al., 2025; Alexander et al., 2021).

- **Conducting qualitative and quantitative research on environmental challenges.**

Social sciences use interviews, surveys, and statistical models to study environmental perceptions and behaviors. Mixed methods allow for more accurate insights into local contexts and sustainability problems (Creswell et al., 2017; Teddlie & Tashakkori, 2009).

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- **Applying social science methodologies to evaluate the impact of green policies and initiatives.**

Policy evaluation relies on methods such as impact assessment, cost-benefit analysis, and participatory observation. These help measure how green initiatives affect real-world behavior and equity (Green Growth Knowledge Platform & GGGI, 2019; Atkinson et al., 2018).

- **Using data to inform and improve sustainable practices.**

Environmental data—emissions, water use, biodiversity—must be interpreted to support better decisions. HSS can look at how data is used, trusted, and acted upon within communities (Pollution Sustainability Directory, 2025a; Transformative Pathways, 2024).

Interdisciplinary Problem-Solving for Sustainability

Complex environmental challenges demand cross-disciplinary collaboration. The HSS fields contribute interpretive tools, ethical frameworks, and critical analysis that help reframe problems and reveal sustainable paths forward. Integrating knowledge across philosophy, political science, and behavioral studies builds holistic and actionable responses to global issues (Sudarshan et al., 2025).

- **Collaborating across fields (e.g., philosophy, sociology, political science, and environmental studies).**

Interdisciplinary teamwork fosters richer insights. When scientists from philosophy, sociology, political science, and environmental studies collaborate, they create broader, ethically grounded solutions that address both systems and lived experiences. This kind of collaboration brings together diverse methodologies and perspectives, allowing teams to move beyond disciplinary silos and co-create solutions that are more robust and contextually relevant. Such synergy is essential for tackling complex sustainability challenges, as it integrates ethical, social, and scientific considerations into actionable strategies (Sustainability Directory, 2025; Tejedor et al., 2018; Eigenbrode et al., 2007).

- **Integrating sustainability concepts into education, business, and governance.**

Sustainability must be embedded in institutions—not just taught in theory. Research shows that educational programs, public policy, and business ethics are most effective when sustainability is integrated into their core strategies, guiding long-term planning and promoting equity across all levels of decision-making. This approach enables institutions to balance financial, social, and environmental considerations, and prepares graduates and professionals to make decisions that support both long-term resilience and social responsibility (Bertels et al., 2010).

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- **Developing holistic solutions that address both environmental and social issues.**

Holistic thinking links ecological and social systems, enabling solutions that address both environmental and social issues. For example, green infrastructure projects are most successful when they incorporate housing equity, public health, and job creation alongside environmental goals. When cities and organizations approach green initiatives holistically—by coordinating across sectors like housing, public health, and employment—they achieve greater overall impact, ensuring benefits like cleaner air, climate resilience, and economic opportunities are more equitably distributed (Pollution Sustainability Directory, 2025b; MyRainPlan, 2024; Bourland, 2022).

- **Understanding the role of behavioral sciences in fostering sustainability.**

Behavioral sciences reveal how values, habits, and incentives shape environmental choices. Tools such as nudging, framing, and social norms are increasingly used to bridge the gap between environmental awareness and action. Nudging—subtly altering the choice environment—can encourage sustainable behaviors without restricting freedom of choice, while framing and the activation of social norms have been shown to influence the acceptance and effectiveness of green initiatives (Santos Silva, 2021; Neale et al., 1987). Empirical studies demonstrate that interventions leveraging social comparisons, message framing, and norm-focused cues can significantly increase pro-environmental behaviors by making sustainable choices easier and more attractive (WinS Solutions, 2025; European Law Institute, 2021).

Green Communication and Media Literacy

Effective sustainability communication requires clarity, ethics, and inclusivity, making it a core green skill in HSS. As environmental issues gain media and marketing visibility, green communication helps diverse audiences interpret and act on sustainability claims (Ismail, 2024; Priest, 2022). Sustainability-focused storytelling, journalism, and public relations have proven effective in mobilizing communities toward sustainable practices (Sharma et al., 2023). Green communication and media literacy also play a key role in combating greenwashing and promoting accurate, impactful narratives that shape behavior and policy (Sharma et al., 2023).

- **Effectively communicating sustainability concepts to diverse audiences.**

Tailoring environmental messages to various cultural and social groups makes communication more impactful. Visuals, metaphors, and narrative techniques help bridge scientific knowledge and public understanding (Priest, 2022).

- **Identifying and combating greenwashing in marketing and media.**

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Greenwashing undermines trust in sustainability claims, as it involves companies using misleading language, vague imagery, or false environmental endorsements to appear more environmentally responsible than they are. This practice not only deceives consumers but also erodes confidence in genuine sustainability efforts and makes it harder for the public to distinguish between authentic and deceptive claims. Media literacy is, therefore, essential: it empowers individuals to critically evaluate environmental messages, recognize deceptive tactics, and demand greater transparency and accountability from organizations. Research highlights that addressing greenwashing requires both stricter regulations and enhanced consumer education to help people detect and resist misleading environmental claims (Durmuş Şenyapar, 2024).

- **Promoting responsible journalism on environmental issues.**

Environmental journalists play a crucial role in holding institutions accountable and shaping informed debates on environmental issues. Through investigative reporting, they uncover environmental violations, expose corrupt practices, and highlight the vested interests behind polluting industries, thereby fostering transparency and public scrutiny (NIMCJ, 2025; Trionfi & Salzenstein, 2024). Ethical environmental journalism ensures accuracy, fairness, and responsible storytelling, empowering the public with reliable information and promoting meaningful dialogue on complex environmental challenges. By translating scientific findings into accessible language and amplifying the voices of affected communities, environmental journalists help drive policy change and inspire collective action toward sustainability (Environmental Journalists, 2025a; Environmental Journalists, 2025b; NIMCJ, 2025).

- **Leveraging digital tools and social media for sustainability advocacy.**

Social media can amplify sustainability campaigns, mobilize communities, and counter misinformation. When strategically used, platforms like Instagram or Twitter support civic environmental action by enabling rapid information dissemination, building activist networks, and inspiring collective participation (Mahiwal et al., 2024).

Sustainable Leadership and Organisational Change

Sustainability requires more than policy—it demands cultural and organizational transformation. In the HSS context, sustainable leadership blends ethical vision with strategic change management. Leaders help shift mindsets, align operations with environmental values, and guide organizations through green transitions (Theocharis et al., 2024; McNeive, 2024).

- **Leading sustainability-focused projects and businesses.**

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Sustainable leaders embed environmental priorities into business models, aligning values with outcomes. They promote innovation through long-term thinking and responsible governance, ensuring that sustainability is integrated into organizational culture and strategic decision-making (Cushen et al., 2022; Zhang et al., 2022).

- **Encouraging green workplace policies in organizations.**

Green human resource management strategies—like eco-friendly onboarding, incentives for sustainable behavior, and resource-saving policies—support sustainability from the inside out. These practices embed environmental priorities into recruitment, training, performance management, and reward systems, encouraging employees to adopt and sustain green behaviors throughout the organization (Chiboiwa et al., 2024; Ayenew Birbirsa & Ayalew Worku, 2022).

- **Implementing ethical leadership strategies that prioritise sustainability.**

Ethical leadership encourages accountability and motivates staff to prioritize environmental goals. It also builds a values-based culture necessary for long-term sustainability. Research shows that ethical leadership not only directly influences employees' environmental behaviors but also fosters a culture of responsibility and ethical decision-making, which are essential for embedding sustainability in organizational practices (Islam et al., 2021; Ahmad & Umrani, 2019).

- **Managing organizational transitions toward sustainable practices.**

Organizational change for sustainability requires strategic planning, effective communication, and a willingness to adapt processes. Leadership is critical, with successful transitions relying on leaders who support change, promote cross-department collaboration, and provide resources and training to help staff adapt to new roles and routines (McNeive, 2024; Khokhar & Akhlaq, 2022). Barriers like lack of leadership support, insufficient planning, and resistance to change can hinder progress, highlighting the need for intentional, well-structured change management approaches (Ayenew Birbirsa & Ayalew Worku, 2022).
In a university setting, integrating these green skills into curricula, projects, and research within HSS disciplines can prepare students to tackle pressing global challenges through a sustainability lens.

1.3 Green Education and the Importance of Green Skills for Students in Humanities and Social Sciences

Green education is expected to significantly transform the education sector by aligning with global sustainability and economic development trends (Ugwu, 2023; Nhamo,

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2014). Its core principles emphasize environmental sustainability, eco-conscious practices, and institutional responsibility beyond traditional instruction. Universities are increasingly embedding green initiatives into their operations and curricula, through sustainable methodologies, infrastructure, and tools, to cultivate environmentally responsible mindsets among students and staff (UNESCO, 2024; Rao & Aithal, 2016; Barbas-Rhoden, 2015). Higher education plays a vital role in preparing students to address real-world sustainability challenges by fostering critical thinking, problem-solving, and environmental awareness (Parmaxi et al., 2024; Rao & Aithal, 2016; Fadeeva & Mochizuki, 2010). Integrating sustainability into teaching, research, and community engagement strengthens institutions while enhancing student readiness for green labor markets (Leal Filho et al., 2019; Rao & Aithal, 2016).

Sustainability education requires a rethinking of curricula through interdisciplinary collaboration and practical application across disciplines (Annelin & Boström, 2024; Tejedor et al., 2018). Ethnographic research and contextual learning approaches, as highlighted by Marcone (2022), help students understand the societal implications of sustainability and apply this knowledge in future careers. In HSS, teaching green skills is essential for addressing environmental responsibility from social, cultural, ethical, and interdisciplinary perspectives (Parra et al., 2020; Frisk & Larson, 2011). As sustainable development demands solutions rooted in cultural values, ethics, and social justice, HSS education promotes critical thinking, ethical leadership, and civic responsibility, while supporting green careers and policy innovation (Mokski et al., 2023; Sharma et al., 2023; Sá et al., 2022; Sarid & Goldman, 2021; Yanniris, 2021). The primary objectives of teaching green skills to HSS students include:

Empowering Informed Decision-Making

- Equip students with the knowledge to make decisions that balance environmental, social, and economic priorities.
- Foster the ability to critically analyze policies, practices, and systems to promote sustainability (Runhaar et al., 2006).

Promoting Interdisciplinary Solutions

- Encourage collaboration across disciplines to address ecological challenges holistically.
- Enable students to integrate insights from diverse fields, including ethics, sociology, political science, and cultural studies, into sustainability efforts (Sharma et al., 2023; Tejedor et al., 2018; Eigenbrode et al., 2007).

Addressing Social and Environmental Justice

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- Highlight the connections between environmental degradation and social inequality.
- Train students to advocate for equitable policies and practices that ensure fair resource distribution and environmental justice (Mallory, 2013; Schlosberg & Carruthers, 2010; Pellow & Brulle, 2005).

Cultivating Ethical Leadership

- Develop a strong sense of ethical responsibility toward the environment and future generations.

- Prepare students to lead initiatives, influence public opinion, and shape policies that prioritise sustainable development (Thought Collective, 2023; Islam et al., 2021).

Enhancing Community Engagement

- Encourage active participation in local and global efforts to address environmental issues.
- Teach students to mobilize communities and foster collective action for sustainability (Anthony Jr., B., 2024; Ardoin et al., 2023; Holm et al., 2015).

Building Resilience and Adaptability

- Prepare students to face and adapt to environmental crises, such as climate change, resource depletion, and biodiversity loss.
- Promote innovative thinking to develop sustainable solutions in response to emerging challenges (Price et al., 2021; Alfred et al., 2020).

Raising Awareness, Green Communication, and Advocacy

- Empower students to become effective communicators and advocates for sustainability.
- Teach them to engage diverse audiences and foster a culture of environmental consciousness (Ismail, 2024; Sharma et al. 2023).

Fostering Long-Term Thinking

- Encourage consideration of the long-term impacts of decisions and policies on society and the environment.
- Promote a mindset that prioritizes future generations and the preservation of natural ecosystems (Downey et al., 2021; Rana & Miller, 2019).

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By teaching these skills, universities strive to nurture a generation of socially conscious, ecologically aware, and action-oriented individuals who can contribute to sustainable practices, policies, and cultural transformations across all sectors of society.

1.4 Core Concepts Related to Green Skills in HSS: Sustainability, Environmental Justice, and Ecological Responsibility

Sustainability in Humanities and Social Sciences:

Sustainability involves meeting present needs without compromising the ability of future generations to meet theirs, requiring a balance of environmental, social, and economic priorities (Sharma et al., 2023; Kuhlman & Farrington, 2010). While STEM fields often drive technological solutions, they may overlook critical socio-cultural and ethical dimensions (Marcone, 2022). HSS offer essential frameworks for understanding how societies engage with environmental policies and technologies. The three-pillar model of sustainability—environmental, economic, and social—cannot succeed without integrating social sciences to address issues like equity and justice (Kuhlman & Farrington, 2010). Technical initiatives, such as renewable energy projects, risk failure if local contexts are ignored, sometimes displacing communities and raising ethical concerns. The ESD framework also highlights the importance of including humanities perspectives for culturally inclusive and socially responsible policies (Sharma et al., 2023).

Understanding sustainability requires historical and cultural awareness. Disciplines such as archaeology and anthropology reveal how past societies managed resources, offering valuable lessons for present challenges (Roshem, 2020; Diamond, 2005). Sustainable development is also shaped by broader political, social, and economic systems. Sachs (2015) underlines that systemic change—addressing poverty, equity, and institutional reform—is essential. Achieving the UN Sustainable Development Goals (SDGs) depends on interdisciplinary collaboration. The 2016 World Social Science Report calls for integrating humanities, social sciences, and natural sciences, emphasizing that social transformation, rooted in values and creativity, is as vital as technological innovation (ISSC, IDS & UNESCO, 2016).

Key Dimensions of Sustainability:

- **Environmental Sustainability:** Protecting and preserving natural resources, ecosystems, and biodiversity in order to maintain the balance of nature and ensure a sustainable future. This involves responsible use of resources, reducing pollution, and mitigating climate change (Lal, 2022).
- **Social Sustainability:** Ensuring equity, inclusivity, and justice within societies. This includes a set of processes and institutions addressing disparities in access to resources and opportunities while fostering current and future community well-

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being. Communities aiming to enhance social sustainability should implement measures that positively impact human health and social relationships, such as ensuring that all community members are included in development planning and decision-making that directly affects their health and well-being (Meinhold et al., 2014; Dillard et al., 2009).

- **Economic Sustainability:** Promoting economic growth and development that minimizes environmental degradation and maximizes resource efficiency, fostering stable and resilient economies, without compromising the requirements of future generations. This involves utilising resources to satisfy current needs while preserving and, if possible, enhancing the natural resource base for future generations (Elsawy & Youssef, 2023).

Environmental Justice in Humanities and Social Sciences:

Environmental justice ensures the equitable distribution of environmental benefits and burdens, protecting marginalized or vulnerable populations from disproportionate harm. HSS are essential for revealing how deep-rooted social, economic, and political inequalities have caused marginalized groups to bear the brunt of pollution, resource depletion, and climate change impacts (Sharma et al., 2023).

Historical patterns of segregation, disenfranchisement, and exclusion have entrenched these disparities. By analyzing these systemic roots, HSS help address the structural factors behind environmental injustice (Bullard, 2005).

Climate justice extends environmental justice by emphasizing how climate change disproportionately affects vulnerable groups. HSS highlight the need for policies that ensure not only emissions reductions but also equitable adaptation, resilience, and procedural fairness in governance (Schlosberg & Collins, 2014).

Activism, literature, and art play vital roles in raising awareness and influencing public discourse. Through storytelling, visual media, and grassroots mobilization, marginalized communities advocate for justice, while HSS study these cultural forms as powerful tools for social change (Juhola, 2024; Sanz & Rodriguez-Labajos, 2021).

Principles of Environmental Justice:

- **Equity:** Fair treatment and meaningful involvement of all individuals, irrespective of race, colour, ethnicity, gender, socioeconomic status, or location, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (Bhatnagar, 2025).
- **Participation:** Inclusive research and decision-making processes that give communities a voice in policies and actions affecting their environment (Davis & Ramírez-Andreotta, 2021).

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- **Remediation:** Addressing historical environmental injustices, such as toxic waste dumping in disadvantaged communities or unequal access to clean air and water (Tamefusa, 2016).

Ecological Responsibility in Humanities and Social Sciences:

Ecological responsibility is the ethical obligation of individuals, communities, and institutions to protect and restore the natural environment for present and future generations. Since human actions—shaped by social norms, economic systems, and cultural beliefs—directly impact ecosystems and biodiversity, ecological responsibility involves making sustainable choices, reducing environmental impacts, and promoting practices that support planetary well-being. HSS examine how collective behaviors, policy decisions, and societal values drive environmental change, highlighting the link between human well-being and planetary health (Sobey School of Business, 2024).

Ethical frameworks like anthropocentrism (human-centered) and ecocentrism (nature-centered) shape how societies interact with the environment. Environmental ethics, as a branch of philosophy, critically examines these perspectives to guide moral responsibility toward both human and non-human life (Brennan & Lo, 2024).

Cultural narratives, traditions, and artistic expressions also influence ecological responsibility. Environmental humanities explore literature, history, and art to reveal how stories and symbols shape environmental values and inspire conservation efforts (Rose et al., 2012).

Key Dimensions of Ecological Responsibility:

- **Individual Responsibility:** Individual responsibility is a key dimension of ecological responsibility, as making conscious lifestyle choices, such as reducing waste, conserving energy, and supporting sustainable products, can collectively contribute to environmental sustainability. Research shows that individual pro-environmental behaviors are most significant when people believe in the efficacy of their actions, and aggregated small-scale changes can lead to substantial positive environmental outcomes (Eden, 1993).
- **Corporate Responsibility:** Corporate responsibility is another important dimension of ecological responsibility, as businesses play a significant role in reducing environmental impacts by adopting eco-friendly practices, minimizing carbon footprints, and investing in renewable energy. Research shows that corporate environmental responsibility (CER) is positively associated with improved environmental performance and sustainable development, with companies implementing proactive measures such as emissions reduction, green innovation, and sustainable production processes to achieve ecological sustainability (Sarfraz et al., 2023).

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- **Global Responsibility:** Global responsibility is the dimension of ecological responsibility that acknowledges humanity's shared duty to tackle global environmental challenges, such as deforestation, climate change, and pollution. It has emerged as a fundamental international norm, driven by environmentalists, scientists, and policymakers who emphasize that coordinated global action is essential for effective environmental stewardship (Falkner, 2020).

By focusing on **sustainability, environmental justice, and ecological responsibility**, HSS can help students understand the interconnectedness of ecological, social, and ethical issues. These concepts provide the foundation for analysing and addressing environmental challenges in equitable, innovative, and culturally sensitive ways.

1.5 Conclusion

The integration of green skills in the HSS is essential for addressing the complex and interconnected challenges of sustainability. HSS provide ethical, historical, social, and cultural frameworks that complement scientific and technical approaches to environmental issues (Holm et al., 2015). These disciplines promote sustainability literacy, critical ecological thinking, and civic engagement, empowering individuals and institutions to advance the SDGs. As sustainability is not solely a technological issue, it demands ethical considerations, cultural sensitivity, and social justice perspectives (Sharma et al., 2023). HSS contribute by fostering interdisciplinary collaboration, shaping policy, and advancing environmental advocacy to build a more sustainable and equitable world.

Separating HSS from STEM fields reinforces rigid disciplinary boundaries and limits critical reflection on the broader social and ethical purposes of science and technology. This divide can lead to a reductionist view of research as either abstract knowledge-seeking or narrowly goal-driven, marginalizing ethical and philosophical considerations as secondary rather than foundational (Otsuki, 2018). To move beyond siloed thinking, educators and institutions must prioritize sustainability education as a core component of higher education across all disciplines. Interdisciplinary curricula that integrate green skills within HSS can facilitate meaningful collaboration between HSS and STEM students, where technical expertise is informed by ethical and social insight. Such integration equips future generations with the knowledge, skills, and values needed to confront contemporary challenges and foster a sustainable future.

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Chapter 2: Integrating green knowledge into subject content

2.1 Overview and Objectives

Chapter 1 presented the importance of green skills in the context of the humanities and social sciences, pointing out their key areas and their connection to the ideas of sustainable development, environmental justice and ecological responsibility. In turn, this chapter focuses on the practical dimension of these concepts – showing how green competencies can be integrated into study programs, both by modifying existing subjects and creating new educational content. This chapter can be seen as a step-by-step guide on how to navigate the path of change in the study programs – from tracking and using sources of inspiration, through reviewing the study programs and identifying modifiable elements, to strategies for integrating environmental topics and matching competences with the learning outcomes set for the given subjects. Adjustment of the study programs is dictated by both the law on higher education and the requirements of the labor market, as well as the expectations of future students and the students themselves. Whether a university keeps up with changing trends often determines its further situation and position in the academic world. Adapting study programs to modern trends and requirements of the socio-economic environment is also part of the universities' missions and visions, among which there are goals such as: developing the skills of the future, shaping future leaders, using innovative teaching methods, cooperating with business and industry, responding to social needs, and transferring knowledge and technology. Detailed implementation of the above concepts of the university's mission most often rests on individual departments and fields of study. Key role in this process is played by the lecturers, whose commitment to keeping the content of subjects up to date and constructive proposals regarding the modification of study programs are an important element of continuous improvement and implementation of the university's mission, including responding to current trends. Essential for the smooth operation of these efforts is the existence of clear and well-known rules for initiating and implementing modifications to study programs by lecturers. Further part of the chapter presents a set of practical rules to facilitate this process.

2.2 Sources of inspiration and rationale for change

Education approaches and study programs should be updated in accordance with the needs of the labor market, with special emphasis on the needs of the region in which the university operates. The following can be used as sources of inspiration for change:

1) Good practices regarding models and experiences, both national and international, relevant to practical education in a given field of study;

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2) Analyses and forecasts of the labor market, reports on the demand for specific skills and jobs in the future;
3) Reports from international organizations;
4) Strategic documents at national and regional level (e.g. city development strategies);
5) Opinions and consultations with employers, both public institutions and private companies;
6) Changes in legislation and industry regulations, new legislation, professional standards or industry guidelines;
7) Sectoral reports and analyses, documents related to specific sectors and their development;
8) Technological trends and innovations, new technologies that may affect a given field and need to be taken into account in the program.

Key strategic documents, which can provide valuable sources of inspiration and reference, are of particular importance in the process of integrating green competencies into study programs. Among them, it is worth taking a look at:

1) The 2030 Agenda for Sustainable Development adopted by the UN, along with the 17 SDGs;
2) The European Green Deal and its related documents, such as the New European Bauhaus, the Biodiversity Strategy for 2030, and the Farm to Fork Strategy;
3) Strategies and reports from international organizations such as the OECD, UNEP, UNESCO, and the World Economic Forum;
4) National documents, including sectoral strategies, National Strategy for Regional Development, Energy Policy of Poland, strategies for environmental protection and water management, as well as reports of think-tanks, research institutes and non-governmental organizations.

The diversity and relevance of the sources of inspiration are the foundation of the dynamic development and topicality of the study programs. Consciously drawing from labor market analyses, stakeholder opinions, teaching trends and strategic documents allows you to create educational offers that respond to the real needs of the environment and the challenges of the future. The next part of the chapter will present the methodology for reviewing existing study programs and identifying specific areas where it is possible to integrate content related to green competencies.

2.3 Review and modification of study programs

One of the key requirements for universities is the introduction of systemic solutions for the review and modification of study programs. In order to realize the importance of implementing such policies, it is worth noting that one of the 10 criteria for the assessment of Polish universities by the Polish Accreditation Committee (PKA) is the quality policy: designing, approving, monitoring, reviewing and improving the study programs. However, the shape of the chosen regulations remains in the autonomy of the

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university, provided that various groups of internal and external stakeholders are included in the process of modifying the study programs.

The procedures for monitoring and improving study programs should indicate the bodies responsible for the different processes. Depending on the structures adopted at the university, these may be deans of departments, deans or vice-deans of faculties, internal program councils or teams for the quality of education, department councils, dean councils, and external committees for the quality of education, such as development councils or consultation councils. The decision to proceed with the modification of the study program for a specific field and cycle of studies should be made by the body indicated in the procedures, after conducting a periodic review of the study program and after consulting internal and external stakeholders of the given field. In the course of work on the modification of the study program, it is recommended to take into account the papers and analyses on: the profile of the graduate of the studies, a description of the learning outcomes postulated for the studies, the study plan, and detailed elements of the education process, such as, for example, the process of dissertation or professional internship. It is important that the formulated documentation of the study program makes it possible to analyze the changes made and includes the justification, purpose and scope of the modifications made. It should also be remembered to ensure the participation of student representatives in the creation of the study programs (e.g. by consulting the student council).

In order to effectively integrate green competencies into the study programs, it is worth starting with a comprehensive analysis of existing educational content – not only in terms of the presence of obvious concepts related to the environment or sustainable development, but also by identifying topics that can be natural starting points for these issues. In the first step, it is worth reviewing the description of learning outcomes assigned to the studies and the syllabuses of individual courses, analyzing them in terms of potential links with issues such as social responsibility, professional ethics, innovations, risk management, public policies, technologies, spatial planning or local development. In many cases, it will be possible to add in environmental, social or economic dimension of sustainable development to existing content, even if it was not originally formulated in this context. Where such references already exist, it is worth deepening them through additional case studies, literature or practical projects. Whereas in courses where the subject of green competencies has not yet appeared, it may be helpful to look for contextual and functional links – e.g. by analyzing the impact of a given issue on the environment, its role in social transformation or its importance in building responsible professional attitudes. This approach makes it possible to treat green competencies not as a separate addition, but as an integral element of modern academic education.

After a broad analysis of the study program and the identification of potential areas related to sustainable development, the next step should be to refer these elements to a recognized strategic framework. In particular, it is worth considering how the content

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and competencies developed within individual courses correspond to the United Nations' 2030 Agenda and SDGs. The analysis should include the identification of the goals that are most relevant to the given area of education – e.g. clean and accessible energy, responsible consumption and production or climate action. This makes it easier to consciously design content and select appropriate teaching methods. At the same time, it is worth taking into account national and regional sustainable development strategies, looking for potential reference points for the local context of education. Such links not only show how specific courses fit into the realization of global and local priorities, but also help students better understand the interdisciplinary nature of contemporary challenges and the importance of their own role in solving them.

In the process of integrating green competencies into the study program, it is also invaluable to involve a wide range of stakeholders and subject the proposed changes to expert opinions. It is worth establishing a dialogue with representatives of enterprises, non-governmental organizations, public administration and graduates who face the challenges of sustainable development in their professional work. Their perspective and practical experience can provide valuable insights into the key competencies sought on the labor market current trends in the area of the green economy. It is equally important to consult experts in the field of sustainable development and education, whose theoretical and methodical knowledge will allow to verify the substantive correctness of the proposed content and the effectiveness of the planned teaching methods. It is also worth making a comparative analysis with study programs implemented by the leading national and foreign universities that successfully integrate the subject of sustainable development. Looking at their methodological approaches, the offered education modules and the forms of cooperation with the socio-economic environment can provide valuable inspiration and guidance. Particular attention should be paid to those programs that are recognized by academia and employers, as well as to initiatives that show innovation in teaching about the green transformation. The analysis of best practices will allow you to identify effective strategies and adjust your own study program to the highest standards in the area of green competencies education.

2.4 Strategies for integrating environmental themes into traditional subjects

Successful integration of environmental themes into traditional subjects requires a variety of strategies that allow these issues to be integrated in a natural and effective way. The following are key strategies that can be used to enrich the teaching process with the perspective of sustainable development and ecology:

1) Curriculum integration: Effective integration of environmental themes requires a holistic approach that goes beyond adding individual modules or topics. It is crucial to weave sustainable development issues into existing courses and subject areas, creating a coherent curriculum. Opportunities for integration are visible in many areas of education, regardless of the specificity of the field. For example, for the field of

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Management, integration opportunities are particularly evident in modules related to strategic management, operational management, human resources management, marketing and finance. ESG topics do not have to be a separate course – they can be included in courses related to company strategy, risk analysis and reporting. Similarly, circular economy concepts can be analyzed in operational management and logistics. Such integration not only enriches the content of education, but also allows students to understand that sustainable development is not a separate area, but an integral part of modern management.

2) Case-study and problem-solving-based teaching: This strategy allows students to apply the acquired theoretical knowledge in practical situations, analyze complex environmental problems and search for innovative solutions. As part of this strategy, students can analyze real-life cases of companies that have implemented sustainable practices, faced environmental challenges, or developed innovative green technologies. Practical teaching methods of green competencies can be successfully implemented in fields of study representing various fields of science. To illustrate this possibility, it is worth invoking the following examples of possible teaching methods:
   - In the fields of law and administration: a case study on an administrative dispute related to the construction of an investment with an impact on the environment, simulation of an administrative hearing on an infringement of environmental regulations, preparation of a draft act of local law regulating waste management or greenery protection;
   - In management-related fields: a case study of a company that has successfully implemented a sustainable development program, an analysis of management dilemmas related to the choice between profit and environmental responsibility, the development of a CSR strategy with focus on climate goals, a workshop on assessing the company's carbon footprint;
   - In media and journalism-related fields: creating social campaigns for environmental protection, analyzing media coverage of climate change, producing podcasts with climate experts, creating infographics and visuals on environmental issues, reporting on environmental events (e.g. climate protests, urban initiatives);
   - In politics and international relations-related fields: a discussion of a case study of an international conflict over natural resources, an analysis of negotiating problems in the context of climate agreements, simulation of UN deliberations on climate agreements (e.g., COP), a monitoring of the climate policy of selected countries, and creating recommendations;
   - In economics, finance, and accounting-related fields: development of a model for assessing the profitability of investments in green technologies, ESG reporting exercises, an analysis of the impact of environmental regulations on the financial performance of companies, designing financial instruments supporting sustainable development (e.g., green bonds).
3) Interdisciplinary cooperation: This is a key strategy, as environmental problems are inherently complex and require a multi-perspective approach. Interdisciplinary

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cooperation can take various forms, such as joint research projects, interdisciplinary courses, workshops and seminars, as well as the exchange of knowledge and experience between lecturers from different fields. For example, renewable energy issues can be analyzed jointly by students and faculty in economics, management, and environmental engineering. Similarly, issues of sustainable urban development can be the subject of interdisciplinary projects in which students of architecture, administration, and sociology participate. This approach allows students to develop problem-solving and teamwork skills in an interdisciplinary environment, which is extremely valuable in contemporary environmental challenges.

4) Skills-based education: Integrating environmental topics into traditional subjects requires students to not only have theoretical knowledge, but above all specific skills that will allow them to apply this knowledge in practice in solving real-life problems. As part of this strategy, emphasis should be placed on active forms of teaching, such as for example:
   - Analysis and search for solutions of specific environmental problems, so that students acquire the critical thinking and decision-making skills;
   - Implementation of projects taking into account selected environmental aspects, which contributes to the development of skills in planning, implementation and presentation of results;
   - Simulations and games that reflect complex environmental systems or decision-making situations related to managing natural resources;
   - Teamwork, through which students acquire the ability to communicate, negotiate, and allocate tasks in the context of environmental projects.

   In the context of sustainable development issues, it is necessary to develop skills in the analysis of environmental impact and assessment of the impact of human activities on the environment, efficient and sustainable management of natural resources, the creation and implementation of new technologies and environmentally friendly solutions, and environmental communication and education. As part of this strategy, it is therefore extremely important to design classes in such a way that students acquire practical skills that are sought after on the labor market. The assessment process should also focus on assessing acquired skills and not only theoretical knowledge.
5) Experience- and community-based education: This strategy allows students to acquire knowledge and skills through direct engagement with real-life situations and interactions with local communities and environmental organizations. As part of this strategy, students can participate in a variety of activities, such as:
   - Internships or work placements in non-governmental organizations, public institutions or companies that deal with sustainable development issues;
   - Study visits to places presenting good environmental practices;
   - Implementation of social projects aimed at solving specific environmental problems in a local community, e.g. organizing information campaigns, zero waste initiatives;

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- Implementation of field projects related to environmental protection in a given region, e.g., urban greenery inventory, environmental education in schools.

It is important that lecturers initiate and support activities that will enable students to gain experience related to sustainable development in practice. This will allow students to directly apply the acquired theoretical knowledge in real-life situations, develop practical skills, increase social engagement, shape attitudes of social responsibility, and build a network of contacts.

6) Digital and technological integration: Modern digital technologies play an increasingly important role in various areas of life, including education. This strategy can use a variety of tools and technologies, such as:
   - E-learning platforms, where it is possible to conduct classes remotely, share educational materials online, send and solve tasks;
   - Mobile systems and applications used for environmental data monitoring, carbon footprint calculation, and environmental education (e.g., use of spatial information systems [GIS] for environmental data analysis);
   - Data visualization, presenting statistical and scientific data on the environment in an attractive and comprehensible way (e.g., in Power BI);
   - Simulations and modelling that allow students to experiment with different scenarios and models of environmental phenomena (e.g., computer simulations of climate change processes);
   - Software to implement and deliver green solutions (e.g., supply chain carbon footprint tracking platforms, ESG reporting tools, environmental accounting software).

   Digital and technological integration can contribute to making the education process more attractive by using interactive and engaging tools, developing digital competencies and preparing students for the use of technology in their future careers. It is therefore recommended that lecturers integrate digital tools and technologies relevant to the analysis and management of environmental issues in the education process.
7) New assessment and evaluation strategy: Integrating environmental topics into the study program also requires adapting assessment methods to match new learning methods. In addition to tests and exams, it is worth using methods that allow to assess practical competencies, such as: implementation of projects in the field of sustainable development, reflexive essays, assessment of soft competencies (cooperation, systemic thinking), as well as self-assessment and peer evaluation. It is also a good solution to cooperate with the external environment, e.g., NGOs or companies that can assess the real impact of student activities. The goal of such a strategy is not only to verify knowledge, but also to develop attitudes and engagement. In that, clarity of the criteria and regular feedback are crucial.
8) Staff development and institutional support: Effective integration of green competencies into study programs requires the active involvement of teaching staff providing them with appropriate substantive and organizational support. Academic teachers should be able to improve their competencies in education for sustainable

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development, both by participating in training and workshops and by access to up-to-date teaching materials, good practices and methodological tools. Universities can support this process by:

- Organizing integral training and workshops for lecturers in the field of sustainable development and methodology of teaching this subject;
- Cooperation with external experts in the field of sustainable development, which will allow the exchange of knowledge and experience;
- Setting up cross-departmental or cross-field teams or working groups that jointly develop teaching solutions and materials on green competencies;
- Integrating the topics of sustainable development into education quality policies, university strategies and assessment criteria for teaching work;
- Sharing OERs that can be used in the teaching process;
- Supporting grassroots initiatives of lecturers and students (e.g. teaching grants, mini-projects, competitions for innovative teaching methods with elements of green competencies).

It is important that staff development is a continuous process that is adapted to changing needs and challenges. Universities should also monitor and assess the effectiveness of actions takes to support the integration of environmental topics.

2.5 Matching competencies to a given course

Successful integration of environmental themes into traditional subjects requires careful matching of green competencies to the character of each course. This process includes several key steps:

1) Defining aspects of green competencies that may be linked to learning goals of a course. These could be:

a) Environmental awareness and understanding of the impact of human activities on the environment;
b) The ability to analyze environmental problems from the perspective of a given discipline (e.g., economic, sociological, legal);
c) Creative and critical thinking about sustainable development and seeking innovative solutions;
d) The ability to communicate and promote the idea of sustainable development;
e) Social responsibility and commitment to environmental action;
f) Making decisions with the future in mind;
g) Cooperation to solve environmental problems.

2) Planning how to integrate sustainable development into the knowledge, skills and social competencies defined for a given course. It is worth considering which of the elements listed in point 1 are or can be related to a given course and identifying specific topics and issues of sustainable development that can be linked to the educational content. To illustrate, the topic of "green marketing" and ethical communication may be introduced to a course related to marketing, and

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environmental protection, or ESG-related provisions may be introduced to courses related to law.

3) Complementing the learning outcomes with sustainable development-related components. To this end, it is necessary to analyze the already existing learning outcomes provided for a given course, and then add those related to green competencies, e.g. "the student knows and understands the environmental risks associated with a given process/strategy", "the student is able to analyze the environmental, economic and social impact of the proposed solutions", "the student is ready to promote pro-ecological and ethical attitudes in teamwork and project work. Instead of creating completely new learning outcomes, existing ones can also be modified to incorporate elements of sustainable development.
4) Planning teaching methods and methods for verifying learning outcomes that will develop green competencies. It is worth choosing methods that support students' engagement in environmental or social problems, e.g., case studies, team projects with a real-life problem to solve, debates, simulations, study visits, problem tasks. Tasks that combine knowledge with action will also work here, e.g. designing a service according to the principles of the circular economy. The assessment criteria should, in turn, take into account elements related to thinking about sustainable development (e.g. whether students consider the environmental and social impact of decisions, whether they are able to assess alternative solutions from the point of their stability and responsibility). Additional points may also be added to the assessment criteria for the environmental impact analysis or for the use of the sustainability perspective in the project.
5) Verification of the integrity of the entire study program of a course (the syllabus). After introducing aspects related to green competencies to the individual elements of the syllabus, it is necessary to check whether the entire program of the course is cohesive. To that end, it is necessary to trace the established learning goals, learning outcomes for the course, educational content, as well as the teaching methods and methods for verifying learning outcomes. All these elements should be cohesive with each other, and, in particular, the established methods for verifying learning outcomes should make it possible to check that students have actually achieved the learning outcomes expected for the course. It is important that integration is cohesive and logical.

After the implementation and realization of a course according to the new program, an extremely important step is also the evaluation of the introduced changes. After the classes, it is worth collecting feedback from students and assessing whether the expected learning outcomes related to green competencies have been achieved and, if necessary, introducing changes for the future.

2.6 Case studies of successful study program modifications

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2.6.1 Modification of the study program on the example of Administration

The implementation of changes to the study program can be seen on the example of Administration taught at the University College of Enterprise and Administration in Lublin. In the 2020/2021 academic year, the need to update the study program of this field of study was diagnosed, in order to make it more attractive and comply with contemporary trends and requirements of the labor market. First, an analysis of the existing specializations in the study program was carried out. As a result of this, it was decided to introduce a specialization into the study program called Innovative Management of Urban Ecosystems. The program of the specialization was worked on in several stages: The first step was to initiate actions by the Owner and the authorities of the University College, who recognized the need to implement new trends and ideas into the program. In accordance with the procedures adopted at the University College, the task of conducting the process of modifying the study program was entrusted to the Dean of the Administration faculty. Among the representatives of the socio-economic environment of the University College, the main partner that took part in the work on the study program was the Lublin City Office (UML). This institution acts as a partner of the University College of Enterprise and Administration in Lublin, as well as a member of the Advisory Board for Administration, and is also responsible for implementing the development strategy of Lublin as an academic city and effectively implements modern trends and ideas to its functioning. Therefore, turning to the Lublin City Office was a natural way in the process of changing the approach to education. UML representatives took a very active part in the work on the program. First, they formulated a list of courses that should be included in the specialization program. The draft of this program was then consulted with the authorities of the University College, Deans of other faculties, as well as lecturers and administrative staff. These consultations took the form of workshop meetings, during which the approach and goals of education as well as the strategy for the development of the faculty were discussed. In order to adjust the proposed program to the formal framework functioning at the University College, work was carried out, among others, on the order of the courses in individual semesters, hours, and forms of classes. The program of the new specialization called Innovative Management of Urban Ecosystems included, among others, the following courses:

- Sustainable development goals / global trends in urban development
- International strategy documents
- Legal aspects of creating strategies for cities and urban ecosystems
- Modern urban planning and spatial planning in cities
- Ideas of smart cities in the modern world
- Social participation in the strategic planning process
- Open urban data and GIS solutions for managing innovative urban ecosystems
- Coordination of knowledge and technology transfer in urban ecosystems.

As you can see, the above set of courses is highly interdisciplinary. The program of the specialization, covering issues such as sustainable development, spatial planning, social participation, smart cities, or open urban data, clearly fits into the trend of green

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competence education. This interdisciplinary and practical design of the program matches the need to educate professionals capable of managing the transformation of cities and regions in a sustainable and innovative way. However, this does not mean that it has not been necessary to update the specialization program again since it was formulated. In the following years, the program was re-analyzed, which showed, among others, the need to extend the subject scope of the specialization to all types of municipalities. This was the result of, among others, establishing cooperation with new representatives of the socio-economic environment, including institutions working for the development of municipalities in the Lublin Voivodeship. As an example of the changes made, new courses were introduced: Revitalization of cities and municipalities, and Energy independence of cities and municipalities. In order to emphasize the change in the nature of the specialization, it was also given a new name – Smart City and Smart Village.

The above process shows how important is the participation and engagement of both internal and external stakeholders in the modifications of study programs. Only dialogue with a wide range of participants allows to create study programs that are up-to-date, consistent with the needs of the market and at the same time embedded in the reality of the university's daily operation. Internal stakeholders bring in knowledge based on teaching and organizational experience, while external stakeholders bring in a perspective of the labor market and expectations towards the competencies of graduates. Study programs should also be regularly evaluated and updated in response to changing social, technological and professional needs, so that education remains current, relevant and future-oriented.

2.6.2 Modifications of programs of individual modules and courses

The integration of green competencies into the study programs of individual courses becomes not only a response to the needs of the labor market but also the university's obligation to address environmental challenges. The following are examples of modifications already implemented in the study programs, as well as change proposals that can be adapted to better integrate sustainable development issues into existing courses:

1) HR Manager and Business Coach specialization in the field of Management at the University College of Enterprise and Administration in Lublin: in response to the growing importance of responsible and ethical personnel management, a course on sustainable development in HR has been included in the Human Resources Management specialization. The program of this course focuses on such areas as the role of HR in building organizations with sustainable development, methods and tools of HR sustainable development policy, or the benefits for the organization resulting from the HR sustainable development policy in the organization. As part of the learning outcomes planned for the course, students learn about the idea and essence of HR sustainable development in the organization and learn how to create a policy of HR sustainable development in the organization and use appropriate tools and

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methods for this purpose. As part of the verification of learning outcomes, students in groups formulate HR sustainable development policies for selected organizations. The introduction of this course enriches the graduate's profile with competencies increasingly sought after on the labor market, especially in organizations guided by the policies of social responsibility.

2) Strategic management course – proposal to include green competencies: Traditional strategic management education focuses on analyzing competition and building market advantage. Nowadays, in the face of the growing importance of ESG, it is worth expanding the content to include issues of sustainable development. As part of this integration, the inclusion in the study program of elements such as analysis of companies implementing ESG strategies, case studies of pro-ecological activities, and reflections on greenwashing may be considered. This will allow to develop skills and competencies related to, among others, assessing the impact of strategies on the environment and society, formulating sustainable goals, differentiating authentic actions from feigned ones, and designing long-term environmentally responsible strategies. In order to verify achieving such structured learning outcomes, you can use methods such as: ESG case studies, team projects, formulating an environmental strategy, ethics debates, decision simulations, stakeholder analysis, or preparing an ESG strategy for a local company. This approach not only updates the study program but also strengthens the competencies of future socially and environmentally responsible leaders.
3) Other fields of study at the University College of Enterprise and Administration in Lublin – change proposals:
    - Administration: the learning outcomes for the Administration field of study refer to "solving cases in the area of national law ordering or allowing the implementation of tools for social participation". Realization of this outcome can be extended to include an analysis of cases related to environmental protection and citizens' participation in decisions concerning, for example, local investments affecting the environment. Additionally, as part of the "Smart City and Smart Village" specialization, students work on creating a strategy document, which can be used to analyze and create a sustainable development strategy for specific cities or regions, taking into account ecological, social, and economic aspects.
    - Finance and Accounting: the learning outcomes for the Finance and Accounting field of study include the ability to interpret economic effects and processes and analyze their cause-and-effect relationships in the area of finance and accounting. Realization of this outcome can be combined with an analysis of the impact of environmental regulations (e.g., carbon emission pricing) on the financial performance of companies or an assessment of the financial risks associated with investments in renewable technologies.
    - International Relations: the learning outcomes for the International Relations field of study include the following ability: "the student is able to assess the usefulness and effectiveness of typical procedures and methods used in the management and administration process in the area of operation of selected

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international organizations". One way of realizing this outcome may be an analysis of the European Union's climate policy or the UN's actions for sustainable development, together with an assessment of their effectiveness and impact on international relations.

- Management: the learning outcomes for the Management field of study include the following ability: "the student is able to design, organize, and conduct a business". This outcome can be linked to a case study of a company that implements sustainable business practices by analyzing how they affect various aspects of its operation (e.g., costs, image, relations with stakeholders). Another example is the outcome related to designing marketing events for a selected company in groups. Students, by realizing this outcome, could formulate a marketing strategy for an eco-friendly product or a social campaign to promote a sustainable lifestyle.

2.7 Conclusion

The implementation of green competencies into study programs and the teaching content of individual courses is today one of the key tasks facing higher education. Green competencies do not have to function as a separate module but can naturally be woven into existing courses or specializations – regardless of the field of study. The above examples of modifications of study programs – both already implemented and proposed – show that the integration of sustainable development issues with teaching content is possible and needed in different fields of study. These actions are conducive to developing competencies in students that respond to current civilizational, environmental, and social challenges. Enriching learning outcomes with green competencies, using engaging teaching methods, and linking content with professional practice make the education process more relevant, modern, and responsible. The key to an effective transformation of education is a conscious design of learning outcomes, a flexible approach to content, and a willingness to seek practical, up-to-date solutions. Selected issues and approaches presented in this chapter will be further elaborated later in the publication, where, among others, teaching methods conducive to the development of green skills and instruments supporting their effective implementation in academic practice will be discussed.

Chapter 3: Teaching methods for green skills integration

3.1 Overview and Objectives

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Integrating green skills into the academic curricula of social and human sciences can be a transformative way to address sustainability, social justice, and environmental challenges. In this way, students can be equipped with the competencies necessary for emerging job markets and contribute to a thriving, sustainable economy. Incorporating green skills in higher education is crucial for creating change makers instead of passive consumers. Developing students' green skills means not only teaching the specific technical skills that boost the greening of the industrial sector, but also it is about promoting their awareness through their behaviors and choices, and encouraging them to adopt a more sustainable lifestyle. The primary objective of such an academic curriculum should be to foster understanding and motivate actions regarding environmental conservation, sustainability, and responsible interactions with the natural environment.

The initiatives and best practices highlighted in this chapter offer valuable insights into how HEIs providing education on human and social sciences can embed sustainability in teaching, learning, and their daily operations. The focus of the chapter is to develop practical teaching methods and strategies on greening higher education in the specific sciences. It aims to be a roadmap for institutions seeking to align their operations with sustainable principles and develop interdisciplinary knowledge, student-centered education, and practical solutions that combine social, cultural, economic, and environmental sustainability.

There are several ways of incorporating green skills in an academic curriculum. It can be achieved, for example, by including the coverage of some environmental issues and material in existing courses or by incorporating sustainable thinking as a concept in regular disciplinary courses tailored to the nature of each specific course, or as a possibility for specialization within the framework of a faculty. Moreover, involving students in experiential learning can help them better comprehend and apply sustainable ideas and practices through hands-on, real-world experiences.

Below basic teaching methods and strategies for integrating green skills specifically in social and human sciences at higher education institutes will be further analyzed.

3.2 Problem-Based Learning Method

3.2.1 Key Features and Benefits from using Problem-Based Learning (PbBL) Method for Teaching Green Skills

PbBL is an effective teaching method in which students are presented with a complex, real-world problem and are asked to work collaboratively to research, analyze, and propose solutions to it (Steinemann, 2003). PbBL focuses on student-centered learning, where the instructor acts as a facilitator rather than as a primary source of knowledge. This collaborative approach empowers students to actively engage with real-world

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issues, to solve complex problems, to acquire critical thinking and practical skills, while addressing sustainability challenges in their communities and beyond (Thomas, 2010; Savery, 2006).

PbBL is an inherently experiential method that provides students with opportunities to apply theoretical knowledge to real-life problems. Students are called to face authentic sustainability challenges, such as climate change, resource management, or environmental justice, ensuring that their learning has direct relevance to "the pressing issues of the day". This teaching method also encourages students to think critically about the causes of environmental issues and to consider practical, feasible solutions that are sustainable and socially fair (Amin et al., 2020). As green skills in social sciences require knowledge from various fields, including sociology, psychology, economics, and political science, PbBL allows students to explore these connections and develop comprehensive solutions. It also fosters the development of a range of soft skills, including communication, leadership, teamwork, time management, and negotiation (Marni et al. 2019). Through this educational process, students work together in teams to research, analyze, and solve problems, while also engaging with stakeholders like local communities, governments, enterprises, or national organizations.

3.2.2 Steps for Implementing Problem-Based Learning to teach Green Skills in Social and Human Sciences students

To implement a PbBL method into teaching green skills to social and human sciences students, there is a series of steps to be followed:

1) Firstly, a real-world problem related to sustainability that is relevant to the social and human sciences must be selected. The problem should be complex, multifaceted, and must encourage students to explore its social, economic, and environmental dimensions, allowing for a holistic approach to sustainability.
   Examples of such problems include:
   - **Social impacts of climate change**: Students could explore how marginalized or vulnerable communities are disproportionately affected by environmental degradation, climate change, or resource scarcity, and propose strategies for equitable policy solutions.
   - **Sustainable Urban Development**: Students should investigate the challenges and opportunities for making cities more sustainable, considering issues like urban sprawl, transportation, waste management, and access to green spaces.
   - **Behavioral Change for Sustainability**: In this case students should develop interventions to promote sustainable behaviors, such as reducing waste, conserving energy, or adopting green transportation options, within specific communities.

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2) The next step should include the definition of the learning outcomes and the green skills that will be developed through this process. Such skills could be;
   - **Environmental training**: Understanding of key sustainability concepts, such as climate change, resource management, sustainable production and development.
   - **Policy Analysis and Design**: Ability to critically evaluate environmental policies and design/propose socially and environmentally sustainable solutions.
   - **Behavioral Change Strategies**: Knowledge of how to influence public attitudes and behaviors toward sustainability using theories from sociology and psychology.
   - **Stakeholder Engagement**: Skills in working with diverse groups, including local communities, government agencies, enterprises, and NGOs, to create collaborative solutions.
   - **Social and Economic Justice**: Awareness of the social implications of environmental issues and the importance of equity in sustainability solutions.

3) The next stage could be to organize teams and coordinate collaborations. Students would be divided into small groups, each tasked with addressing a different aspect of the problem. For example, if the problem is sustainable urban development, one team could focus on transportation solutions, another on waste management, and another on green architecture. In any case each group should:
   - **Conduct research** using a variety of methods, such as literature reviews, case studies, interviews with experts, or surveys of community members.
   - **Collaborate within the group and with other teams** to ensure their solutions are comprehensive and interconnected.
   - **Engage with external stakeholders**, such as local government officials, community organizations, or environmental experts, to gain insights and feedback on their proposed solutions.

4) While students work independently and in teams, the instructor's role is to act as a facilitator and guide them. Specifically, he/she should:
   - Provide **resources and guidance** as needed, such as readings, videos, and case studies, but avoid giving direct solutions to the problem.
   - Encourage students to **ask critical questions**, challenge assumptions, and consider alternative perspectives.
   - Monitor group dynamics, ensuring that each student contributes and that collaborative efforts are productive.
   - Offer **feedback** during the process, pointing out areas for improvement, gaps in research, or areas where students may need to adjust their approach.

5) Each team should develop and present a solution or set of solutions to the problem. The solutions should be:

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- **Sustainable**: They should consider the environmental, social, and economic impacts of the proposed actions.
- **Feasible**: The proposals must be realistic, taking into account the limitations of resources, time, and community or institutional constraints.
- **Equitable**: Solutions should be designed to ensure fairness and address the needs of vulnerable or marginalized populations.
- **Innovative**: They should encourage students to think creatively and propose novel approaches that can be scalable or transferable to other contexts.

At the end of the project, teams should present their findings and solutions in a final presentation. This could include:

- A **written report** detailing the problem and their research, analysis, and proposed solutions.
- An **oral presentation**, where students advocate for their solutions.
- **Visual aids** like graphics, posters, or digital platforms to communicate their ideas in an engaging and accessible way.

6) After the presentations, there could be a debriefing or reflection session where students could:
   - Discuss what they have learned through the process, including the challenges they faced, the skills they developed, and the insights they gained.
   - Consider the impact of their solutions on both the environment and the community and how their work could be implemented in real-world settings.
   - Receive feedback from the other teams and the instructor on their performance and the quality of their proposed solutions.

This reflection helps them solidify the knowledge gained and encourages students to think about how they can apply these green skills in future academic or professional endeavors.

Summarizing PbBL method cultivates critical thinking, ethical reasoning, and a strong foundation in collaborative inquiry.

3.3 Project-Based Learning Method

3.3.1 Key Features and Benefits from Using Project-Based Learning (PjBL) Method for Teaching Green Skills

PjBL is an innovative teaching methodology that focuses on student-driven exploration of real-world problems through practical projects. PjBL fosters deep learning by engaging students in the application of knowledge to address real-world challenges, often requiring collaboration, critical thinking, and interdisciplinary approaches (Bramwell-Lalor et al., 2020; Genc, 2014). Unlike traditional lectures, PjBL provides students with an active learning experience. Thus, students gain a deeper understanding by dealing with ideas in real-world contexts (Krajcik & Shin, 2014). This hands-on approach helps

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students internalize green skills by doing rather than just listening to theory. When used in teaching green skills to social and human sciences students, PjBL becomes a dynamic tool to integrate sustainability concepts with social, economic, political, and cultural dimensions.

By employing PjBL, social and human sciences students can develop green skills, while also honing their skills on problem-solving, teamwork, and communication. Through PjBL, students engage in authentic tasks that bridge academic learning with practical applications, preparing them to contribute meaningfully to sustainability challenges in their future careers.

Through the PjBL method students can be actively engaged in projects requiring them to research and investigate a topic in depth, to collaborate with other students and experts, to apply interdisciplinary knowledge for finding solutions to complex problems and to present their findings and solutions in various formats, such as reports, presentations, or even community-based actions. This educational process often includes open-ended questions or problems that do not have a single solution, and students' work is evaluated based on real-world impact or application.

In the context of teaching green skills, PjBL can empower students to work on projects that address environmental issues while exploring their social, political, and economic implications. Such projects could, for example, be based on:

- **Sociology and Social Change:** Students can explore how different social groups experience the impacts of environmental degradation differently. They may work on a project that investigates environmental justice and propose strategies to address disparities in access to green spaces or clean air, food and water.
- **Political Science and Policy:** Political science students can work on projects that involve environmental policy analysis, international agreements on climate change, or advocacy for sustainable governance. Projects could involve writing policy proposals, conducting interviews with policymakers, or evaluating existing environmental laws.
- **Economics and Sustainable Development:** In economics, students can use PjBL to analyze the economic aspects of sustainability. They could investigate the costs and benefits of adopting green technologies, propose green economy models, or examine how economic policies can incentivize sustainable behavior.
- **Psychology and Behavior Change:** Psychology students can examine the human psychological factors behind sustainability behaviors. For example, they could design and test strategies to encourage environmental-friendly behaviors like reducing waste or adopting energy-efficient practices, using psychological theories such as behavioral economics or social norms.
- **Social Work and Environmental Advocacy:** Social work students might design community-based projects aimed at helping vulnerable populations adapt to

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climate change impacts. These could involve providing social services to marginalized communities or educating communities about sustainable practices to improve their quality of life.

3.3.2 Steps for implementing Problem-Based Learning to teach Green Skills in Social and Human Sciences students

Implementing the PjBL method to teach green skills to social and human sciences students involves a series of steps. These steps are:

1) The initial step is to identify an environmental or sustainability issue that is both relevant and challenging. For social and human sciences students, possible project themes include:
   - **Urban Sustainability**: Developing a proposal for a city's green infrastructure, such as sustainable public transportation or waste management systems.
   - **Environmental Justice**: Creating a community-based action plan to address environmental disparities in marginalized communities.
   - **Climate Change Policy**: Designing an advocacy campaign or policy proposal to address the local impacts of climate change.
   - **Sustainable Development**: Analyzing the economic and social dimensions of a development project (e.g., green housing, renewable energy) in a developing country.

   The issue should have a clear social and environmental impact, ensuring that students' work is meaningful and can contribute to positive change.

2) The next step should be the formulation of driving questions. Driving questions are crucial for PjBL as they focus students' inquiry and direct their efforts. Examples of driving questions for green skills projects might include:
   - "How can we design a sustainable city model that balances economic growth with environmental protection?"
   - "What policies can be implemented to ensure that climate change mitigation efforts are equitable for low-income communities?"
   - "How can we increase environmental-friendly behaviors in urban populations using psychological interventions?"
   - "What are the economic and social impacts of transitioning to renewable energy in a developing country?"

   These questions should be open-ended, require deep research, and prompt critical thinking.

3) Once students have formulated their project objectives and their driving questions, they should collaborate on research, brainstorming, and planning. Students will conduct background research, gathering data from scholarly sources, interviews with experts, or

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case studies. Collaborative work encourages interdisciplinary learning and teamwork, as students bring diverse perspectives to the project.

4) Followingly**,** students have to conclude with tangible proposals, such as:
   - **Proposals** for sustainable urban policies.
   - **Advocacy campaigns** for green practices.
   - **Economic models** for green growth.
   - **Psychological interventions** for promoting sustainable behavior.

   These proposals should draw on knowledge from multiple disciplines and may require students to engage with real-world stakeholders, including policymakers, community leaders, or environmental experts. Students may also use digital tools to develop their solutions, such as data visualization, simulation models, or social media strategies for public outreach.

5) At the end of the project, students have to present their findings and proposals to their classmates, instructors, and, if it is possible, to external experts or community stakeholders. Presentations might take the form of:
   - **Reports or policy briefs** that summarize their findings and solutions.
   - **Multimedia presentations** that communicate the project outcomes.
   - **Public campaigns** that will share their solutions with a wider audience.

6) The final step should include a reflection section that is an essential part of PjBL. At this phase, students should reflect on their learning experiences, the challenges they faced, the interdisciplinary nature of the project, and how the project has influenced their views on sustainability. This process encourages metacognition and self-assessment, helping students refine their problem-solving and collaboration skills.

3.3.3 Examples of Project-Based Learning Projects for Teaching Green Skills in Social and Human Sciences' students

Example 1: Designing a Green Urban Policy

Driving Question: How can a city implement policies to transition towards sustainable urbanization while ensuring social equity?

- Students research urban sustainability, green spaces, public transportation, waste management, and affordable housing.
- They collaborate to design a green urban policy proposal that balances economic growth, environmental protection, and social equity.

Example 2: Climate Justice and Vulnerable Populations

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Driving Question: How can climate justice be promoted in a community that is disproportionately affected by environmental hazards?

- Students research the intersection of climate change, social justice, and vulnerable populations.
- They design an advocacy campaign that addresses the environmental disparities faced by marginalized communities and propose policies for climate adaptation.

Example 3: Behavioral Interventions for Sustainability

Driving Question: What behavioral interventions can encourage people to adopt sustainable practices like recycling, energy conservation, or reducing waste?

- Students apply psychological theories to design interventions that change public attitudes toward sustainability.
- They create a behavioral change campaign that incorporates social norms, incentives, and education.

Overall, PBL engages students in real-world sustainability challenges that require them to plan, research, and deliver actionable solutions. This learning method not only strengthens research and teamwork skills but also fosters systems thinking and a deeper understanding of how social, economic, and environmental factors intersect.

3.4 Discussion-Based Learning Method

3.4.1 Key features and benefits from using Discussion-Based Learning (DBL) method for Teaching Green Skills

A DBL method can be an effective pedagogical tool for teaching green skills because it fosters critical thinking, collaborative learning, and deep engagement with complex environmental and societal issues. It focuses on students interaction and dialogue rather than solely on lectures or passive content learning. It is an effective educational method that gives students the chance to be part of the process, searching and discussing possible solutions (Holbrook et al., 2022). Through this method, students critically engage with a variety of perspectives, fostering both individual and collective learning. Specifically, the main principles of DBL include:

- **Active Participation**: Students contribute to the discussion, posing questions, sharing ideas, and debating differing viewpoints.
- **Critical Thinking**: Students are encouraged to analyze, evaluate, and critique the content of the discussions, often challenging assumptions or proposing alternatives.

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- **Collaboration and Peer Learning**: Learning becomes a shared experience, where students gain insights not only from the instructor but also from their classmates.
- **Real-World Application**: Discussions often center on contemporary issues, allowing students to apply theoretical knowledge to practical, real-world challenges.

A discussion-based approach in the context of green skills allows learners to explore environmental challenges through diverse lenses, such as social, cultural, economic, and political dimensions. This approach enables them to think critically about how these challenges intersect with human behavior and societal structures.

3.4.2 Strategies for incorporating Discussion-Based Learning Method into Teaching Green Skills to Social and Human Sciences' students

Below are some useful strategies for the implementation of DBL method for teaching green skills in social and human sciences programs.

1) Case study analysis

One of the most effective ways to introduce green skills in a discussion format is through case studies that present real-world environmental issues. For example, the discussion could center on a community affected by environmental degradation or a government policy aimed at promoting sustainable development. During these discussions, students can:

- Analyze the causes and consequences of the environmental issue.
- Debate potential solutions from multiple disciplinary perspectives (e.g., sociology, economics, psychology).
- Critique existing policies or propose new ones.
- Reflect on ethical considerations, such as the balance between economic growth and environmental protection.

Case studies can be drawn from local or global contexts and thus allow students to appreciate the universality and local specificity of sustainability issues.

2) Debates on ethical dilemmas

Ethical discussions are an essential component of teaching green skills, especially in the social and human sciences. Students can engage in structured debates on ethical dilemmas related to sustainability, such as:

- Should economic development take precedence over environmental protection in developing countries?
- Is it ethical for wealthy nations to consume resources at a higher rate than developing nations?
- How should we balance the rights of indigenous communities with national environmental goals?

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These discussions can encourage students to reflect on their personal values and how these align with the broader principles of sustainability and social justice. Debate formats promote critical thinking and expose students to diverse ethical perspectives, fostering a deeper understanding of how social, political, and environmental values intersect.

3) Collaborative Group Projects

Through DBL, group projects can be an effective method to encourage collaboration. Students could work in small groups to investigate specific green skills and present their findings to the class. As part of these group projects, students can hold discussions to debate different approaches, share research findings, and refine their ideas. This fosters peer learning and helps students understand the importance of interdisciplinary collaboration in solving sustainability challenges.

4) Interdisciplinary guest speakers and panels

Inviting guest speakers from various disciplines (e.g., environmental scientists, policy makers, economists, or community activists) to participate in class discussions can offer students valuable insights from experts in the field. This interdisciplinary approach helps students to:

- See how green skills intersect across different fields of study.
- Learn how experts approach sustainability challenges from diverse perspectives.
- Engage in discussions with professionals who are actively addressing real-world issues.

Panels or guest lectures provide students with an opportunity to ask questions and debate contemporary sustainability issues, further enhancing their critical thinking and engagement.

3.4.3 Assessment methods in Discussion-Based Learning

While DBL emphasizes dialogue and collaboration, assessment of student learning can also be dynamic and varied, and is therefore essential to complete this teaching method. Some potential assessment methods include:

- Ask students to write reflective essays on the discussions, demonstrating their understanding and ability to synthesize ideas from various viewpoints.
- Evaluation of students' debate performance that includes assessment of their ability to construct arguments, engage with counterarguments, and present evidence during debates.
- Evaluation of the effectiveness of group collaborations through peer feedback and project outcomes.

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These assessments align with the participatory nature of DBL and encourage students to build communication, negotiation, and empathy skills while exploring global sustainability dynamics.

3.5 Experiential-Learning Method

3.5.1 Key features and benefits from using Experiential Learning (ExL) for teaching Green Skills

ExL is a pedagogical approach rooted in the principle that knowledge is created through the transformation of experience (Kolb, 1984). It emphasizes active student participation in meaningful, real-world contexts, allowing learners to engage deeply with environmental and sustainability challenges. This learning model aligns particularly well with the development of green skills in higher education, as it bridges theory and practice, encourages critical reflection, and fosters both technical and soft skills essential for sustainable thinking.

In the context of social and human sciences, ExL empowers students to understand the societal dimensions of sustainability through direct engagement. Rather than passively absorbing content, students are immersed in environmental issues through field activities, community-based projects, service learning, and simulations. This approach supports interdisciplinary learning, promotes civic responsibility, and enhances motivation and retention by demonstrating the real-world relevance of sustainability education (Pavlova et al., 2020).

3.5.2 Strategies for implementing experiential learning in Social and Human Sciences

1) **Field-Based Activities:** For example, organizing visits to recycling centers, sustainable farms, renewable energy facilities, or water treatment plants allows students to observe sustainability in action. These activities offer opportunities to analyze the interaction between human behavior and environmental systems and to reflect on challenges such as waste management, food security, or energy justice.
2) **Community Engagement and Service Learning:** Students can collaborate with local organizations, municipalities, or NGOs to participate in environmental awareness campaigns, conduct surveys on sustainability practices, or co-design community interventions. For example, students might assess recycling habits in neighborhoods or help promote energy-saving behaviors in local schools (Brundiers & Wiek, 2011).
3) **Scenario-Based Role Playing:** Through structured simulations, students take on roles such as policymakers, environmental activists, or citizens debating climate adaptation measures. These activities help students explore trade-offs and ethical dilemmas while building negotiation and systems thinking skills (Barab & Dede, 2007).

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4) **Participatory Action Research: i**ncorporating students in research projects that aim to co-create solutions with communities reinforces the ethical dimension of sustainability and highlights the value of democratic participation in environmental governance (Chevalier & Buckles, 2013).

5) **Reflective Practices:** A crucial component of ExL is reflection. Students should be encouraged to search through journals, write critical essays, or engage in structured debriefs that allow them to process their experiences, evaluate their learning outcomes, and identify personal growth areas.

3.5.3 Learning outcomes and competencies developed

ExL serves several skills, such as:

- Enhanced environmental awareness and ethical reasoning.
- Ability to collaborate across disciplines and societal sector.s
- Skills in communication, problem-solving, and participatory decision-making.
- Greater empathy for communities affected by environmental degradation.
- Capacity to apply academic knowledge in practical contexts.

3.5.4 Challenges in using the Experiental Learning method

While highly impactful, experiential learning requires careful planning and institutional support. Challenges may include logistical constraints, the need for long-term community partnerships, and the assessment of learning outcomes beyond traditional testing methods. To overcome these, educators should ensure clear learning objectives, integrate reflection consistently, and evaluate both process and product (Kolb & Kolb, 2005).

Overall, experiential learning is a transformative method for equipping students in social and human sciences with green skills. By immersing students in real-world challenges and promoting active, reflective learning, this approach fosters not only knowledge acquisition but also social responsibility, systems thinking, and long-term behavioral change.

3.6 Interdisciplinary Approach

3.6.1 Key features and benefits from using an interdisciplinary approach for teaching Green Skills

Using an interdisciplinary approach is crucial for teaching green skills because it reflects the complex and interconnected nature of sustainability challenges. Environmental, social, economic, and political systems are intertwined, and addressing sustainability issues requires knowledge that transcends single academic disciplines. An

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interdisciplinary learning model enables students to synthesize diverse perspectives, cultivate systems thinking, and appreciate the interconnectedness of human and environmental systems (Sterling, 2004; Newell, 2001).

In the context of social and human sciences, integrating environmental studies, economics, political science, psychology, and ethics into sustainability education equips students with a holistic understanding necessary for effective problem-solving and decision-making. It fosters the ability to see problems through multiple lenses, identify synergies and trade-offs, and design inclusive, adaptive solutions.

3.6.2 Strategies for implementing an interdisciplinary approach

Implementing an interdisciplinary approach, especially for teaching complex topics like green skills, requires deliberate planning and collaboration. Some of the key strategies for effectively designing and delivering interdisciplinary learning are:

1) **Cross-Disciplinary Projects:** Assign projects where students must integrate concepts and methodologies from different fields. For example, students may work on developing behavioral interventions for food waste reduction by combining insights from environmental science, sociology, and psychology.
2) **Interdisciplinary Case Studies:** Analyze real-world examples where interdisciplinary collaboration led to successful sustainability outcomes. Case studies such as Denmark's transition to renewable energy can illustrate the roles of policy, economics, technology, and societal values in achieving green goals (Lund, 2007).
3) **Integrated Course Modules:** Develop course units that blend theories and methods across disciplines. For instance:
    - In **psychology**, students could explore psychological barriers to adopting sustainable behaviors or the mental health impacts of climate change (Clayton et al., 2017).
    - In **sociology**, students could examine how environmental movements influence political change and public behavior.
    - In **economics**, they might evaluate the economic viability of circular economy practices.
    - In **political science**, students could analyze international environmental agreements and the politics of environmental justice.
4) **Collaborative Teaching and Learning:** Promote co-teaching models where instructors from multiple disciplines jointly design and deliver courses. Workshops, joint lectures, and multidisciplinary student teams can simulate real-world collaborative settings.
5) **Systems Thinking Tools:** Introduce tools such as causal loop diagrams, system maps, and life cycle analysis to help students visualize and analyze the interdependencies among environmental, social, and economic factors (Meadows, 2008).

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3.6.3 Learning outcomes and competencies developed by using an interdisciplinary approach for teaching Green Skills

There are several learning outcomes and competencies associated with using an interdisciplinary learning method to teach green skills. These outcomes reflect not only knowledge, but also the practical and cognitive abilities that students develop. Through this method, students become equipped with:

- Systems thinking: They learn to understand and analyze the interconnections between environmental, social, and economic systems.
- Problem-solving: They learn to identify sustainability problems and develop innovative, feasible solutions.
- Critical thinking: They learn to evaluate sources, assumptions, and consequences of environmental decisions.
- Collaboration
- Ethical reasoning: They become capable of assessing the ethical implications of environmental and social actions
- Civil engagement: They get used to participating in civic processes that support environmental justice and sustainability.

3.6.4 Challenges in using an interdisciplinary approach for teaching Green Skills

Implementing interdisciplinary approaches may face institutional barriers such as rigid curricula, disciplinary silos, and limited faculty collaboration. It requires deliberate curriculum design, openness to cross-departmental cooperation, and support for innovative assessment methods that capture interdisciplinary learning outcomes (Repko, 2008).

Summarizing an interdisciplinary approach is indispensable for cultivating green skills in higher education. It equips students with the cognitive flexibility, analytical depth, and collaborative mindset required to address sustainability challenges that cut across environmental, social, and economic domains.

3.7 Interactive workshops and simulations

3.7.1 Key features and benefits from using interactive workshops and simulations for teaching Green Skills

Interactive workshops and simulations provide dynamic and participatory learning experiences that bridge theoretical knowledge with practical application. These methods allow students to experiment with real-world scenarios, test strategies, and witness the consequences of their decisions in a controlled environment. In the context of teaching

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green skills, they foster active learning, critical thinking, collaboration, and familiarity with digital technologies essential for addressing sustainability challenges (Barab & Dede, 2007).

Workshops and simulations are particularly effective for social and human sciences students, enabling them to understand the complexity of environmental issues and societal responses, experience stakeholder perspectives, and apply interdisciplinary knowledge to decision-making processes. By creating immersive and interactive settings, students can develop strategic thinking, negotiation skills, and systems thinking, all vital competencies for green careers.

3.7.2 Strategies for implementing interactive workshops and simulations

The following strategies can guide effective planning and execution of interactive workshops and simulations:

1) **Environmental Scenario Simulations:** Students engage in simulations where they model environmental systems or manage sustainability projects. Some examples of this strategy are:

    - Using GIS (Geographic Information Systems) to plan sustainable urban development.
    - Simulating climate change negotiations, with students representing different nations or interest groups.
    - Using simulation games.

2) **Workshops with Digital Tools:** Introduce students to digital applications for sustainability, such as:

    - **Carbon footprint calculators** to assess and reduce personal or institutional environmental impact.
    - **Life cycle analysis software** to evaluate product sustainability.
    - **Data visualization platforms** to analyze trends in emissions, biodiversity loss, or energy use.

3) **Gamified Learning Activities:** Integrate serious games and educational apps that teach sustainability concepts through competition and storytelling. For example, games focused on balancing resource use and economic development or reducing a company's environmental footprint.
4) **Virtual Collaboration Workshops:** Use online platforms (e.g., Miro, Padlet, Microsoft Teams) to facilitate sustainability projects where students from diverse disciplines or even different universities collaborate remotely, sharing research, brainstorming solutions, and co-designing interventions.

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5) **Design Thinking Workshops:** Organize sessions where students use design thinking methodologies to tackle sustainability challenges creatively. Students move through stages of empathy, problem definition, ideation, prototyping, and testing, applying human-centered approaches to green innovation.

3.7.3 Learning outcomes and competencies developed by using interactive workshops and simulations for teaching Green Skills

By participating in interactive workshops and simulations focused on green skills, learners will develop skills such as:

- Digital literacy in sustainability-related tools and simulations
- Systems thinking and understanding of environmental interdependencies
- Critical analysis and strategic decision-making skills
- Collaboration and negotiation skills in interdisciplinary and multicultural settings
- Innovation and problem-solving capacity

3.7.4 Challenges in using interactive workshops and simulations for teaching Green Skills

Implementing interactive workshops and simulations requires careful preparation, including scenario realism, facilitation skills, and access to appropriate technological tools. Educators must ensure that activities are inclusive, well-structured, and linked to clear learning objectives to maximize educational impact (Gee, 2003).
Interactive workshops and simulations are powerful pedagogical tools for developing green skills in social and human sciences students. They offer opportunities for experiential learning, technology integration, and critical engagement with complex sustainability issues, preparing students to become innovative and adaptable change agents in a rapidly evolving world.

3.8 Conclusion

Teaching green skills to social and human sciences students requires more than a transmitting knowledge process, It demands engaging them as critical thinkers, making them collaborators, and changemakers. By incorporating active learning methodologies, such as PjBL, PbBL, DBL, ExL, interdisciplinary approaches, and interactive workshops and simulations, offers a robust and holistic framework towards this direction. These methods not only deepen academic understanding but also cultivate practical competencies, ethical awareness, and civic responsibility needed in the context of global environmental and social challenges. By engaging students in real-world tasks, educators help learners to move beyond theoretical knowledge and become problem-solvers, systems thinkers, and effective communicators. Social science students, in particular, benefit from these approaches as they allow them to explore the social dimensions of

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environmental change, such as inequality, governance, behavior, and cultural values, By combining multiple learning strategies, educators can create rich, interdisciplinary learning experiences that not only build technical understanding of sustainability but also empower students to lead transformative action in their communities and careers. It repositions education not just as a means of knowledge transfer, but as a dynamic platform for turning students into informed, conscious, responsible citizens who take active part towards the green transition.

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Chapter 4: Evaluating sustainability competencies and projects

4.1 Overview and Objectives

Building upon the foundational green skills and core concepts defined in Chapter 1, this chapter provides educators with the practical tools and frameworks needed to effectively evaluate student competencies and projects. As HEIs increasingly integrate green competencies into humanities and social sciences curricula, the question of evaluation comes to the forefront. How do we measure a student's grasp of systemic thinking, environmental justice, or social responsibility? How do we assess the real-world impact of a sustainability project?

This chapter addresses these critical questions by providing practical guidance for HEI didactic staff. The objective is not merely to assign a grade, but to foster a deeper understanding, promote reflective practice, and ensure that learning outcomes align with the urgent demands of sustainable development. It focuses on three core pillars as outlined in the project methodology: the creation of robust assessment rubrics, the use of diverse evaluation methods, and the navigation of complex ethical concerns inherent in the evaluation process. The underlying principle is that evaluation itself is a pedagogical tool. When designed thoughtfully, it can guide students toward developing the nuanced competencies they will need as professionals in the labor market and as active participants in civil society, moving beyond assessing rote knowledge to evaluating the ability to analyze, synthesize, and act upon complex socio-ecological challenges.

We will explore practical tools such as rubrics, portfolios, and sustainability audits, always with an eye toward their application within the humanities and social sciences. Furthermore, we will emphasize the importance of ethical consistency and regulatory compliance, ensuring that our evaluation practices are not only effective but also fair, just, and aligned with international standards like the UN SDGs and the EU Green Deal. Ultimately, this chapter equips educators with the strategies needed to design and implement evaluation processes that are as transformative and forward-thinking as the sustainability education they support.

4.2 Creating assessment rubrics for sustainability-focused learning

Assessment rubrics are indispensable tools for providing clear, consistent, and transparent evaluation of complex competencies. In sustainability education, where outcomes are often interdisciplinary and process-oriented, rubrics help demystify expectations for both students and educators. Their purpose extends beyond grading;

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they are designed to teach students how to think about quality work and to operate with the kinds of assessment frameworks they may encounter in professional settings, from CSR reporting to project evaluation in NGOs.

4.2.1 The purpose and framework of sustainability rubrics

A well-designed sustainability rubric is built upon a clear framework that ensures its effectiveness and relevance. This framework should be guided by three core principles:

1) **Clarity:** The criteria and performance levels must be unambiguous. A student should be able to look at the rubric and understand precisely what is expected of them. This involves using descriptive, non-judgmental language that focuses on observable behaviors and evidence.
2) **Relevance:** The rubric must directly align with the specific sustainability competencies being taught. This ensures that the assessment is a valid measure of the intended learning outcomes defined in Chapter 1.
3) **Flexibility:** A rubric should be adaptable enough to be applied to different contexts and organizational types that students might engage with (private companies, public bodies, social enterprises), allowing the same core competencies to be assessed across diverse projects.

4.2.2 Key components of an effective rubric

An effective rubric contains three key components: criteria, levels of achievement, and descriptors.

Criteria for Sustainability

These are the specific aspects of performance that will be assessed. To ensure coherence across this publication, the assessment criteria should be drawn directly from the **key green skills** defined and explained in **Chapter 1**. An effective rubric will translate these conceptual skills into measurable criteria.

For example:

- The competency of **Critical Ecological Thinking** can be assessed through a criterion measuring a student's *Analysis of Interconnected Social and Environmental Systems*.
- The competency of **Sustainability Literacy** can be assessed through a criterion measuring the *Application of Core Sustainability Principles*.
- The competencies of **Environmental Justice and Civic Engagement** can be assessed through a criterion measuring the *Analysis of Equity and Stakeholder Inclusion*.

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- The competency of **Sustainability Ethics and Policy-Making** can be assessed through a criterion measuring the *Application of Ethical Principles and Alignment with Policy Frameworks*.

Levels of Achievement

These are the graduated levels used to rate performance on each criterion. They can be qualitative (e.g., "Excellent," "Satisfactory," "Needs Improvement"), quantitative (e.g., a numerical scale of 1-5), or a combination.

Descriptors

This is the heart of the rubric. Descriptors are detailed, narrative explanations of what performance at each level looks like for each criterion. They provide the substance that makes the rubric a powerful tool for feedback and learning.

4.2.3 Example Rubric: "Humanities Project on Local Environmental Justice"

Below is a revised holistic rubric designed for a project investigating environmental injustice. Note how the criteria in the left column now directly reflect the core skills from Chapter 1, making the connection between teaching and assessment explicit.

Project Title: *Investigating Local Environmental Justice: A Case Study Analysis*

Criteria (Based on Skills from Chapter 1)	**Excellent (5)**	**Satisfactory (3-4)**	**Needs Improvement (1-2)**
1. Critical Ecological Thinking & Systems Analysis	Articulates a deep, nuanced understanding of how historical, social, economic, and environmental factors intersect to create the injustice. Clearly explains specific hazards and provides compelling evidence from	Identifies relevant social and environmental factors but the analysis of their interconnection is limited. Describes the environmental issue in general terms. Evidence is present but may lack depth.	Provides a superficial description of the issue with little or no analysis of underlying root causes or systemic connections. Evidence is weak or absent.

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	multiple source types.		
2. Environmental Justice & Civic Engagement	Actively identifies and respectfully incorporates the perspectives of a wide range of stakeholders, especially marginalized community members, through primary or in-depth research. The analysis empowers community voices.	Identifies key stakeholders but relies primarily on secondary sources. The representation of community voices may be indirect or limited.	Fails to identify or engage with diverse stakeholder perspectives, especially those of the affected community. The analysis may be one-sided or rely on stereotypes.
3. Sustainability ethics & policy alignment	Proposes innovative, holistic solutions that explicitly connect the case to broader ethical principles (e.g., equity, intergenerational responsibility) and regulatory frameworks (e.g., UN SDGs, EU Green Deal).	Proposes solutions that address some aspects of the problem but may be partial. Mentions relevant ethical or policy frameworks but does not fully integrate them into the analysis.	Proposes simplistic or unrealistic solutions that do not address root causes. Fails to connect the case study to any broader legal or ethical frameworks.

4.3 Diverse evaluation methods

While rubrics provide the criteria for assessment, educators must choose the appropriate method or artifact through which students will demonstrate their competencies. A single examination or essay is often insufficient to capture the depth and breadth of sustainability learning. The methodology for this project highlights three

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particularly effective and diverse methods: portfolios, formal reports, and sustainability audits. The key is to choose the method that best aligns with the specific learning activity, the sector of focus, and the competencies being developed.

4.3.1 Portfolios: Tracking growth and reflection

A portfolio is a curated collection of a student's work over time that demonstrates progress, achievement, and critical reflection. It is particularly well-suited for long-term, project-based learning in sustainability.

- **Content:** A sustainability portfolio in a humanities course might include a range of artifacts: initial research proposals, annotated bibliographies, critical essays, reflective journals, photo essays documenting fieldwork, audio recordings of interviews with community members, and a final synthesis paper.
- **Function:** Its primary strength is showcasing growth. By including early drafts alongside final versions, or initial reflections alongside later ones, the portfolio makes the learning process visible. The inclusion of a mandatory reflective component, where the student analyzes their own journey, develops metacognitive skills—a crucial sustainability competency.
- **Strengths:** Excellent for demonstrating long-term reflection and personal growth. It can capture a wide variety of learning evidence, accommodating different student strengths.
- **Challenges:** Can be time-consuming for both students to compile and educators to assess. The interpretation can be subjective, making standardized grading difficult without a very clear rubric.

4.3.2 Formal reports: Structured, in-depth analysis

A formal report is a structured, formalized piece of documentation designed to analyze a specific sustainability issue or project. This method mirrors professional practices in consultancy, government, and corporate sectors.

- **Content:** A report typically follows a conventional structure: executive summary, introduction, methodology, findings, analysis/discussion, and recommendations. In a social sciences context, this could be a policy analysis report, a social impact assessment, or a research report on consumer attitudes toward sustainable products.
- **Function:** This method excels at assessing a student's ability to conduct rigorous, evidence-based analysis and communicate findings in a clear, professional format. It can be designed to focus specifically on feasibility, impact, and future improvement strategies.

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- **Strengths:** Provides a formal, standardized format that is easy to compare across students. It develops skills in research, data analysis, and professional writing that are directly transferable to the labor market.
- **Challenges:** The rigid structure may not capture more creative or innovative aspects of a student's thinking. There is a risk that students focus more on format than on the critical substance of the sustainability issue.

4.3.3 Sustainability audits: real-world impact assessment

A sustainability audit is a structured evaluation of an organization's, community's, or campus's practices against a set of sustainability criteria. It is an experiential, hands-on method that bridges theory and practice.

- **Content:** Students, often working in teams, would select a target (e.g., a university department, a local café, a community policy) and use a predefined checklist or framework to assess its environmental, social, and economic performance. The final output is typically an audit report with findings and actionable recommendations for improvement.
- **Function:** This method is unparalleled for assessing real-world impact and practical problem-solving. It forces students to engage with the complexities and trade-offs of implementing sustainability initiatives in a live environment.
- **Strengths:** Highly structured and focused on tangible, real-world impact. It is an excellent form of active, project-based learning that develops skills in data collection, analysis, and stakeholder communication.
- **Challenges:** Can be complex and resource-intensive to organize, often requiring coordination with external partners. The scope must be carefully managed to be achievable within an academic term.

4.3.4 Comparative Analysis and Selecting the Appropriate Method

There is no single "best" method; the choice depends entirely on the learning objectives. The table below provides a comparative summary to aid educators in their selection.

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Method	Primary Focus	Strengths	Challenges	Best Suited For...
Portfolios	Process, Reflection, Growth	•Showcases development over time •Accommodates diverse evidence • Fosters metacognition	• Time-consuming • Subjective interpretation • Can be unstructured	Semester-long projects; assessing personal development and reflective practice; courses emphasizing creative and critical thinking.
Reports	Analysis, Professionalism, Evidence	• Formal and standardized • In-depth analysis of a topic • Develops professional skills	• May stifle creativity • Can prioritize form over substance	Capstone projects; assessing research and analytical skills; preparing students for corporate or policy roles.
Sustainability Audits	Application, Impact, Practice	•Structured, real-world application • Focuses on tangible impact • Develops teamwork skills	• Complex and resource-intensive • Requires external partners	Experiential learning courses; group projects; assessing practical problem-solving and stakeholder engagement.

An educator in a literary studies course might choose a portfolio to allow students to trace the evolution of their theoretical analysis across several texts. In contrast, an educator in a public policy course might assign a formal report analyzing the effectiveness of a specific piece of environmental legislation. A sociology course focused on community engagement could find a group-based sustainability audit of a local

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organization to be the most effective capstone assessment. Often, a combination of methods, such as a final report included within a larger portfolio, can provide the most comprehensive evaluation of a student's competencies.

4.4 Addressing ethical concerns in sustainability-oriented teaching and research

The evaluation of sustainability projects is not a value-neutral, technical exercise. It is fraught with ethical considerations that educators must navigate with care and intention. Building on the core concepts of sustainability ethics and justice introduced in Chapter 1, this section focuses on the **ethical conduct of the assessment process itself**. How we teach and assess must be consistent with core values of justice, equity, and responsibility.

4.4.1 Identifying ethical dilemmas in evaluation

The evaluation process must acknowledge, and in some cases, directly assess how students navigate complex ethical challenges. Key dilemmas include:

- **Balancing environmental goals with socio-economic realities:** Evaluation must be nuanced enough to reward students who grapple with trade-offs rather than those who propose simplistic, one-dimensional solutions.
- **Engaging communities without exploitation:** An ethical evaluation process must consider how a research project was conducted. Was there genuine, reciprocal engagement? Did the community benefit from the students' work? Was informed consent properly obtained?

4.4.2 Upholding core ethical principles

To navigate these dilemmas, evaluation practices should be grounded in a set of core ethical principles.

- **Respect for Human Rights and Dignity:** Evaluation should assess whether a student's project respects the rights, dignity, and agency of all people involved or affected.
- **Upholding environmental justice and equity:** An ethical evaluation will reward projects that, in line with the principles from Chapter 1, prioritize the needs of the most vulnerable and seek to dismantle systemic injustices.
- **Ethical consistency and averting "Greenwashing":** A crucial ethical benchmark is authenticity. The evaluation should reward projects that demonstrate genuine, substantive engagement, not just those that present a superficially "green"

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facade. This means assessing the depth of analysis and the integrity of the proposed actions.

4.4.3 Ensuring fairness, transparency, and regulatory compliance

Translating ethical principles into practice requires concrete strategies to ensure the evaluation process itself is fair and transparent.

- **Developing Fairness in Evaluation:** Use inclusive and participatory methods where possible and avoid bias through transparent rubrics.
- **Use Inclusive and Participatory Methods:** Where possible, evaluation can be made fairer by involving stakeholders in the process. For community-based projects, this could mean inviting a community partner to provide feedback on a student's work or even contribute to the development of the assessment criteria. This ensures the evaluation reflects the values and priorities of those most affected by the project.
- **Avoid Bias and Ensure Transparency:** Rubrics, as discussed earlier, are a key tool for transparency. Educators must also be mindful of their own biases and ensure that the criteria are applied consistently to all students. Making assessment criteria public from the start of an assignment is a fundamental practice of fairness.
- **Integration with Regulations and Standards:** Ensure student work aligns with major frameworks like the UN SDGs and the EU Green Deal and adheres to academic standards for research ethics:
- **Align with EU and International Regulations:** Student projects should be encouraged and assessed on their ability to align with major sustainability frameworks. This includes the **UN SDGs**, the **EU Green Deal**, and other relevant international and national regulations. For example, a project on sustainable agriculture could be assessed on how well it addresses SDG 2 (Zero Hunger) and aligns with the principles of the EU's Farm to Fork Strategy. This integration grounds academic work in the real-world policy landscape and provides students with a common language for their professional futures.
- **Adhere to Academic and Professional Standards:** All research involving human subjects must adhere to the institution's ethical review board standards. Evaluation should confirm that proper protocols for informed consent, data privacy, and confidentiality have been followed.

By embedding these ethical considerations directly into the evaluation design, educators do more than just measure learning; they actively shape students into becoming responsible, ethical, and critically-minded sustainability practitioners.

4.5 Conclusion

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The evaluation of sustainability competencies and projects is one of the most challenging and vital tasks for educators in the humanities and social sciences. As this chapter has demonstrated, effective evaluation is a critical component of pedagogy, directly shaping how students understand and engage with the complex, interconnected challenges of our time.

We have established that the adoption of comprehensive assessment tools, beginning with clear, relevant, and flexible assessment rubrics that directly measure the core competencies defined in Chapter 1, is foundational. These rubrics serve not only to grade but to teach, making explicit the criteria for high-quality, impactful work.

Furthermore, we have explored a range of **diverse evaluation methods**—including portfolios, reports, and sustainability audits—each with unique strengths for assessing different facets of learning. The key takeaway is the need for intentional selection, choosing the method that best aligns with the learning objectives.

Finally, and perhaps most importantly, we have underscored the non-negotiable role of **ethical standards** in the evaluation process. Navigating dilemmas, upholding principles of justice, and ensuring fairness are central to the integrity of sustainability education. They are central to the integrity of sustainability education. An evaluation that ignores ethics fails to prepare students for the profound responsibilities they will face.

For HEI didactic staff, the journey toward implementing these practices requires commitment and reflection. However, the reward is immense: fostering a new generation of graduates who possess not only the knowledge but also the practical skills and ethical compass to contribute meaningfully to a more sustainable future. The success of sustainability-focused learning and research hinges on our ability to assess it in a way that is as deep, integrated, and conscientious as the concept of sustainability itself.

Chapter 5: Technical Support for Green Skills Implementation

5.1 Overview and Objectives

Technology plays a crucial role in integrating green skills into higher education. The development of digital infrastructure is essential to support sustainability-focused learning, yet institutions face challenges such as resource limitations and resistance to

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change. However, numerous opportunities exist, including increased access to innovative teaching tools and global collaboration on sustainability education.

In the following sections, we outline and explain the various technical options available to universities for supporting the integration of green skills learning into their curricula.

5.2 Digital Tools and Platforms for Curriculum Development

5.2.1 Open Educational Resources (OERs) for Sustainability

OERs are teaching, learning, and research materials freely available in the public domain or released under an open license that permits no-cost access, use, adaptation, and redistribution by others with minimal or no restrictions. UNESCO (2019) defines OER as "learning, teaching and research materials in any format and medium that reside in the public domain or are under the copyright that has been released under an open license, which permits no-cost access, re-use, re-purpose, adaptation and redistribution by others." These resources can include textbooks, course materials, syllabi, videos, tests, software, and any other tools or materials used to support access to knowledge. The key feature of OER is that they are free to access and adapt, enabling educators and learners to tailor them to local needs, contexts, and languages.

OERs play a critical role in promoting sustainability in education, particularly in the context of global challenges such as the COVID-19 pandemic. The need for accessible and adaptable educational materials has become paramount, and OER provides mechanisms to achieve these goals while supporting the principles of sustainable development. The integration of OER in education fosters an inclusive environment by offering free access to resources that can be adapted to meet diverse learner needs (Ouahib et al., 2023). This adaptability aligns with Sustainable Development Goal 4, emphasising equitable education (Lo et al., 2024). Furthermore, the potential of OER to address unexpected disruptions, such as those experienced during the pandemic, highlights their value in maintaining continuity in education. For instance, educational institutions in Morocco successfully leveraged OER during COVID-19 to enhance teaching and learning, demonstrating its efficacy in varying educational contexts (Ouahib et al., 2023).

Sustainability in OER also extends beyond direct educational impact; it encompasses the socio-economic aspects associated with their creation and deployment. Drevenšek and Urbančič (2022) discuss the importance of collaborative efforts in developing OER, indicating that teamwork in projects can significantly close knowledge gaps related to the SDGs. Similarly, Ikahihifo et al. (2017) emphasise that adopting OER can reduce student costs, aligning educational practices with economic sustainability. However, challenges such as insufficient funding and inadequate infrastructure remain serious obstacles to OER's widespread adoption and longevity (Ganapathi, 2019; Annand, 2015).

The role of faculty and educators is crucial in the sustainability of OER. Studies have shown that faculty perceptions regarding the quality and usability of OER are vital for

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their adoption (Rodés et al., 2019; Cox & Trotter, 2017). However, bureaucratic hurdles and a lack of supportive policies can impede the effective integration of OER into higher education curricula (Annand, 2015). Educational institutions must foster environments where faculty feel empowered to create and utilise OER, thereby advancing pedagogical innovation and institutional sustainability (Eaton et al., 2022). Moreover, partnerships between K–12 and higher education institutions can enhance the efficacy of OER by creating a unified approach to resource development and implementation. Implementations like the Pathways Project demonstrate how cross-institutional collaborations can lead to more sustainable and effective educational practices (Arispe & Hoye, 2023). This synthesis of efforts contributes to a larger ecosystem where OER can thrive and adapt to the needs of learners globally.

OER holds transformative potential for education sustainability by improving access, adaptability, and equity in learning. Their holistic impact, however, requires concerted efforts from educators, institutions, and policymakers to overcome existing barriers and foster a culture of open educational practices that align with the targets set out in the 2030 Agenda for Sustainable Development.

5.3 Collaborative Platforms for Green Skills Development

As the world embraces more sustainable practices, collaborative platforms have become vital in education for developing green skills. Tools like Miro, Padlet, and Google Workspace enable interactive learning and active engagement with sustainability concepts. By offering dynamic spaces for brainstorming, sharing, and co-producing knowledge, these platforms foster essential soft skills and support the broader goals of sustainable development. The following sections will examine their impact on green skills development through insights from existing literature.

5.3.1 Miro: Enhancing Creativity and Collaboration

Miro is an online collaborative whiteboard that allows users to brainstorm, plan, and map ideas in real-time. This platform is advantageous in developing green skills and fostering creativity, critical thinking, and collaborative problem-solving (Haryani et al., 2021). Haryani et al. emphasise that integrating creativity and critical thinking in educational environments is vital for fostering innovative solutions to sustainability challenges. Miro enables students to visualise complex sustainability issues, engage in reflective practices, and collaborate on projects that necessitate creative solutions.

Moreover, the interactive nature of Miro encourages participation from all learners, irrespective of their prior knowledge of sustainability topics. Students can collectively craft solutions by simulating real-world sustainability challenges—such as waste management, energy efficiency, or climate adaptation- enhancing their understanding and retention of green skills.

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5.3.2 Padlet: Facilitating Knowledge Sharing and Engagement

Padlet is a digital bulletin board where users can post notes and multimedia content, facilitating knowledge sharing and interactive discussions. In sustainability education, Padlet allows students to share resources, insights, and reflections on sustainable practices visually engagingly (Oluwayimika & Idoghor, 2023). The platform's design supports equal participation, making it easier for shy or less assertive students to contribute. This aligns with findings from Soares et al., which highlight that digital resources can significantly enhance student engagement and support personalised learning experiences (Soares et al., 2024).

Using Padlet, educators can create collaborative spaces where students can share project ideas, documents, and educational content relevant to sustainability. The ease of use of such collaborative tools enhances student engagement, making learning more interactive (Soares et al., 2024).

5.3.3 Google Workspace: Seamless Collaboration in Education

Google Workspace encompasses a suite of productivity tools that enable real-time collaboration on documents and presentations, making it an effective platform for developing green skills. Features such as Google Docs, Sheets, and Slides allow students to collaborate on sustainability projects, conduct research, and present their findings seamlessly. The ability to edit documents simultaneously promotes a sense of teamwork, which is essential for addressing complex sustainability issues (Шаров et al., 2024).

Research by Cronin suggests that open practices facilitated through platforms like Google Workspace can enhance teaching methodologies and student learning outcomes (Cronin, 2017). This aligns with the increasing emphasis on open OERs, revolutionising traditional educational practices by providing accessible, adaptable, and collaborative content creation opportunities (Tang, 2020; Berti, 2018). The integration of Google Workspace in sustainability education thus not only promotes collaborative skills but also ensures that students can engage with high-quality learning materials effectively.

5.4 Learning Management Systems (LMS) for Sustainability Content Integration

5.4.1 Customizing LMS for Sustainability Education

Integrating sustainability education into LMS is essential for fostering environmental awareness and developing green skills among students. By customising platforms like Moodle, Blackboard, and Canvas with interactive features, collaborative tools, and sustainability-focused content, educational institutions can create engaging and transformative learning experiences. This approach enhances student involvement and learning outcomes and supports the broader goal of embedding sustainability into higher education, equipping learners to address today's urgent environmental challenges.

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5.4.2 Enhancing Engagement through Interactive Learning

Customisations that facilitate interactive learning experiences are pivotal in promoting sustainability education. For instance, integrating features such as discussion boards, multimedia resources, and simulation-based learning tools can enhance the depth of student engagement. Business simulation games have been shown to positively impact students' flow experiences, facilitating the development of essential skills while deepening their understanding of sustainability issues (Buil et al., 2018). Such simulations can be embedded into LMS platforms, providing students with practical scenarios to apply theoretical knowledge in a simulated environment reflecting real-world sustainability challenges.

5.4.3. Promoting Collaborative Learning

Collaborative learning can significantly enhance the effectiveness of sustainability education. Platforms such as Padlet and Miro can be integrated within an LMS, allowing students to collaborate on group projects, share resources, and provide feedback on one another's contributions. This collaborative approach can be instrumental in transforming students' learning experiences, as it encourages the involvement of external stakeholders beyond academia, such as NGOs, local communities, and industry professionals. Engaging these external partners can provide students with broader perspectives and insights into the practical implications of sustainability initiatives (Čolić et al., 2023).

Adopting collaborative platforms not only aids in skill development but also allows students to immerse themselves in discussions surrounding sustainable urban development and other complex sustainability themes. Studies indicate that transformational learning in sustainability education necessitates interactions with external practitioners (Fokdal et al., 2020).

5.4.4 Creating Sustainable Educational Content

Effective LMS customisation must encompass creating and curating educational content that aligns with sustainability principles. This can include integrating OERs focusing on sustainability topics (Gatti et al., 2019). Utilising resources like Khan Academy or materials from established universities can provide students with high-quality content while encouraging participatory learning (Buzády & Almeida, 2019). Implementing a comprehensive LMS framework that supports collaborative authoring of OER can further enhance the educational materials available for sustainability courses, fostering a community of practice among educators and learners (Moundridou et al., 2019).

5.4.5 Challenges and Future Directions

While customising LMS for sustainability education offers exciting possibilities, several challenges remain. Issues such as integrating technology into the curriculum, ensuring equitable access to resources, and cultivating faculty expertise in sustainability teaching strategies must be addressed (Ma et al., 2022). Collaborative efforts that include cross-

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institutional partnerships can alleviate some of these challenges by pooling resources and expertise (Kiss & Schmuck, 2020). By doing so, institutions can better align with global sustainability agendas, such as the United Nations' SDGs, which underscore the importance of educational efforts in fostering a sustainable future.

5.5 Integrating Experiential and Project-Based Learning

Integrating ExL and PBL into LMS platforms requires a deliberate rethinking of the LMS's pedagogical approach and technical design. The process involves embedding collaborative, reflective, and hands-on learning activities directly into the digital environment to simulate real-world contexts and promote active learning.

One key strategy is to leverage the modular structure of modern LMS platforms to create dedicated spaces where experiential projects can be designed, managed, and assessed. For example, by harnessing the capabilities of LMS platforms—as described by Laroiya (2024)—designers can integrate interactive modules such as discussion forums, group workspaces, and e-portfolios that allow students to document, reflect upon, and showcase their project work. Such platforms consolidate educational resources and communication tools and facilitate real-time feedback, thus strengthening the connection between theoretical concepts and their practical applications.

Furthermore, the incorporation of project-based learning necessitates the creation of assignments that mirror real-world challenges. Efstratia's work on experiential education through PBL illustrates that when students engage in projects that reflect their future professional contexts, they are more likely to develop critical thinking, problem-solving skills, and a deeper understanding of the subject matter (Efstratia, 2014). An integrated LMS can support these pedagogical goals by enabling the upload of multimedia project artefacts, peer-review functionalities, and instructor-driven assessment tools such as interactive rubrics and reflective surveys. Additionally, by aligning with experiential learning cycles—concrete experience, reflective observation, abstract conceptualisation, and active experimentation—these LMS modules can provide structured pathways for students to engage with and iterate upon their learning experiences.

Moreover, integrating these approaches into an LMS requires technical and instructional alignment. The LMS must support synchronous and asynchronous interactions to accommodate diverse project timelines and team configurations. For instance, real-time collaborative document editing and mobile accessibility ensure that in-person and virtual project teams can work seamlessly. This technical integration is vital for sustaining learner engagement and enabling educators to track project progress through embedded analytics and reporting tools, ensuring that reflective processes and iterative feedback loops are maintained throughout the project lifecycle.

Finally, combining experiential and project-based learning within an LMS promotes active engagement and fosters a learner-centred environment where students take

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shared responsibility for their education. This integration supports the development of interpersonal communication skills, creativity, and the practical competencies needed for the 21st century—outcomes substantiated by research in the field (Lubis et al., 2018). Through such an integrated approach, educational institutions are poised to transform traditional learning experiences into dynamic, context-rich environments that bridge the gap between classroom theory and real-world application.

5.6 Tracking and Assessing Green Competencies

5.6.1 Using digital badges, e-portfolios, and micro-credentials to certify sustainability competencies

Educational institutions increasingly adopt a multimodal digital credentialing ecosystem that integrates digital badges, e-portfolios, and micro-credentials to certify sustainability competencies. This approach addresses the growing demand for measurable sustainability skills and the need to offer more flexible and granular forms of recognition beyond traditional degree programs (Samar, 2022; Ifenthaler et al., 2016).

Digital badges serve as visual, evidence-based tokens that validate specific sustainability competencies, such as sustainable design, environmental management, and resource conservation. These badges signal the mastery of a distinct skill set and facilitate collaboration among diverse institutional stakeholders in creating a shared vision for competency-based certification (Ifenthaler et al., 2016; Gibson et al., 2013). Their design and implementation leverage metadata that links to supporting evidence—often housed in a learner's e-portfolio—thus enhancing transparency and trust across academic and professional networks (Goulding et al., 2023). Such badge systems are beneficial when institutional partnerships reinforce the credibility and applicability of sustainability credentials, aligning academic outcomes with environmental and industry benchmarks (Samar, 2022).

Micro-credentials complement digital badges by providing modular, stackable units of learning that can be cumulatively recognised as formal evidence of proficiency in sustainability practices. In contrast to traditional credentials, micro-credentials allow learners to build a personalised learning pathway that reflects ongoing professional and academic development in green practices (Reed, 2023; Khan et al., 2024). Institutions have adopted micro-credentialing models focusing on discrete sustainability competencies, transforming the evaluation process into highly agile and responsive to emerging industry requirements (Narayanaswamy et al., 2024; Raj et al., 2024). These alternative digital credentials are being used to assess technical content and validate applied, real-world skills through project-based learning and authentic assignments (Samar, 2022; Ahmat et al., 2021).

E-portfolios play a critical role in this integrated framework by acting as comprehensive repositories where learners can curate artefacts, reflections, and endorsements that

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document their sustainability journey. Such digital collections often include evidence such as project reports, interactive simulations, and reflective essays that substantiate the acquisition and application of green competencies (Боднар & Yuwei, 2024; Samar, 2022). The synergy between e-portfolios and digital badges creates a dynamic record supporting formative and summative assessment processes. Furthermore, e-portfolios provide a platform for continuous feedback and self-assessment, reinforcing the pedagogical shift toward learner-centred education with a sustainability focus (Ahsan et al., 2023).

Educational institutions use digital badges, e-portfolios, and micro-credentials to establish a robust, modular system for certifying sustainability competencies. This integrated digital credentialing infrastructure provides a transparent and scalable method for assessing sustainability-specific skills and enhances academic programs' relevance to contemporary environmental and economic demands (Narayanaswamy et al., 2024; Reed, 2023; Samar, 2022). As institutions continue to innovate in this space, the approach promises to foster greater engagement, facilitate continuous professional development, and ultimately contribute to a more sustainable future by ensuring graduates are well-equipped with the necessary green competencies.

5.6.2 AI-powered analytics and dashboards for insights into student engagement and progress

AI-powered analytics and dashboards have transformed how educational institutions monitor student engagement and track progress in sustainability topics by providing real-time, data-driven insights that inform instructional strategy and enhance learning outcomes for sustainability education. These tools integrate multiple data streams—student interaction logs, assignment submissions, forum discussions, and project-based tasks—to generate comprehensive visualisations in dashboards highlighting engagement trends specific to sustainability modules (Aggarwal et al., 2023).

At the heart of these systems is the ability of advanced machine learning algorithms to analyse behavioural data and generate predictive models. For example, Aggarwal et al. (2023) demonstrate that AI can assess individual learning styles, pace, and strengths through real-time data processing, facilitating the customisation of sustainability content. These analytics pinpoint areas where students are thriving and identify potential challenges early in the learning process by flagging deviations from expected engagement patterns. The predictive capabilities of AI-powered dashboards allow educators to intervene promptly and tailor their pedagogical approaches to improve student outcomes in sustainability topics.

Furthermore, Fernandes et al. (2024) emphasise how AI can personalise learning pathways by analysing extensive datasets in higher education. In the context of sustainability education, AI-driven dashboards can parse through aggregated metrics to deliver insights regarding the acquisition of sustainability competencies. The dashboards bridge raw data and actionable insights by translating detailed statistical analyses into

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meaningful visualisations, such as trend lines and heat maps, that educators and administrators can use to refine curricula and pedagogical interventions.

Additionally, Mudinillah et al. (2023) discuss the role of AI in supporting sustainable learning in higher education. Their research highlights that AI-powered tools streamline the process of collecting and analysing student performance data while fostering an environment of continuous feedback and reflection. Such an ecosystem is particularly beneficial for sustainability education, where dynamic subject matter and rapidly evolving environmental contexts require adaptive and responsive educational practices. Dashboards incorporating AI analytics can thus provide longitudinal views of learner progress, enabling educators to track the evolution of sustainability competencies over time and make informed decisions regarding curriculum adaptation.

In summary, AI-powered analytics and dashboards enhance student engagement and track progress in sustainability topics by leveraging sophisticated data processing techniques and user-friendly visual interfaces. These tools enable early identification of learning challenges, support personalised content delivery, and facilitate ongoing curriculum adjustments—all critical factors for nurturing sustainability competencies in a rapidly changing educational landscape (Fernandes et al., 2024; Aggarwal et al., 2023; Mudinillah et al., 2023).

5.7 Institutional support structures and professional development programs

5.7.1 Faculty training for Green Skills teaching

Faculty training for green skills teaching can be implemented through a multifaceted faculty development program that combines targeted sustainability content with innovative pedagogical strategies and technology integration. Successful implementation involves structured, continuous professional development initiatives that address both the theoretical foundations of sustainability and the practical means to incorporate green skills into various disciplinary contexts.

One effective approach is to design faculty development programs that explicitly integrate sustainability content and pedagogical innovation. For example, programs such as the Piedmont Project illustrate how faculty training can be structured to offer both content-specific knowledge and transformative teaching strategies, ensuring that sustainability principles are interwoven throughout the curriculum (Eisen & Barlett, 2006). Such initiatives enhance instructors' understanding of sustainability and empower them to redesign their courses and adopt hands-on teaching strategies that encourage experiential learning and critical reflection on environmental issues (Hurney et al., 2016).

A second key element is leveraging technology to support faculty in this transformation. Faculty development strategies may incorporate digital tools and blended learning

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environments, like the approaches outlined by Keengwe et al. (2010), which equip instructors with the necessary skills to integrate technology into their teaching practices. These digital components facilitate the creation of online modules, virtual communities of practice, and digital resource repositories that reinforce green skills content and foster collaboration among faculty members across disciplines. Using such technological tools enhances pedagogical delivery and supports faculty in engaging students in sustainability topics through interactive and learner-centred activities.

Complementary to these strategies, faculty training programs should emphasise mentorship and continuous support. Establishing peer mentoring systems and communities of practice creates venues for informal sharing and reflection, reinforcing sustainable teaching practices over time. Training programs can incorporate iterative feedback loops and reflective assessments, ensuring that the pedagogical methods and sustainability content are continually refined based on outcome assessments and faculty needs (Hurney et al., 2016). Embedding sustainability into the core of the training curriculum encourages educators to critically examine and transform their own practice, thereby making sustainability a pervasive theme across academic programs (Reid & Petocz, 2006).

In summary, implementing faculty training for green skills teaching is best achieved through a comprehensive, integrated approach that combines sustainability-focused content, technology-enhanced teaching strategies, and ongoing mentorship. By adopting models such as those demonstrated in the Piedmont Project, Eisen & Barlett (2006), and integrating digital and reflective practices as outlined by Keengwe et al. (2010) and Hurney et al. (2016), educational institutions can build a robust framework for faculty development that promotes environmental responsibility and prepares students for the challenges of sustainability in their future professional roles.

5.8 Technical and administrative support for sustainability integration

5.8.1 Green digital infrastructure policies and sustainability-focused IT strategies

Universities are increasingly prioritising the implementation of green digital infrastructure policies and sustainability-focused IT strategies to reduce their environmental impact and to support environmentally conscious learning environments. Such initiatives involve the integration of energy-efficient data centre designs, comprehensive ICT service management, and digital transformation strategies that align with sustainability goals.

A central component is the adoption of green data centre policies. Universities are leveraging innovative cooling methods, energy-efficient hardware, and renewable energy sources to minimise energy consumption in their IT operations (Austen & Subroto, 2023). These policies are designed to optimise infrastructure efficiency while ensuring business

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continuity and supporting practical decision-making regarding IT resource management. By prioritising green technology upgrades and sustainable data centre planning, institutions not only reduce their carbon footprint but also set a precedent for integrating sustainability into their core operational strategies.

Equally important is the restructuring of ICT services using established frameworks. For instance, several universities have applied the Information Technology Infrastructure Library (ITIL) framework to assess and optimise their ICT services, ensuring that digital transformation initiatives are both efficient and sustainable (Sukums et al., 2023). This approach enables the strategic allocation of digital resources and the integration of sustainable practices into daily operational processes. By aligning ICT service management with sustainability objectives, institutions create an environment where digital innovation and environmental stewardship mutually reinforce each other.

Moreover, universities manage ICT for sustainable education by embedding sustainability principles into digital learning environments. The integration of advanced ICT systems—such as cloud computing, smart classrooms, and interactive e-learning platforms—supports not only operational excellence but also promotes a culture of sustainability among students and staff. Universities can offer digitally mediated learning experiences through these platforms that emphasise energy conservation, resource optimisation, and environmentally responsible practices. Such systems also facilitate robust data analytics, enabling stakeholders to monitor and evaluate sustainability outcomes effectively.

The ongoing digital transformation in higher education underscores the need for deliberate strategies incorporating environmental considerations into digital education policies (Alenezi et al., 2023). Institutions are increasingly adopting green IT strategies encompassing regular capacity planning, performance monitoring, and implementing innovative technologies. This integrated approach ensures that the university's technological backbone contributes to sustainability goals by reducing energy consumption and maximising resource efficiency.

Furthermore, sustaining the integration of innovative teaching and learning technologies requires reinforcement measures and capacity-building strategies. Research indicates that the successful integration of sustainable IT practices depends on institutional policies that promote continuous training and provide incentives for adopting innovative educational technologies. These reinforcement measures bolster the technical proficiency of faculty and staff and enhance the cultural transformation toward a greener and more sustainable campus environment.

In summary, universities implement green digital infrastructure policies by integrating energy-efficient data centre planning, robust ICT management frameworks, and comprehensive digital transformation strategies. These initiatives, underpinned by green IT policies and capacity-building measures, foster environmentally conscious learning environments that align with the global agenda for sustainable development.

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5.8.2 Funding opportunities and incentives

Higher education institutions seeking to support sustainability education and research initiatives can identify diverse funding opportunities and incentives by adopting a multifaceted strategy. This strategy involves leveraging public-private partnerships (PPP), exploring alternative financing models, tapping into international grant frameworks, and accessing specialised green finance instruments.

One promising approach involves forming strategic public-private partnerships to share resources and risks while accessing additional funding streams. Research indicates that many institutions are countering reductions in state funding by engaging in PPPs, which enable institutions to partner with industry, government, and non-governmental organisations to support infrastructure development, research projects, and innovative sustainability programs (Minassians & Barseghyan, 2024; Jones-Esan, 2022). Such partnerships have been shown to secure financial resources and foster long-term collaborations that contribute to knowledge transfer and innovation in sustainability education.

In addition to traditional partnerships, alternative financing models such as waqf funds, representing pious endowments, offer a sustainable financing mechanism for higher education. Studies have highlighted the potential for Waqf-based educational financing to relieve financial pressures, particularly in contexts where conventional funding sources are insufficient, thereby enhancing student access and quality education while supporting research initiatives in sustainability (Mahamood & Rahman, 2015). These alternative models emphasise values-based philanthropy and are increasingly considered by institutions aiming to align their funding strategies with socially responsible and environmentally conscious goals.

Furthermore, universities can combine external grant funding with private capital to create integrated investment models. For instance, leveraging EU grants alongside private funding through PPP models has proven effective in energy and green infrastructure sectors, directly relevant to sustainability research (Kuzior et al., 2023). Such integrated approaches provide financial incentives that stimulate applied research and sustainable innovation across campus environments.

Moreover, fostering linkages and other institutional partnerships can be instrumental in resource mobilisation. By engaging in collaborative networks that span academia, government, and industry, institutions can streamline access to funding opportunities and reinforce their capacity for interdisciplinary research in sustainability (Chumba, 2020). These networks enhance financial sustainability and create synergies that boost the overall innovation ecosystem within higher education.

Finally, harnessing targeted green finance instruments—such as green bonds, green loans, and specialised sustainability funds—can give universities access to capital dedicated explicitly to environmental projects. A growing body of literature emphasises

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that green finance is designed to support investments that mitigate climate change and promote ecological sustainability, thereby aligning financial objectives with the broader goals of sustainable development. Coupled with PPPs focused on sustainability, these instruments offer a robust incentive framework that reduces institutions' carbon footprint and enhances their research capabilities.

Public-private partnerships remain vital in these funding strategies as a bridge between public funding limitations and private sector competencies. Establishing such partnerships secures direct financial resources and provides valuable access to technical expertise and networks necessary for environmental innovation. The combination of alternative financing, integrated grant models, and strategic partnerships provides a comprehensive framework for higher education institutions to enhance sustainability education and research initiatives in a challenging funding environment.

5.9 Conclusion

Integrating green skills into higher education curricula is no longer an aspirational goal but is necessary to prepare students for a sustainable future. As this chapter has demonstrated, a wide range of technical solutions—including OERs, simulations and business games, collaborative platforms, LMS, gamified learning tools, and digital credentialing mechanisms—offer powerful avenues to embed sustainability principles across disciplines. These digital infrastructures and educational technologies enrich pedagogical practices and ensure that students develop both the cognitive and practical competencies required to address real-world environmental challenges.

Key to this transformation is the strategic customisation of LMS platforms, the use of AI-powered analytics, and the deployment of digital badges, micro-credentials, and e-portfolios that track and certify the acquisition of green competencies. When combined with experiential and project-based learning, these tools support deeper engagement, personalised learning, and the practical application of sustainability concepts. Faculty training programs, cross-sectoral partnerships, and green IT strategies ensure the institutional capacity to support and scale these innovations effectively.

However, challenges remain. Institutions must overcome structural and cultural barriers, including limited funding, fragmented digital infrastructures, and the need for faculty upskilling. Addressing these issues requires a holistic approach incorporating strategic investment in green digital infrastructure, professional development, and inclusive policy frameworks that encourage innovation and collaboration.

Looking ahead, the future of sustainability education in higher education will depend on continued experimentation with emerging technologies, strategic partnerships across sectors, and the internationalisation of sustainability curricula. Initiatives such as Erasmus+ and other global cooperation frameworks will be vital in advancing this agenda by promoting exchange, co-creation, and sharing best practices.

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To fully realise the transformative potential of green skills education, universities must continue to evolve as agile, digitally enabled institutions capable of responding to rapidly changing environmental and societal contexts. Through sustained commitment, cross-institutional collaboration, and technological innovation, higher education can lead the way in cultivating a new generation of sustainability-conscious professionals equipped to navigate and shape a greener, more resilient future.

Summary

The *HEI GreenPath* publication serves as both a visionary and practical guide for embedding sustainability in higher education, particularly within the humanities and social sciences. It opens by redefining green skills beyond technical expertise to include critical ecological thinking, environmental justice, civic engagement, and ethical leadership. The chapters explore the pedagogical transformation required for green education—highlighting innovative methods such as problem-based, project-based, and experiential learning, as well as interdisciplinary and digital approaches.

Further sections delve into the practicalities of curriculum reform, presenting strategies for integrating sustainability into course content, learning outcomes, and assessment models. A dedicated focus on technical and institutional support outlines the digital platforms, collaborative tools, and administrative frameworks needed to implement sustainable education effectively.

Real-world case studies, particularly from WSPA, demonstrate how targeted curriculum modifications—such as the development of new specializations and partnerships with local stakeholders—can align academic programs with environmental and societal needs. The document concludes by reinforcing the importance of continuous evaluation and ethical standards, ensuring that sustainability education is not only rigorous but also equitable and transformative.

Ultimately, *HEI GreenPath* positions higher education as a catalyst for green transition—empowering institutions, educators, and students to lead systemic change toward a more just and sustainable future.

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Disclaimers

- **Open Access**

- **Declaration of generative AI and AI-assisted technologies in the writing process**

During the preparation of this work, the authors used ChatGPT to improve language and readability. After using this tool/service, the authors reviewed and edited the content as needed, and they take full responsibility for the content of the publication.

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