

Review

Semi-Systematic Literature Review on Sustainability and Sustainable Development in Higher Education Institutions

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Abstract: Public sector organizations, primarily higher education institutions (HEIs), are facing greater levels of responsibility since adopting and committing to the Agenda 2030 for Sustainable Development (SD) and its 17 Sustainable Development Goals (SDGs). HEIs are expected to provide guidance for various stakeholders on this matter, but also to implement this agenda and the SDGs in their institutions. Although the role of these organizations has been recognized, the fields and issues that HEIs should address on their path towards sustainability and SD are still unclear. To provide further clarity, a semi-systematic literature review on sustainability and SD in HEIs was conducted to identify both the key concepts and main research themes that represent sustainability and SD in HEIs and to identify research gaps. This review increases our knowledge of this topic and enhances our understanding of sustainability and SD in the context of HEIs.

Keywords: sustainability; sustainable development; higher education institutions; literature review



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1. Introduction

Sustainable development (SD) addresses the biggest challenges facing humanity in the 21st century [1]. The crucial role that higher education institutions (HEIs) and education play in contributing to sustainability and SD was formally and internationally recognized in 1972 at the UN Conference on the Human Environment held in Stockholm [1–5]. Since then, a significant number of HEI declarations, charters, and partnerships have been developed and designed to foster environmental education (EE), SD, and education for sustainable development (ESD) [1,3–5]. The concept of SD was then linked to a necessary reform of education systems worldwide at the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, when Agenda 21 was adopted [1,6–8]. In Agenda 21, HEIs' vital role in addressing sustainability and SD challenges was acknowledged and greater engagement with the concept of SD was expected [1,6–8]. Again, a number of HEIs joined alliances and signed commitments and declarations to integrate sustainability and SD in all aspects of their organizations [1,3,5,6,9]. In spite of a number of SD initiatives and an increasing number of HEIs becoming engaged with SD [3,5,6], HEIs were still lagging with regard to their contributions to sustainability and SD [3,10].

In September 2000, the Millennium Declaration was signed by the United Nations, which included eight Millennium Development Goals (MDGs). The MDGs were subsequently included in various stages of education [11]. After the World Summit on Sustainable Development held in 2002 in Johannesburg and during the UN Decade of Education for Sustainable Development ((UN DESD, 2005), which aimed to integrate the principles of SD into all aspects of HEIs [4,8], the engagement of HEIs in sustainability and SD challenges worldwide increased [7]. The relevance of HEIs for SD was reaffirmed at the United Nations' Rio + 20 conference held in Rio de Janeiro in 2012, which resulted in a political outcome document and the continuous implementation of the United Nations Global Action Programme on ESD [6].

In September 2015, the 2030 Agenda for SD (the 2030 Agenda) was adopted by all United Nations member states, who agreed to fully implement the 2030 Agenda and its 17 Sustainable Development Goals (SDGs). The 2030 Agenda acknowledges the role played by public institutions in effectively implementing its SDGs [12], the fact that public sector organizations are crucial to maintaining SD, and the critical role filled by HEIs regarding sustainability and SD [1,2,6,9,11,13]. In this role, HEIs are responsible for providing guidance on this matter to both internal stakeholders (e.g., students, staff, management) and external stakeholders (e.g., governments, other HEIs, funding bodies, businesses, citizens, the general public) [1,3,10]. HEIs carry out core activities (e.g., education, research, outreach and operations), thus having significant economic, environmental, and societal impacts [3]. The internal and external stakeholders of HEIs, in turn, expect the HEIs to be sustainable [7]. Although the role of HEIs and their impacts in the field of sustainability and SD has been recognized, the fields and issues that should be addressed by HEIs in the transition towards sustainability and SD are still unclear [6]. Moreover, no synthesis of the available literature on this topic is currently available [2]. Scholars have rarely explored how sustainability and the HEI SD mandates are understood in the scientific discourse or in practice, identified common aspects, or identified gaps [8]. To address these challenges and questions, a semi-systematic literature review (SSLR) was conducted. This SSLR was also carried out to develop a more systematic understanding of sustainability and SD in HEIs, to depict the research field, and to identify the research gaps [14]. The SSLR methodology is particularly useful when investigating a broader, multidimensional topic such as sustainability, enabling researchers to map theoretical approaches or themes and identify gaps in the literature [14]. This SSLR enabled us to investigate the literature on sustainability and SD in HEIs and to answer the following questions:

- What relevant literature can be found when investigating sustainability and SD in HEIs and where is this literature published?
- What themes are addressed in the literature on sustainability and SD in HEIs?
- What research gaps are identified in the literature on sustainability and SD in HEIs?

This research is structured as follows. In Section 2, the research methodology is presented. The review results are summarized in Section 3. In Section 4, the discussion, the limitations of this research, and propositions for further research are provided. Finally, in Section 5, the main conclusions are summarized.

2. Materials and Methods

The first step of this SSLR was the selection of the keywords. The keywords were selected by building on the relevance of the topic of sustainability and SD in the context of HEIs and the research questions provided in the Introduction section. The aim for the keywords included was to comprehensively cover the topic and research questions, taking into account the complexity of sustainability and SD and the fact that it affects all areas and activities in HEIs [2,13]. Therefore, the keywords were defined in a broad sense to include environmental, social, and economic aspects of sustainability and SD (sustainab *, sustainab * development) in all areas and activities of HEIs (higher education institution *) [4,9,15].

The literature search process for this SSLR was conducted using search strings generated from the predefined keywords and the Boolean search operator shown in Table 1.

The PRISMA flow diagram shown in Figure 1 depicts the research strategy applied in this work. The literature was identified using Scopus, the largest citation database of peer-reviewed literature. To ensure the accessibility of the literature, the language was limited to English, and the publication stage was set as final. In this work, we placed a focus on peer-reviewed scientific journal articles, since these were considered to be the most useful [15]; therefore, the source types for the search were limited to journals, and the document types were limited to articles, reviews, and conference papers. To include high-quality and up-to-date results, journals without impact factors were excluded [16]. The initial sample of articles was extracted from 200 journals. This list was reduced to 63 journals by taking into account the majority of published articles and different journal rankings, namely, the

h-index, CiteScore, SCImago Journal Ranking (SJR), Source Normalized Index per Paper (SNIP), and the Journal Impact Factor (JIF). All 63 journals are indexed in the Web of Science. The full list of included journals can be found in Appendix A. To ensure that the concepts of sustainability and SD in HEIs were cited in the articles, the keywords in the documents were reviewed. For example, an additional bias resulted from the fact that one of the main publishing journals on this topic is named *Sustainability*. If the paper addressed any aspect of sustainability or SD in the context of HEIs, it was included in the final sample. The full list of revised and accepted keywords for each search string can be found in Appendix B. No time boundaries were set, and the literature search was conducted in March and April 2020. These search parameters were applied to search strings and, after the duplicates were excluded, a sample set of 356 articles was derived.

Table 1. Search strings.

Keywords	Boolean Search Operator	Content Searched	Search Strings ²
Sustainable Sustainability Sustainable development Sustainability development University ¹ [4,15] Universities Higher education Higher education institution Higher education institutions	AND	Title or Keywords or Abstract	"Sustainab *" AND "Higher Education Institution *"
			"Sustainab *" AND "Development" AND "Higher Education Institution *"

¹ Using the keyword "university" in search strings can lead to the collection of irrelevant documents, because it is often used in the authors' affiliations; therefore, the phrase "higher education institution(s)" was used. ² Truncation symbol at the end of a root word was used to ensure that all aspects of sustainability and SD in all areas and activities of HEIs were included in the database literature identification.

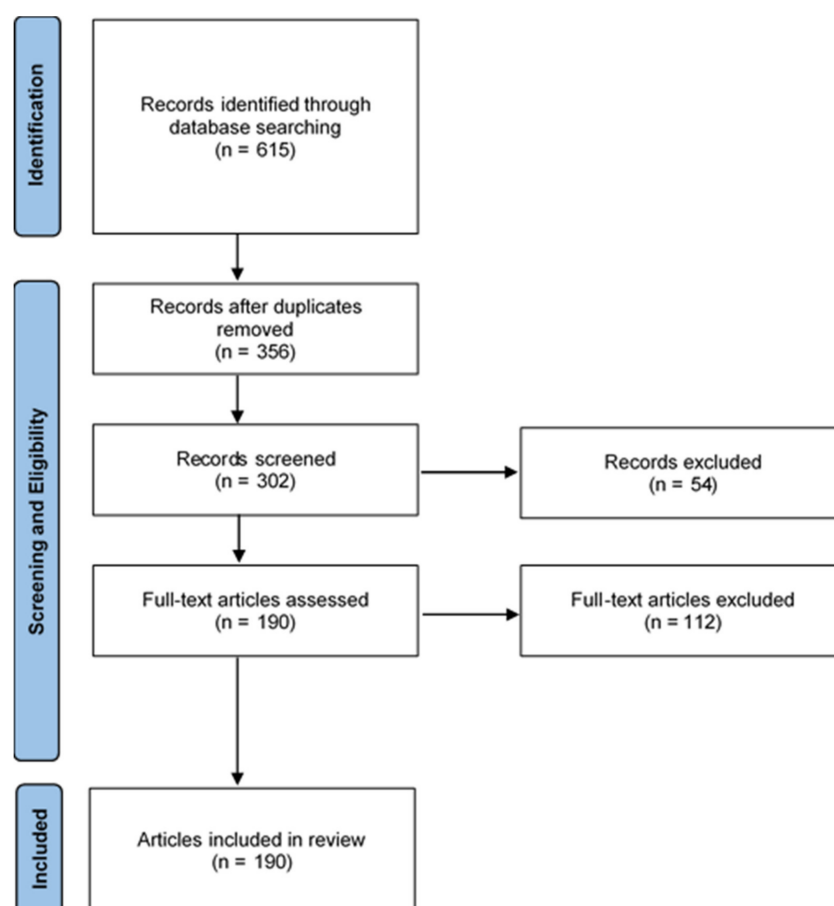


Figure 1. PRISMA flow diagram. Adapted from Page et al. [17].

The last step was to screen the titles, abstracts, and/or keywords to ensure the definitional fit to the purpose of this work and to assess the quality of articles. After screening, the articles were analyzed using Field-Weighted Citation Impact (FWCI). FWCI indicates how frequently one article is cited compared to similar articles [18]. If an article has an FWCI value greater than 1.00, that article is cited more frequently than expected compared to the global average. Therefore, all articles with an FWCI above 1.00 were included in the data sample, yielding a final sample of 190 articles. An analysis of the available literature [3,5] indicated that the HEI system consisted of seven elements, i.e., institutional framework, campus operations, education, research, outreach and collaboration, SD through on-campus experiences, and assessment and reporting. These seven elements are represented in Table 2, along with the descriptions and examples. The information represented in Table 2 was used to categorize the final literature sample and to assign each article to one element of the HEI system. In the following, these seven elements of the HEI system are referred to as the categories of the final literature sample. If the assignment was unclear, e.g., in the case of ambiguousness, the article was assigned to a category based on its prevailing characteristics according to the descriptions and examples in Table 2. After the assignment, a qualitative analysis for each individual article was performed and the following information was extracted:

- What question(s) was (were) addressed in the article?
- What method(s) was (were) used to answer the question(s)?
- What research gaps were identified in the article?

Table 2. Final sample categories, descriptions, and examples.

Category (HEI Element)	Description, Examples
Institutional framework	Sustainability and/or SD policies, vision, mission, strategy, office, declarations and/or commitments signed, organizational change, barriers and drivers of change
Campus operations	Energy use and/or efficiency, emissions, waste, water and water management, purchasing, transport, equality and diversity
Education	Sustainability and/or SD courses and programs, transdisciplinarity, curricula reviews, “educate-the-educators” programs
Research	Sustainability and/or SD research centers, funding, publications, transdisciplinarity, sustainability and/or SD research used in education
Outreach and collaboration	Sustainability and/or SD-related exchange programs, joint degrees with other universities, joint research, partnerships, and sustainability and/or SD events open to the community
SD through on-campus experiences	Sustainability or SD working group, student and staff engagement, sustainability and SD visibility throughout the campus, sustainability and SD awareness
Assessment and reporting	Sustainability and SD assessment, sustainability and SD communication, environmental report, sustainability report, sustainability rankings

The question(s) addressed in each individual article provided insights into the main research theme(s) covered. Furthermore, for each article, the research method(s) applied

and research gaps identified were derived. This information is presented in the Results section of this paper.

3. Results

The first proposed question, “What relevant literature can be found when investigating the sustainability and SD in HEIs and where is this literature published?”, can be treated as two sub-questions: (i) “What relevant literature is found when investigating sustainability and SD in HEIs?” and (ii) “Where is this relevant literature on sustainability and SD in HEIs being published?” Relevant literature identified consisted of 190 focal articles. The detailed results of the analysis of the 190 focal articles are presented later in the Results section. To address the second sub-question, we determined that the majority of the articles (126) were published in *Journal of Cleaner Production* and *International Journal of Sustainability in Higher Education* (Figure 2).

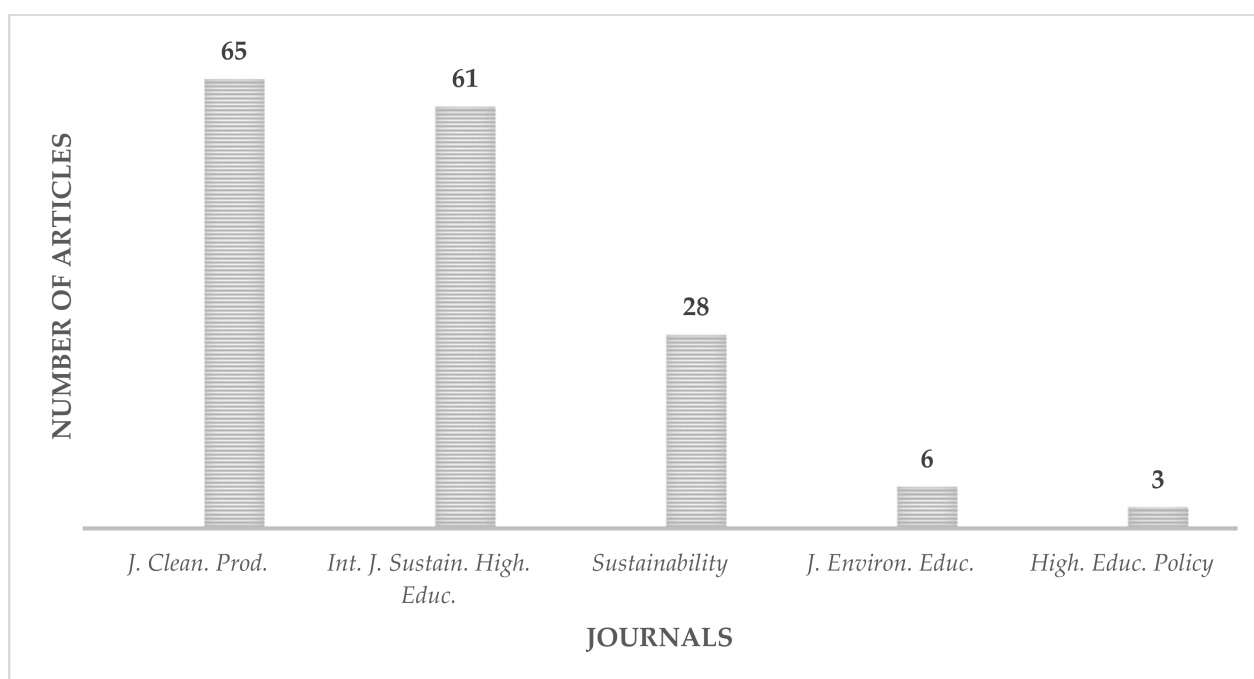


Figure 2. Distribution of focal articles in journals (>two published articles in a journal).

Most of the remaining articles were published in the journals *Sustainability*, *Environmental Education Research*, and *Higher Education Policy*. Figure 3 shows the distribution of focal articles over time, clearly indicating that the amount of research in this field is increasing.

Fewer articles appeared to be published in 2020 due to the time frame in which the literature search was conducted, i.e., March and April 2020. Research conducted after this period was not considered in this literature review; hence, the low number of articles in 2020 does not reflect the number of publications for the entire year. Taking the regional context into account, most articles targeted HEIs in North America (USA and Canada), South America (Brazil), Asia-Pacific (Australia and China), Europe (Germany, Spain, Portugal, Sweden, and Belgium), and South Africa.

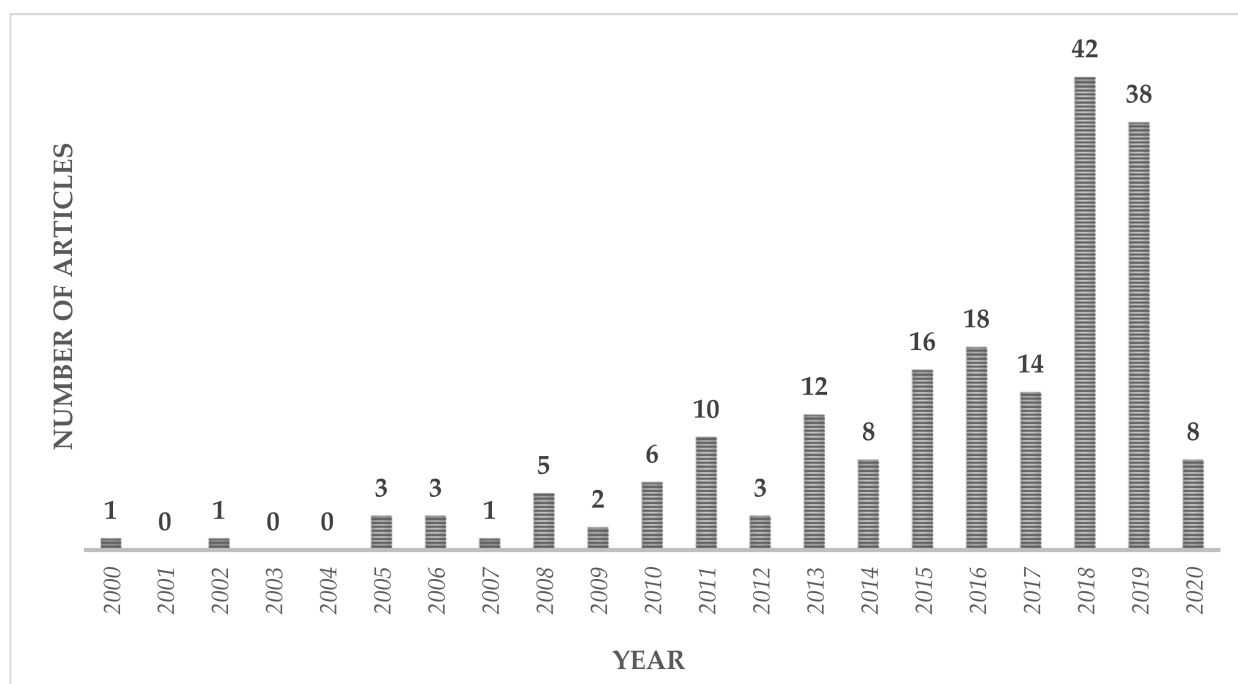


Figure 3. Distribution of focal articles over a 20-year time frame.

Figure 4 depicts the distribution of the focal articles by category. The results show that the institutional framework, research and assessment, and reporting in the context of sustainability and SD in HEIs were the most heavily investigated areas.

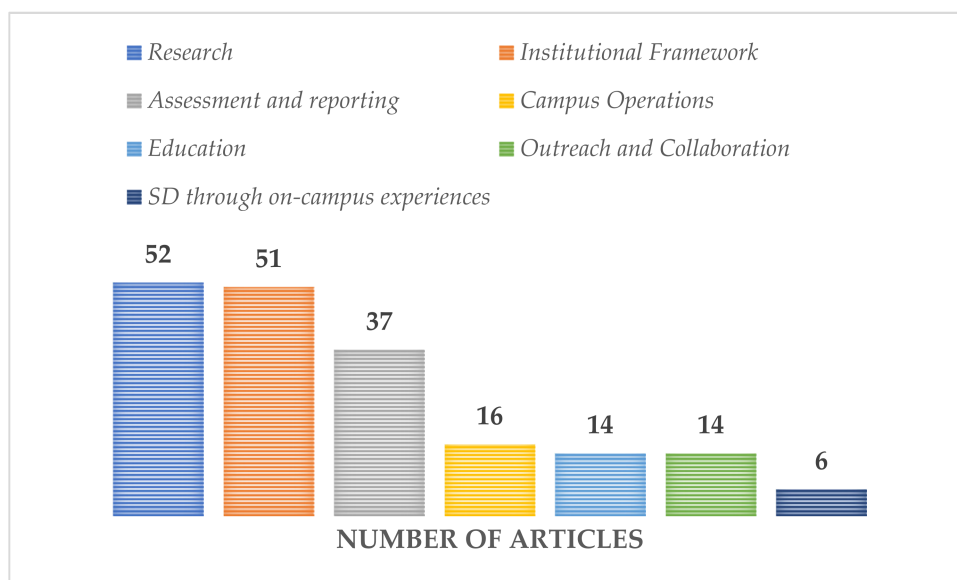


Figure 4. Distribution of focal articles by category.

In order to address the second proposed question, “What themes are addressed in the literature on sustainability and SD in HEIs?”, as well as the third proposed question, “What research gaps are identified in the literature on sustainability and SD in HEIs?”, an overview of the articles in each category is presented in the next part of the Results section. The categories are organized into the following subsections: institutional framework, campus operations, education, research, outreach and collaboration, SD through on-campus experiences, and a final category of assessment and reporting.

3.1. Institutional Framework

From the final literature sample, 51 articles were assigned to the category “institutional framework.” These articles are addressed in more detail in the following subsubsections.

3.1.1. Organizational Change

The “institutional framework” category in the context of sustainability and SD in HEIs contained several articles that emphasize various aspects of organizational change to achieve sustainability and SD. In Table 3, a summary of these articles is presented. The research theme(s) and method(s) used were derived for each article.

Table 3. Articles from the institutional framework category focusing on organizational change.

Article	Research Theme(s)	Research Method(s)
Akins et al., 2019 [19]	Barriers and drivers of organizational change	Case study
Barth 2013 [20]	Organizational change for sustainability in HEIs	Case study
Awuzie and Abuzeinab 2019 [21]	Organizational factors influencing SD in HEIs	Case study
Blanco-Portela et al., 2017 [22]	Organizational change for sustainability in HEIs	Literature review
Godemann et al., 2014 [23]	Drivers of organizational change towards SD in HEIs	Literature review
Hoover and Harder 2015 [2]	Organizational change for sustainability in HEIs	Literature review
Hugé et al., 2018 [24]	Organizational change process towards sustainability	Survey
Leal Filho et al., 2017 [25]	Obstacles of the implementation of SD in HEIs	Survey
Lozano and von Haartman 2018 [26]	Drivers of organizational change towards sustainability in HEIs	Survey
Veiga Ávila et al., 2019 [27]	Innovation and sustainability barriers in HEIs	Survey

Akins et al. [19] and Barth [20] used process-oriented analyses to explore changes made in HEIs to support SD. The results of these analyses [19] revealed the barriers and drivers of change in a specific HEI to support SD, according to two published frameworks, showing that this analytical method can be used to identify the most difficult barriers, barriers that can be easily overcome and drivers that can have the most impact. Barth [20] also identified the most important drivers and barriers and how they interrelate, enabling distinctive patterns of implementation processes to be detected by using a unique set of influencing factors. A discourse on whether HEI leadership should follow the “top-down” approach or a distributed leadership approach appeared in this literature. The dimensions of employee empowerment require further research, particularly those regarding the changes made to support SD as a critical success factor and the frameworks developed to address other aspects of change and other stakeholders. Using an interpretive structural modeling (ISM) approach, Awuzie and Abuzeinab [21] explored the relationship between various organizational factors and the influence this relationship has on SD implementation in an HEI. The authors concluded that communication plays a central role in the effective management of SD implementation in HEIs.

In a literature review, Blanco-Portela et al. [22] compared the drivers and barriers to organizational change supporting sustainability in HEIs and companies. The authors

proposed that further empirical exploration and assessment of sustainability drivers and barriers was needed. Godemann et al. [23] addressed the capacities of social accountability and stakeholder engagement to foster change that supported SD in HEIs, citing a need to conduct more research on this topic to better understand how social accountability and stakeholder engagement shapes organizational change in HEIs. Hoover and Harder [2] systematically analyzed interpersonal and structural processes characterizing and impacting organizational change that supports sustainability in HEIs. In an analysis of organizational change processes supporting sustainability in engineering HEIs, Hugé et al. [24] applied the social issue maturation framework to identify, describe, and assess patterns of change across HEIs. These authors suggested more research on the context-specific interpretations of sustainability was needed as well as ways to identify and overcome potentially competing interests of involved actors. Leal Filho et al. [25] identified and analyzed the main obstacles to the implementation of SD at HEIs, proposing further research to establish the individuals' perceptions of each obstacle, to derive their impacts, and to identify and test ways to overcome these obstacles. These authors also indicated more information was needed about obstacles in public and private HEIs to identify differences between them.

Lozano and von Haartman [26] analyzed the importance of sustainability drivers in three types of organizations (i.e., companies, civil society, and public agencies), pointing out the importance of each driver, ranking the drivers, and analyzing relations among them to categorize them. They also assessed categorical relationships and—to improve sustainability—recommended that each type of organization identify its most important drivers and the influence they have on the organization. Further research was proposed to identify organizations that were less engaged with sustainability, to identify their drivers, and to study the drivers' influences on sustainability change. The authors specifically remarked that researchers needed to know more about how barriers influence sustainability change and analyze how important these drivers are in organizations of different sizes. In general, our review of this literature revealed a need for more research on public agencies.

To identify and internationally compare barriers to innovation and sustainability in HEIs, Veiga Ávila et al. [27] performed a comparative analysis by continent, proposing that more in-depth investigations of barriers to innovation and sustainability were needed. Specifically, such investigations would need to examine the type of investment in innovation and/or sustainability, the institution's lifetime, the type of HEI (private vs. public), and the intention or lack of intention to achieve SDGs. The inclusion of HEIs from different regions and the depiction of projects developed to meet the SDGs by supporting innovation were encouraged.

3.1.2. Stakeholders' Perceptions of and Influence on Sustainability and SD

Aleixo et al. [7], Blanco-Portela et al. [28], and Vargas et al. [29] described the stakeholders' perceptions of sustainability and SD in HEIs, including their views on barriers and drivers of change. Focusing on four HEIs and using the survey as a research method, Aleixo et al. [7] investigated the stakeholders' perceptions of sustainability, sustainable HEI, and barriers and challenges to sustainability in HEIs. Using the same research method, Blanco-Portela et al. [28] studied the sustainability leaders' perceptions regarding the drivers for and the barriers to the integration of sustainability in HEIs in a selected country. The latter authors identified drivers and barriers to change, their importance and prioritization, as well as their interrelations. In a case study, Vargas et al. [29] investigated how stakeholder networks for SD influence the organizational change for sustainability in HEIs in a specific country, analyzing the SD policy frameworks of HEIs and concluding that such networks may not support the effective integration of SD in HEIs. These authors identified several barriers to organizational change towards sustainability in HEIs in the context of stakeholder networks and SD policy frameworks, indicating that further research was needed to examine the policymakers' perceptions and how key informants interpreted stakeholder interactions in their institutions included in the policy framework. This would allow the

identification of discrepancies between the actual interactions or perceived interactions and the interactions included in the policy frameworks.

3.1.3. Drivers and Barriers to Sustainable Procurement (SP) Practices

Leal Filho et al. [30] conducted a survey and investigated drivers and barriers to sustainable procurement (SP) practices, identifying a gap between policy and practice regarding SP. These authors indicated that similar studies need to be conducted in the future complement this research, involving in-depth interviews and case studies. This research would clarify the SP practices, barriers, and drivers in HEIs and enable a comprehensive analysis to be performed of the SP policy frameworks with more HEIs.

3.1.4. Approaches, Models, and/or Frameworks to Support Sustainability and SD

Several papers assigned to the category “institutional framework” provided approaches, models, or frameworks that could be applied to support sustainability and SD in HEIs, as represented in Table 4. Bauer et al. [31], Dyer and Dyer [32], and Horan and Shawe [33] addressed governance and leadership in the context of sustainability in HEIs. Bauer et al. [31] introduced the heuristic “governance equalizer” approach, adapting the approach from the existing governance literature to identify processes, instruments, and methods that promote the SD in HEIs (i.e., to analyze sustainability governance in HEIs). These authors suggested that conducting expert interviews could validate the “governance equalizer,” whereas further research on criteria development could reveal which equalizer dimensions are applied in the practice. In a case study, Dyer and Dyer [32] described how strategic leadership could support sustainability in an HEI and described a framework that could be used for strategic sustainable development (FSSD). The FSSD can be used as a tool to design effective approaches for sector-wide sustainability initiatives. Horan and Shawe [33] outlined and applied an integrated approach, “Higher Education Accelerating Development for Sustainability” (HEADS), suggesting that it can be used to evaluate the higher education sector’s role in facilitating national sustainability transitions towards a low-carbon society and, more specifically, their role in the solar photovoltaic (PV) niche development.

Table 4. Articles from the institutional framework category focusing on approaches, models, and/or frameworks to support sustainability and SD.

Article	Research Theme(s)	Research Method(s)
Bauer et al., 2018 [31]	Sustainability governance in HEIs	Survey
Dyer and Dyer 2017 [32]	HEI strategic leadership for sustainability and the Framework for Strategic Sustainable Development (FSSD)	Case study
Horan and Shawe 2019 [33]	Leadership role of HEIs	Case study
Casarejos et al., 2017 [34]	Strategy towards sustainability	Literature review
Filho et al., 2015 [35]	Integrative approaches to SD at HEIs	Case studies
Hayter and Cahoy 2018 [36]	Strategic view of higher education social responsibilities	Literature review and framework
Juárez-Nájera et al., 2010 [37]	Sustainable behavior	Survey
Kapitulčinová et al., 2018 [38]	Change management process and a supporting toolset	Literature review and survey
Ramísio et al., 2019 [1]	Sustainability vision and sustainability strategy	Case study
Velazquez et al., 2006 [39]	Managerial model for a sustainable HEI	Survey and literature review
Verhulst and Lambrechts 2015 [40]	SD integration process in an HEI	Case study

In this literature review, we identified a publication by Casarejos et al. [34] that proposed a conceptual framework for modeling HEI organizational environments to support sustainability. These authors reviewed international recommendations and initiatives for sustainability, frameworks, key topics fostering sustainability in HEI organizational environments, and a set of actions that support sustainability in these environments. They also presented a scheme to assess the degree of commitment, parity, difficulty, and institutional performance. Using two case studies, Filho et al. [35] addressed the challenges and priorities associated with the use of the integrative approaches for SD implementation in HEIs. Hayter and Cahoy [36] introduced a strategic social responsibility (SSR) framework based on the dynamic capabilities, i.e., the capacity of an organization to respond to the environment and influence constructive change. This framework was developed to guide HEIs along their paths to fulfilling their social responsibilities, but the authors indicated that more organizational management tools needed to be developed for HEIs that are adapted to their unique social mission and their impacts. Our review shows that more research is needed to provide examples of dynamic capabilities in HEIs. Specifically, the SSR framework in HEIs could be applied and the relationship between this framework and the local HE policy could be explored in future research.

Juárez-Nájera et al. [37] proposed the use of a socio-psychological model to examine the sustainable behavior of individuals in HEIs, indicating that more research is needed with a greater number of participants and HEIs. Kapitulčinová et al. [38] reviewed tools, methods, frameworks, and approaches (TMFAs) available to change agents for sustainability in HEIs, showing that these are usually applied to a certain HEI dimension (e.g., teaching, research, outreach) rather than to multiple dimensions. The authors also introduced an integrated change approach consisting of a change management process and a support toolset called “Accelerator.” Detailed research on change agents and practitioners that support sustainability in HEIs is needed to identify which TMFAs are actually used in which dimensions and the success of this application. These studies show that the inclusion of HEI stakeholders and clearer definitions of the range of change agent attributes are required for successful change management supporting sustainability in HEIs.

Ramísio et al. [1] presented a framework to implement a sustainability strategy in a specific HEI, and Velazquez et al. [39] presented a managerial model for a sustainable HEI consisting of four phases: (i) sustainability vision of an HEI; (ii) sustainability mission of an HEI; (iii) sustainability committee responsible for creating policies, targets, and objectives; and (iv) sustainability strategies. Focusing on the human barriers to SD integration in HEIs, Verhulst and Lambrechts [40] proposed a conceptual model that can be used to identify these barriers and their interrelations in different stages of the integration process. The authors planned to further improve the model and develop more applications in other case studies.

3.1.5. Sustainability and SD Policies

In the course of the content analysis and survey, Leal Filho et al. [41] verified the assumptions that (i) SD policies are fundamental for HEIs’ sustainability efforts and that (ii) SD policies indicate how active certain HEIs are in the sustainability field. Although the lack of SD policies in HEIs does not seem to indicate poor performance regarding sustainability efforts, these policies represent valuable tools for communicating HEIs’ levels of commitment to sustainability and can be used in sustainability efforts. The authors planned to study alternative explanations and variables that influenced SD policies in HEIs and the enactment of SD policies in the future. Lidstone et al. [42] reviewed policy documents, identifying the HEI areas where these were used as a tool to achieve campus sustainability. Most policies addressed aspects of campus sustainability found in the literature (i.e., research, education, facilities, and community outreach), but these aspects were not equally emphasized; more attention was placed on facilities than on research and education. Replicating this study in different HEIs around the world could enable researchers to compare their similarities and differences and reasons for these. More

studies are also needed to identify the awareness level regarding these policies, how they are enacted in HEIs, and to determine whether they support the sustainable transformation of HEIs.

Shawe et al. [43] mapped the sustainability policies and initiatives of a select number of national and international HEIs, and then explored how these HEIs integrated sustainability, concluding that no standard or systematic approach to integrating SD in HEIs exists and that the number of sustainability initiatives outweighs the number of sustainability strategies and policies. The authors planned to carry out more research on the “unsuccessful” stories and endeavors regarding the integration of sustainability and SD in HEIs, since this information can be very valuable for HEIs.

3.1.6. SD Declarations, Charters, Initiatives, and Partners

Lee et al. [44], Lozano et al. [3], and Lozano et al. [5] examined signed SD declarations, charters, initiatives, and partners. Lee et al. [44] determined how committed HEIs in a specific country were to sustainability declarations by examining how they incorporated goals for SD into their vision, mission, and graduate attribute statements. They found that many HEIs publicly endorsed sustainability goals and values, but that expressed commitment was not reflected in their vision, mission, or graduate attribute statements. Further research on good practice models of SD in HEI policies is needed, including in-depth analyses of HEIs that have SD strategies. Lozano et al. [3] analyzed the texts of 11 declarations, charters, and partnerships developed for HEIs to improve the effectiveness of ESD, and Lozano et al. [5] identified strong relations between SD commitment, SD implementation, and the signing of SD declarations, charters, and initiatives. The latter authors proposed to analyze the SD implementation data of a much larger sample of HEIs to explore causality between the commitment, implementation, and guidance from the point of signing the declarations and charters; to investigate longitudinal differences in the commitment to and implementation of SD; to analyze SD holistic approaches taken to link commitment and implementation more effectively; and to explore the differences between the lagging and leading HEIs.

3.1.7. SD and/or Sustainability Implementation and Integration

Several articles from the institutional framework category studied how SD and sustainability were implemented and integrated in HEIs. In Table 5, a summary of these articles is presented. The research theme(s) and method(s) used were derived for each article.

Table 5. Articles from the institutional framework category focusing on SD and/or sustainability implementation and integration.

Article	Research Theme(s)	Research Method(s)
Aleixo et al., 2018 [45]	SD implementation in HEIs	Survey
Farinha et al., 2018 [46]	Sustainability implementation in HEIs	Survey
Farinha et al., 2019 [47]	Sustainability integration in HEIs	Content analysis
Filho 2011 [48]	Status and issues of SD at HEIs	Literature review
Goni et al., 2017 [49]	Role of information systems in sustainability implementation at HEIs	Case study
Larrán Jorge et al., 2015 [50]	Implementation of sustainability practices in HEIs	Survey
Leal Filho et al., 2019 [51]	Planning SD in HEIs	Survey
Leal Filho et al., 2018 [52]	Planning SD in HEIs	Case studies
Moura et al., 2019 [53]	Sustainability practices in HEIs	Content analysis
Nicolaides 2006 [54]	Ethical imperatives for sustainable HEIs	Content analysis
Velazquez et al., 2005 [55]	Barriers of implementing sustainability in HEIs	Literature review
Bieler et al., 2017 [56]	Sustainability in strategic plans of HEIs	Content analysis

Aleixo et al. [45] analyzed perceptions of HEI leaders and compared these to how thoroughly the sustainability practices were implemented in HEIs in a specific country (i.e., fully, in part, or not at all) and which were considered relevant, subsequently proposing to conduct further research on this topic, including other stakeholders. In the survey, Farinha et al. [46] analyzed the key actors' perspectives and assessed how thoroughly sustainability changes were implemented in HEIs in a particular country. A future analysis of the HEIs' plans, policies, and strategies was planned, as well as a survey of persons responsible for sustainability implementation in HEIs to understand sustainability implementation, best practices, and recommendations more clearly. Farinha et al. [47] analyzed HEI strategic and activity plans as well as activity and sustainability reports to determine the level of sustainability integration in these institutions. These authors emphasized how important it was to analyze the content of these documents when assessing and profiling the educational sector of a country to determine the level of sustainability implementation and planned to conduct a survey in the future.

Filho [48] reviewed the status of SD at HEIs and identified issues that needed to be addressed to integrate SD systematically in HEIs, detecting a positive trend in the number of publications, reports, and documents on sustainability and SD in HEIs as well as a need for more case studies, projects, approaches, and methods. Goni et al. [49] highlighted the relevance of information systems (IS) in sustainability implementation in HEIs, proposing research on the development of the sustainability implementation framework, as aligned between sustainability and IS strategies. Our review indicates that an analysis of strategic domains for both sustainability and IS is needed; in addition, a study on the required skills and capabilities should be carried out to align sustainability and IS strategies and to design a strategic alignment concept for HEIs.

Larrán Jorge et al. [50] analyzed how thoroughly HEIs in a specific country have implemented sustainability practices. To describe the role of planning as a tool to support the SD and its implementation in HEIs, Leal Filho et al. [51] reported survey results and revealed major barriers for planning and implementing SD in HEIs. In several case studies, Leal Filho et al. [52] revealed difficulties and potentials associated with planning and implementing sustainability in HEIs, whereas Moura et al. [53] provided an overview of practices applied by HEIs in a specific country. In the context of sustainability initiatives in HEIs, Nicolaides [54] identified how environmental management systems (EMS) and ESD were used in HEIs to facilitate sustainability. Velazquez et al. [55] reviewed potential barriers hindering sustainability implementation in HEIs, whereas Bieler et al. [56] reviewed how sustainability was represented in the HEIs' strategic plans in a specific country. The latter authors planned to investigate why most HEIs' strategic plans included sustainability as one of many policy priorities but only addressed one or two sustainability domains. Overall, these papers indicate that the role of strategic plan policy texts and associated practices in HEI sustainability transformation should also be examined.

3.1.8. Effects of SD Practices

Pedro et al. [57] analyzed the relationship between intellectual capital and SD practices in HEIs, but also the relationship between the SD practices and the stakeholders' quality of life. Future studies were planned to focus on human capital and to test the measures and indicators of this asset, proposing to conduct comparative studies on the factors of age and pro-sustainability education as determinants of successful SD practices in HEIs and cross-country comparison studies to assess the role of "organizational" inertia as a potential barrier to change that supports sustainability and SD. This paper indicated a general lack of research on intellectual capital in HEIs, suggesting that perception studies need to be carried out that include governance and students and address intellectual capital and its role in SD and quality of life. Findler et al. [4] reviewed the impacts of HEIs on SD, showing that research on this topic is steadily growing and citing case studies as the most commonly used method to study specific HEIs and their impacts. The authors identified a gap regarding holistic, whole-institution analysis and assessments of direct and indirect

impacts in the area of the institutional framework. Our review specifically enabled us to identify cultural impacts and impacts on policy, social cohesion, and individual behavior as underexplored areas. Long-term indirect impacts are difficult to measure with quantitative indicators; therefore, research to study how qualitative indicators can capture these impacts seems to be needed.

3.1.9. Initiatives and Associations for Responsibility and SD

Henderson et al. [58] focused on the initiative of the United Nations, namely, the Principles for Responsible Management Education (PRME), and examined whether and how these principles will change over the next 50 years. Symaco et al. [59] applied Boyer's framework to the scholarship of engagement, investigating the role of HEIs in the Association of Southeast Asian Nations (ASEAN) in terms of social responsibility and SD. The authors identified many initiatives, but concluded that the social responsibility and SD in ASEAN HEIs is still far from being fully integrated into their core activities.

3.1.10. Maturation of Sustainability

Vargas et al. [60] investigated the maturation of sustainability in HEIs, concluding that sustainability processes in HEIs often start as ad hoc processes but grow and mature over time as different actors become involved. Furthermore, sustainability in HEIs is being connected more frequently with sustainability in the private sector, as well as with sustainability in other public institutions and actors. The roles of interactions among members of society, industry, and academia regarding sustainability matters are recognized as being of increasing importance.

3.1.11. SD Promotion and Communication

After identifying the main sustainability guidelines in HEIs, Berchin et al. [61] conducted a case study of an HEI to determine which strategies it used to promote sustainability, deriving sustainability actions in HEIs from the literature and illustrating how these were implemented in the selected HEI. They depicted the sustainability plan followed by this HEI and proposed that it could be used and replicated in other HEIs. In the course of another case study, Berchin et al. [62] analyzed the roles of international conferences, cooperation, and dialogue with other institutions in promoting SD strategies in HEIs, and Djordjevic and Cotton [63] identified key barriers to and examples of a successfully communicated sustainability message in a single HEI, providing practical recommendations. Our review of these papers indicates that further research is needed on the communication of sustainability in HEIs and, specifically, that larger-scale studies need to be conducted to verify whether barriers and opportunities identified in this study are more widely applicable.

3.2. Campus Operations

The category "campus operations" contained 16 articles that varied in their research foci, from general topics such as EMS and tool implementation to specific issues such as energy use and demand, waste management, carbon neutrality, and public procurement. These articles are addressed in more detail in the following subsections.

3.2.1. Environmental Management

Evangelinos et al. [64] identified primary constraints on sustainability and environmental management promotion in HEIs, recommending that knowledge on this topic needs to be distributed to the wider community to successfully promote sustainability in HEIs. Disterheft et al. [65], Leon-Fernandez and Domínguez-Vilches [66], and Price [67] examined the EMS implementation process, as represented in Table 6.

Table 6. Articles from the campus operations category focusing on environmental management.

Article	Research Theme(s)	Research Method(s)
Evangelinos et al., 2009 [64]	Constraints in the promotion of sustainability and environmental management	Case study
Disterheft et al., 2012 [65]	Environmental management systems (EMS)	Survey
Leon-Fernandez and Domínguez-Vilches 2015 [66]	Tools for environmental management and environmental sustainability	Desktop research and survey
Price 2005 [67]	Implementation of ISO14001	Case study
Hancock and Nuttman 2014 [68]	Sustainability transport	Case study

Disterheft et al. [65] reviewed European HEIs that implemented EMS, comparing top-down and participatory implementation approaches, whereby the latter or a mix of participatory and top-down approaches was found to be most effective. The authors indicated that more research is needed to develop a tool that can be used to assess the effectiveness and contribution of participatory processes to campus sustainability and the overall development of competencies for SD among internal stakeholders of HEIs. Leon-Fernandez and Domínguez-Vilches [66] reviewed the most common environmental management tools used in HEIs in a specific country and how environmental sustainability was integrated in their activities, suggesting that visibility of environmental sustainability needed to be raised. One major problem identified was lack of uniform terminology for similar tools and processes and vice versa, unifying terminology used to refer to distinct concepts. Price [67] summarized a path taken by a specific HEI to receive ISO 14001 accreditation, whereas Hancock and Nuttman [68] described how a specific HEI implemented a project for sustainable transport, identifying the main facilitators and barriers.

3.2.2. Energy Efficiency and Energy Use

Leal Filho et al. in their survey [69] and Wadud et al. in their case study [70] addressed a specific issue: energy efficiency and energy use in HEIs. The former studied the level of engagement in energy-efficiency measures and identified types of renewable energy used to date, including a sample of HEIs worldwide. In the future, the authors planned to include a larger sample of HEIs and to identify both the best practices applied and to address the relationship between energy sustainability and teaching, research, and outreach. Wadud et al. in their case study [70] applied a hybrid model of energy use (demand) in an HEI and investigated variations in energy use between HEIs (cross-sectional analysis) and over time (temporal analysis).

3.2.3. Implementation of Circular Economy (CE)

In two case studies Mendoza et al. [71,72] reviewed how the circular economy (CE) was being implemented in HEIs to improve resource efficiency and environmental campus sustainability. In the first case study, Mendoza et al. [71] proposed a methodological framework that could be applied to develop a CE strategy, whereas in the second case study [72], the implementation of the proposed framework in a specific HEI was depicted. In general, the authors concluded that knowledge on the implementation of CE in HEIs is lacking. They proposed to conduct further research on developing tools, data gathering systems and indicators to measure circularity, and monitor progress. Our review indicates overall that additional case studies are needed to identify and share best practices and that the effectiveness of CE strategies should be analyzed with respect to environmental sustainability and the engagement of relevant stakeholders.

3.2.4. Sustainable Consumption

Pacheco-Blanco and Bastante-Ceca [73] analyzed HEIs' contributions to sustainable consumption through green public procurement (GPP) initiatives in a specific country. The authors noted that although the HEIs included environmental criteria in the public procurement contracts and organized awareness and media campaigns, these initiatives often reflected the perceptions of those people in charge of promoting them rather than the missions of the HEIs. Identifying the initiatives was also often hindered by the lack of transparency on the HEIs' websites. In general, GPP is a relatively novel topic in HEIs, especially GPP related to sustainable consumption. Our review indicates that this topic should be further studied to increase GPP and adapt measures that contribute to sustainable consumption. The authors recommended carrying out future usability studies to improve access to information and to identify good practices. This literature review indicates that conducting interviews with managers of green offices and people in charge of promoting green initiatives could help to identify strengths, weaknesses, and barriers and, in turn, support the implementation process for GPP initiatives in various stages.

3.2.5. Campus Sustainability

Both Sima et al. [74] and Washington-Ottombre and Bigalke [75] addressed campus sustainability. Sima et al. [74] reviewed campus greening initiatives in a sample of HEIs in a specific country and identified constraints and necessary measures, whereas Washington-Ottombre and Bigalke [75] assessed the state of campus sustainability innovations (environmental innovations; EIs) within the Sustainability Tracking Assessment & Rating System (STARS). More research on campus sustainability initiatives was proposed, namely, in the form of an in-depth analysis of specific key topics (e.g., waste management, waste reduction, energy-efficient buildings, green infrastructure, water management, sustainable transport) to identify the barriers. The authors discussed how these barriers could be overcome and additional ways that implementing campus sustainability initiatives could be identified. Our review indicates that targeting campus sustainability policies (greening policies) and how these are implemented in HEIs (top-down versus multi-level approach) could also be helpful. Washington-Ottombre and Bigalke [75] proposed additional research on the drivers of specific EIs and the roles of agents of change versus local socio-economic contexts.

3.2.6. Waste Management

Tangwanichagapong et al. [76], Zen et al. [77], and Zhang et al. [78] all addressed the specific topic of waste management. Tangwanichagapong et al. [76] depicted the effects of 3R (reduce, reuse, and recycle) waste management initiatives on a campus community. These initiatives positively affected people's attitudes but did not alter the waste management behavior. Campus sustainability reporting (SR) was identified as a communication tool that can be used to encourage the practice of 3R activities and inform people. Zen et al. [77] described the process of waste minimization at a specific HEI, and Zhang et al. [78] described a four-phase waste management strategy developed over 15 years by a specific HEI.

3.2.7. Carbon Neutrality

Going one step further, Udas et al. [79] described a process of gradual transformation and strategies adopted at a specific HEI to achieve carbon neutrality. The institutional sustainability framework adapted from Velazquez et al. [39] as well as a whole-institution approach were implemented. The authors of this study highlighted certain success factors, such as strong leadership support and participation at all levels, as well as the major challenges, such as lobbying for renewable electricity, the lack of long-term economic guarantee, and the lack of monitoring and SR.

3.3. Education

In following subsections, 14 articles that were assigned to the category “education” are reviewed.

3.3.1. Sustainability and/or SD Courses and Programs, Curriculum Innovation, Curriculum Review

Aleixo et al. [80] examined the vertical integration of SDGs in HEIs in a specific country, focusing on undergraduate and master’s degrees. The authors noted that few indicators existed that could be used to measure the integration of SD in curricula. Brugmann et al. [81] introduced course inventory methodology that could be applied to identify sustainability content in the undergraduate curriculum, presenting this sustainability course inventory methodology, the community-engaged learning sustainability inventory methodology, the co-curricular inventory methodology, and the extracurricular inventory methodology. The authors planned a series of surveys to verify these results.

Dimitrova [82] described the institutionalization of specialized SD modules at the specific HEI, and Holden et al. [83] described a specific graduate course and the experience of a particular sustainability learning classroom model. At another HEI, Howlett et al. [84] evaluated and presented the first-year “Sustainable Development” subject. Powell and Larsen [85] examined the role of a specific master’s program in an HEI that addressed the sustainability issue of water resource management. Staniškis and Katiliute [86] cited the results of analyses of selected programs; their methodology, self-evaluation and external auditing processes; evaluation criteria; and evaluation results. Turning to Master of Business Administration programs, Stonkutė et al. [87] analyzed the integration of corporate social responsibility (CSR) into these programs worldwide, identifying a substantial lack of such integration into professional business and administration training. The authors then proposed to conduct further research and to expand the number of analyzed programs and countries, to conduct cyclical research every 5 to 10 years to analyze how the programs evolve, and to take a hybrid approach, i.e., employ a combination of content analysis and in-depth interviews with business educators and/or academic staff members. In a similar effort, Yarime et al. [88] described select academic programs at several HEIs worldwide to examine how well interdisciplinarity was integrated into academic programs and to study the process of institutionalization and cross-sector collaboration. Finally, Wyness and Sterling [89] provided an overview of the design and implementation of a curriculum review.

3.3.2. Frameworks and Criteria for Innovation in Education

Juárez-Nájera et al. [90] focused on sustainability and presented a framework to develop a new academic and professional culture, placing an emphasis on teaching dimensions and principles. This framework was then applied to a specific course in an HEI and the course outline was provided. Khan and Henderson [91] presented criteria for sustainability-focused courses developed by a specific HEI and investigated whether and how instructors implemented sustainability education in their courses. In general, our review revealed that the assessment of the implementations of sustainability education is weak or nonexistent.

3.3.3. Experiences and Communities in Education

Regarding master’s programs, Larsson and Holmberg [92] described the experience of three master’s degree students in a lab-based learning environment at a specific HEI, whereby the students were involved in value creation for sustainability transitions. The authors proposed similar studies in the future to compare the experiences. Natkin and Kolbe [93] placed a focus on faculty learning communities (FLC) and evaluated a sustainability faculty fellows (SFF) program at a specific HEI, proposing to conduct further research on possible (FLC) models, their effects and roles in supporting the sustainability

initiatives of HEIs, and to conduct a social network analysis among faculties participating in FLCs.

3.4. Research

In the category “research,” with 48 articles, the focus was placed on the one hand on the research focusing on the roles of HEIs with regard to sustainability and SD in general and on the other hand on the sustainability and SD research conducted at HEIs that can support progress towards sustainability and SD. These articles are addressed in more detail in the following subsections.

3.4.1. Special Journal Issues

Within the research category, Adomssent et al. [94], Mader et al. [95], Mochizuki and Fadeeva [96], and Ramos et al. [97] reported on special journal issues with a focus on sustainability and SD in HEIs. Adomssent et al. [94] reported on the special volume of *Journal of Cleaner Production* (JOCP), which covered the fourth International Conference on Higher Education for Sustainable Development “Higher Education for Sustainable Development: Moving the Agenda Forward.” Emerging research areas identified in this paper were management ESD, sustainable consumption in HEIs, and higher education for SD (HESD). In the area of management ESD, the authors proposed to redesign management education curricula and focus on competencies needed to deal with complex issues responsibly and sustainably as well as research to measure learning outcomes. Sustainable consumption was identified as a priority issue in core HEI activities, requiring strategic leadership. The authors also stated that strategies for sustainable organizational change have to be prioritized, since levels of organizational change and the sector’s social accountability are generally under-researched in the context of HEIs. Mader et al. [95] reported on the special issue of *Sustainability Accounting, Management and Policy Journal* (SAMPJ), which addressed effective change management, leadership, support, and governance for sustainability transformation in HEIs and placed a special focus on the results of an international empirical study, “Turnaround Leadership for Sustainability in Higher Education.” Mochizuki and Fadeeva [96] highlighted important aspects of case studies presented in the special issue of the *International Journal of Sustainability in Higher Education* (IJSHE), which placed a focus on sustainability and SD competences, particularly in the ESD community. The authors highlighted competence-based approaches used by HEIs and their stakeholders worldwide. Ramos et al. [97] reviewed the special volume stream of the JOCP, categorizing the authors’ contributions into SD implementation, stakeholder engagement and participation, campus operations, SR and assessment, organizational change management, curriculum development, and book reviews.

3.4.2. Function of Research in the Context of Sustainability and SD

Adomssent et al. [98] and Dedeurwaerdere [99] studied the research function of an HEI in the context of sustainability and SD. Adomssent et al. [98] described how transdisciplinary research methods were tested and further developed, highlighting the transformative approach or scenario development, two methods that can be used effectively to explore and test the potential and capability of SD in a single HEI. They also studied how such SD could be transferred to other HEIs, outlining the character of one HEI’s research and development project. These authors identified the need to develop quality assessment mechanisms, instruments, and indicators that could be used to evaluate interdisciplinary and transdisciplinary research processes and facilitate interdisciplinary teaching and knowledge transfer. Dedeurwaerdere [99] identified three core requirements of transformative sustainability science in an integrated way: (i) an interdisciplinary approach to coupled human/nature systems, (ii) an explicit integration of strong sustainability ethics, and (iii) the development of extra-scientific transdisciplinary research collaborations. The authors of this study cited two modalities for organizing sustainability research, i.e., strategic research for sustainability and sustainability research.

3.4.3. Fostering Sustainability in Academic Research

To foster sustainability in academic research, Hugé et al. [100] proposed a range of actions. Our review indicates that further research on the applicability of the proposed actions and on the transferability of university-specific experiences is needed, and that not only applicability but also the effectiveness of the different actions should be investigated. Another interesting topic proposed by Hugé et al. [100] was the divergent interpretations of the meaning of “research for sustainability” by a variety of stakeholders and institutions. Koehn et al. [101] gathered insights from the senior international officers (SIOs) on how to enhance international research and development (R&D), concluding that changes and improvements in both external and internal environments are needed. These could involve improving external environments by forming collaborations between universities to increase external funding for international R&D or essential internal incentives to encourage engagement in international R&D activities. More research on this topic was proposed, including long-term and inclusive analyses to assess changes in external and internal environments.

3.4.4. Research on Stakeholder’s Perceptions of and Impacts on Sustainability and/or SD

Several papers examined students, i.e., their perceptions, attitudes, competences, knowledge, and behavior regarding sustainability and SD, as represented in Table 7.

Table 7. Articles from the research category focusing on stakeholders’ perceptions of and impacts on sustainability and/or SD.

Article	Research Theme(s)	Research Method(s)
Boca and Saraçlı 2019 [102]	Research on environmental education (EE)	Survey
Gramatakos and Lavau 2019 [103]	Informal learning	Case study
Meyer 2016 [104]	Characteristics associated with pro-environmental behavior	Survey
Mann et al., 2013 [105]	Sustainability attributes	Survey
Rodríguez-Solera and Silva-Laya 2017 [106]	Students’ perception of competencies and values	Case study
Urquidi-Martín et al., 2019 [107]	Determining factors to develop critical thinking focused on sustainability	Survey
Zamora-Polo et al., 2019 [11]	Students’ knowledge of SDGs	Case study
Zsóka, Á. et al., 2013 [108]	Relationship between environmental education (EE) and environmental knowledge, attitudes, and behavior	Survey
Lazzarini et al., 2018 [109]	Academic profile	Survey
Pérez-Foguet et al., 2018 [110]	Role of online training courses	Case study

Extending the focus to students, Boca and Saraçlı [102] examined the relationship between the perceptions, attitudes, and environmental behavior of students enrolled in different specialization fields. Since the study was carried out at a single HEI, the authors proposed expanding the scope to other HEIs in future work, proposing to carry out more studies on EE and cross-cultural research. Taking a slightly different approach, Gramatakos and Lavau [103] examined how the diversity and significance of informal learning experiences support student learning with regard to sustainability. Specifically, the authors gathered the students’ perspectives and experiences, asking how their HEI experience supported learning for sustainability. The analysis of the results revealed key themes: the communities of informal learning and the domains of informal learning. Further research on the interrelations between informal and formal learning was proposed to provide specific recommendations for practice and institutional commitments within HEIs. Our review

indicates that a broader survey across HEIs would provide more information about the extent and relative importance of informal learning.

Meyer [104] analyzed the students' characteristics with regard to their pro-environmental behavior and quantified the desirability of different environmental initiatives. The probability of pro-environmental behavior substantially increased with each additional year the student spent on campus, and informal learning was identified as an important driver of behavioral change. Initiatives related to energy conservation and recycling were seen as more desirable, although the preferences were highly heterogeneous. The authors planned to conduct future research to identify which student experiences on campus increase pro-environmental behavior, preferably in the form of a longitudinal study to more effectively control for unobservable characteristics. Mann et al. [105] explored how students can be clustered based on their pro-environmental attitudes using statistical cluster analysis methods. Such clustering enables teachers to develop various teaching approaches and learning environments, depending on the different clusters identified. Our review results suggest that future research still needs to examine how these approaches and environments should be customized.

Rodríguez-Solera and Silva-Laya [106] examined the social, economic, and environmental impacts of graduates from a specific HEI in their communities, asking these graduates to describe their perceptions of their impacts regarding how they practiced the competences and values proposed by this HEI. Urquidi-Martín et al. [107] reviewed the effectiveness of business simulations as tools to develop critical thinking, placing a focus on sustainability and using a model to identify the determining factors when examining the effectiveness of these tools. The results indicate that such simulations are useful and motivate students to learn by helping them to develop critical thinking skills. The authors planned to carry out other similar studies in different HEIs with students of different ages to be able to compare and extrapolate the results. Furthermore, they felt it would be interesting to investigate the opinions of graduates, professors, and professionals regarding the usefulness of these tools.

Zamora-Polo et al. [11] surveyed students to assess their knowledge of SDGs, revealing that the students' knowledge of SDGs was highly limited. Zsóka et al. [108] explored the relationship between EE, environmental knowledge, and attitudes, describing the actual behavior of students, whereas Lazzarini et al. [109] shifted the focus from students to academics and, more specifically, to the characteristics of the academics involved in the activities related to SD. These academics have interdisciplinary profiles, integrate SD principles into all their academic activities, and promote these principles outside the HEI. Also focusing on academics, Pérez-Foguet et al. [110] assessed how useful online training courses were for this group. These courses were carried out as part of the Global Dimension Engineering Education (GDÉE) initiative, placing a specific focus on the acquired capacities and skills in SD. The authors analyzed two sets of quantitative and qualitative indicators to assess the perceived quality and relevance of the training proposals and the participants' learning acquisition. They concluded that the online training courses effectively promoted academics' competences in SD and proposed to expand this study by performing a qualitative assessment in the form of discussion groups or personal interviews. These methods would enable them to describe the participants' learning experiences more effectively, including those who did not complete the courses.

3.4.5. Research on Evaluation of Sustainability and SD in Education

Brito et al. [111] and Minguet et al. [112] introduced measures to evaluate sustainability and SD in education. Brito et al. [111] designed indicators to evaluate the sustainability of the teaching function, concluding that each institution must generate its own indicators to match its policies and objectives. To assess the initial situation prior to introducing sustainability into a specific HEI's curriculum, Minguet et al. [112] created a way to measure how much sustainability had already been introduced into the curriculum. Most papers in the research category focused on research on education for sustainability and research

on ESD that could be used in HEIs to implement sustainability and support SD in this particular core activity, i.e., education.

3.4.6. Research on Sustainable Teaching

Rampasso et al. [113], Sahakian and Seyfang [114], and Vemury et al. [115] presented research conducted on sustainable teaching in particular subject areas. Rampasso et al. [113] reviewed good practices and initiatives developed to support critical thinking skills and sustainable teaching, noting that in order to develop critical thinking, an action–research approach was used to integrate operations management (OM) concepts and SD in the three-year project. The authors reported that the didactic books represented obstacles because they usually did not combine the OM concepts with SD fundamentals, and said that a critical analysis of OM books needs to be conducted to better understand how they should cover the SD concepts. Furthermore, they noted that an in-depth analysis using surveys and statistical evaluations would be needed to determine how frequently students incorporate SD concepts or how they evaluate the most valuable lessons. Our review indicates that a longitudinal analysis could provide more insights and significant results and that an investigation of the cultural factors influencing the results, including other HEIs from different countries, is needed.

Sahakian and Seyfang [114] reviewed sustainable consumption teaching regarding learning competencies, using a framework for sustainability competences derived from the available literature to assess how well courses covered key elements of the framework, i.e., systems thinking, anticipatory competence, normative competence, strategic competence, and interpersonal competence. Vemury et al. [115] presented teaching methods and strategies that could be used to deliver sustainable design education. The teaching and assessment model presented in this paper could be transferred to other courses. Authors of several papers presented general methods, strategies, and models for the implementation of education for sustainability and SD within an HEI, as well as the drivers of and barriers to this process.

3.4.7. Research on ESD

The majority of articles from the research category presented general methods, strategies, and models for the implementation of education for sustainability and SD within an HEI, as well as the drivers of and barriers to this process. These articles are addressed in more detail below.

3.4.8. Research on ESD Integration and Implementation

Cebrián [116] presented a developed evidence-based model (the I3E model) that could be used to embed ESD in an HEI, based on doctoral research on organizational learning and change process at a specific HEI to build ESD into the HEI's curriculum. Dlouhá et al. [117] investigated the ESD transition factors in Central European HEIs and provided insights into the similarities and differences at the national level and the overall trends in the region. The authors identified a lack of research on ESD at the HEI level in post-socialist countries. Fiselier et al. [118] described the ESD integration process in HEIs in a specific country as well as the integration approaches, challenges faced and overcome, and the critical success factors. In particular, the authors emphasized that the Quality Assurance Agency (QAA) and the Higher Education Academy (HEA) could be used as guides to promote the ESD agenda. After reviewing the evolution of ESD in international declarations, Haigh [119] highlighted the obstacles regarding the implementation of ESD and curriculum greening in HEIs. By performing a case study, Hill and Wang [120] provided information about other HEIs striving to create similar HEI-wide sustainability requirements. The authors shared their experiences with incorporating sustainability into a general education curriculum. Jucker [121] presented the conclusions and 10 practical strategies to foster education for sustainability, which were derived from a research project on education for sustainability in higher education.

Kieu et al. [122] highlighted the challenges facing ESD implementation in teaching education institutions in a specific country. The authors also provided recommendations and solutions that can be applied in ESD teaching education in developing countries, indicating that future research is required to examine the role of non-formal educational educators, e.g., NGOs, in training teachers in ESD. Leal Filho et al. [123] described the use of project-based learning as a tool to support integrative approaches to sustainability in the context of higher education, providing examples of successful approaches and trends that characterize this form of learning. Our review indicates that more research is needed to develop measures to evaluate the impact of such approaches and to explore the potential for projects integrated into the curriculum to result in outputs that benefit wider communities.

Lu and Zhang [124] investigated how ESD initiatives were delivered in formal education, campus management, and extra-curricular activities in two HEIs. Good practices were also highlighted in this paper. Using the Copernicus charter principles, Milutinović and Nikolić [125] assessed the higher education practices in a specific transition country and identified weaknesses in its higher education system that inhibit the ESD. The authors also recommended strategic interventions that could lower the negative impact of the weaknesses on ESD. By examining ESD drivers in higher education in a specific country, Nomura and Abe [126] identified government support and encouraging leadership development for sustainability amongst HEI executives as critical factors that strengthens sustainability efforts. Novo-Corti et al. [127] studied economic higher education in a specific country and measured the level of SD implementation in programs, projects, debates, and courses. The authors proposed to identify clear ways to implement ESD in HEIs in this country, considering the labor market requirements and the transition to a green, sustainable economy. A full summary of articles focusing on research on integration and implementation of ESD in HEIs is presented in Table 8.

Table 8. Articles from the research category focusing on research on ESD integration and implementation.

Article	Research Theme(s)	Research Method(s)
Cebrián 2018 [116]	Evidence-based model for embedding education for sustainability	Case study
Dlouhá et al., 2017 [117]	ESD transition	Case study
Fiselier et al., 2018 [118]	ESD	Case studies
Haigh 2005 [119]	Obstacles to greening the curriculum	
Hill and Wang 2018 [120]	Incorporating sustainability into general education	Case study
Jucker 2002 [121]	Research project on education for sustainability in higher education	Survey
Kieu et al., 2016 [122]	Challenges in ESD implementation in educational institutions	Case studies
Leal Filho et al., 2016 [123]	Role of project-oriented learning	Case studies
Lu and Zhang 2014 [124]	ESD initiatives	Case studies
Milutinović and Nikolić 2014 [125]	Constraints of ESD	Survey
Nomura and Abe 2010 [126]	Drivers of ESD	Content analysis and survey
Novo-Corti et al., 2018 [127]	Measures for specific training elements laying to foundations for SD	Survey

3.4.9. Research on ESD Trends

A full summary of the articles focusing on research on ESD trends is represented in Table 9. These articles are further addressed in more detail. Sterling and Scott [128] summarized positive and negative ESD trends across the HEI sector in a specific country.

Trechsel et al. [129] discussed factors that enable the successful integration of mainstream SD into education at an HEI. Based on a review of the UN DESD, Wals [130] described the outcome of phase II of this review, focusing on processes and learning in ESD. The authors presented and discussed key outcomes documented in the report's section on higher education. Taşçı and Titrek [131] described executives' strategies, perceptions, and experiences in higher education in a specific country with regard to lifelong learning and sustainable leadership. The authors planned to carry out a quantitative investigation in the future, and specifically a scale development, based on this study's qualitative findings.

Table 9. Articles from the research category focusing on research on ESD trends.

Article	Research Theme(s)	Research Method(s)
Sterling and Scott 2008 [128]	Positive and negative trends of ESD in HEIs	Strategic review
Trechsel et al., 2018 [129]	Conditions for integration and mainstreaming of SD into education	Case study
Wals 2014 [130]	Learning processes	Review
Taşçı and Titrek 2020 [131]	Lifelong learning and sustainable leadership	Survey
Desha et al., 2009 [132]	Rapid curriculum renewal	Literature review
Glover et al., 2011 [133]	Sustainability curriculum-auditing tool	Case study
Leal Filho et al., 2019 [134]	Advantages of introducing the SDGs into teaching	Survey
Lengyel et al., 2019 [135]	Pre-conditions of an authentic sustainability curriculum	Survey
Lozano 2010 [136]	Adoption and diffusion of SD in curricula	Case study
Lozano et al., 2019 [137]	Sustainability competencies and pedagogical approaches	Survey
Ramos et al., 2015 [138]	Strategic environmental assessment in curricula	Case study

Targeting curricula and their content, Desha et al. [132] presented emerging elements of rapid curriculum renewal and described how these elements could be applied based on the available literature. The authors proposed to conduct further research on the practical application of these elements in various disciplines. Glover et al. [133] discussed how a particular sustainability curriculum-auditing tool could be applied and assessed its validity in terms of supporting sustainability in the higher education sector. Although the audit identified what the curriculum offered, the quality and effectiveness of the curriculum content was not identified.

Leal Filho et al. [134] surveyed how SDGs were currently being integrated in teaching, exploring the advantages of this integration and common barriers encountered. The authors concluded that SDGs are still only initially and tentatively being integrated in HEIs and that although much literature on ESD exists, research on how the HEIs engage with SDGs is lacking. Lengyel et al. [135] analyzed three essential pre-conditions of an authentic sustainability curriculum (ASC), acknowledging and emphasizing (i) the primary importance of meditative mindfulness, (ii) the impossibility of limitless economic growth, and (iii) the impossibility of reconciling ideals of neoliberal capitalism and consumerism with human and environmental justice. The authors surveyed undergraduate students and focused on their views on mindfulness, economic growth, and sustainability, concluding that students lack mindfulness, sustainability literacy, universal values concerning nature

and their fellow humans, and systems thinking skills. Lozano [136] examined how SD are adopted and diffuse in the curricula at a specific HEI and planned to conduct further research on this topic to more clearly understand how SD is diffused by examining the delivery and assessment of HEI courses. Focusing on European HEIs, Lozano et al. [137] investigated how sustainability is being taught, sustainability competences are being developed, and pedagogical approaches are being used. The results show that the social dimension was the least frequently addressed, whereas the economic, environmental, and cross-cutting dimensions were addressed almost equally. The authors identified that relations exist between the contribution to sustainability and the strength of competences, as well as between the strength of competences and the strength of pedagogical approaches. On the basis of these results, the authors proposed to conduct further research to assess the level of sustainability contribution, the competences covered and developed, and the pedagogical approaches used in one or more HEI(s) at all levels of education, regardless of whether sustainability was being taught. They also proposed to conduct a cross-country comparison and follow-up research using interviews or focus groups to gain deeper insight into pedagogical approaches used to ensure more sustainability-oriented education.

Ramos et al. [138] analyzed the level of integration of strategic environmental assessment (SEA) in HEI programs in two countries, finding that SEA integration is rather unconsolidated. Teaching on impact assessment was well-established and common in many programs; however, SEA was mostly either absent or only a minor topic, and these cases were usually treated as a teaching topic on environmental impact assessment. The authors identified a lack of research on education regarding environmental assessment approaches for strategic levels of decision-making.

3.4.10. Research on Sustainability Learning Outcomes

Sandri et al. [139] and Svanström et al. [140] addressed sustainability learning outcomes. The former outlined the context of measuring learning outcomes associated with sustainability and delivered recommendations based on a literature review and existing learning outcome measures, whereas the latter compared common elements among HEIs regarding sustainability learning outcomes. In general, more effective methods to assess sustainability capabilities to measure how graduates apply these in a workplace are needed. The authors suggested further research to determine whether a sustainability capability measurement tool can be generic and applied across a HEI or whether it needs to be discipline-specific.

3.4.11. Research on Transformative Learning

Iyer-Raniga and Andamon [141] as well as Leal Filho et al. [142] addressed the topics of transformative learning in the context of education for sustainability and SD in HEIs. Iyer-Raniga and Andamon [141] evaluated transformative learning as a key to the innovation of sustainability education in the built environment curricula in HEIs in a specific region. Citing examples from a set of HEIs across the seven countries, Leal Filho et al. [142] stated that transformative learning in education for sustainability required both faculty commitment and student engagement, concluding that the ESD concept has not been sufficiently integrated into the concept of transformation in HEIs.

3.4.12. Research on the Environmental Dimension in ESD

Jabbour [143] and Versteijlen et al. [144] cited research on the environmental dimension in HEIs. Jabbour [143] analyzed contributions to environmental management knowledge through teaching, research, community, and management and proposed a model for analyzing these contributions, which could be applied to enhance expertise in environmental management. For each topic addressed (i.e., research, teaching, community, and management), the authors provided empirical evidence that described how the studied HEIs addressed the environmental dimension. Versteijlen et al. [144] reported relative student (and staff) travel contributions to the carbon emissions of HEIs in a specific country, de-

scribing the pros and cons of online education as a means to reduce the carbon impact of student travel. The authors proposed to further study the relation between online and blended course designs, as well as their carbon emissions.

3.5. Outreach and Collaboration

Overall, the review of papers placed in the category “outreach and collaboration” enabled us to identify a general lack of research on HEI contributions to sustainability at the local level, indicating that cross-sector partnership performances should be examined more carefully. These papers are addressed in the following subsections in more detail.

3.5.1. Sustainability-Oriented HEI Networks

A summary of the articles from the outreach and collaboration category that targeted sustainability-oriented HEI networks is represented in Table 10. These articles are addressed below in more detail.

Table 10. Articles from the outreach and collaboration category focusing on sustainability-oriented HEI networks.

Article	Research Theme(s)	Research Method(s)
Dlouhá et al., 2018 [145]	Sustainability-oriented HEI networks	Desktop research, survey, and workshop
Dlouhá, et al., 2013 [146]	SD oriented courses within the academic learning networks	Case studies
Kahle et al., 2018 [147]	Sustainability-oriented HEI networks	Case study
Naeem and Peach 2011 [148]	HEI network for promotion of sustainability in postgraduate education and research	Case study
Ruiz-Mallén and Heras 2020 [8]	Main traits of sustainability discourses and practices promoted by the selected HEI networks	Content analysis
Vezzoli et al., 2015 [149]	Learning network	Case study

Dlouhá et al. [145] collected information on 14 HEI networks, describing their structures, roles, relationships, and activities. Dlouhá et al. [146] described SD courses offered in European HEI academic learning networks. Kahle et al. [147] proposed an analytical framework that could be used to describe HEI networks more categorically, identifying 15 characteristics from the literature to develop this framework, which the authors then applied to two sustainability-oriented HEI networks. Our review indicates that applying the proposed framework to other HEI networks and adapting it accordingly would be an excellent subject for future research.

Naeem and Peach [148] studied a specific HEI network, asking how sustainability was promoted in postgraduate education and research and how this network was used to share and expand experience in ESD. The paper provides an overview of initiatives and issues faced by the HEIs involved. Ruiz-Mallén and Heras [8] described how sustainability is interpreted in HEI networks and found that “greening” is the dominant sustainability topic discussed in these networks, followed by “resilience” and “alternative.” Vezzoli et al. [149] provided an example of an HEI learning network that addresses a specific sustainability issue. The authors provided the theoretical background, initial actions, and expected outcomes for this network. In general, our review shows that the sustainability-oriented HEI networks play important roles in the sustainability transition, generating added value for all network members. These networks generate social capital through cooperation, but the nature and the role of this capital requires further investigation. They also have a cumulative impact, because they tend to facilitate the initiation, support of, realization of, and reporting on SD policies launched at global, regional, or institutional levels. However, no comparative assessment of different HEI networks has been conducted.

3.5.2. HEI Partnerships

Koehn [150] analyzed potential benefits and risks of the transnational HEI partnerships devoted to SD. As an example, the authors compared university-to-university projects supported by bilateral awards in two particular countries.

3.5.3. Networks between HEIs and Communities or Local or Regional Institutions

Table 11 provides an overview of the articles from the category “outreach and collaboration,” which examined networks between HEIs and communities or local or regional institutions. These articles are addressed in more detail below.

Table 11. Articles from the outreach and collaboration category focusing on networks between HEIs and communities or local or regional institutions.

Article	Research Theme(s)	Research Method(s)
Barnes and Phillips 2000 [151]	Benefits from partnerships between HEIs and local organizations in the environmental sector	Case studies
Leal Filho et al., 2019 [152]	Regional SD initiatives of a set of HEIs	Case studies
Mader et al., 2013 [153]	The role of HEIs in sustainability initiatives at the local level	Case study
Munro et al., 2016 [154]	Sustainability partnership between an HEI and a city	Case study
Mehling and Kolleck 2019 [155]	Cross-sector collaborations and partnerships	Case study
Trott et al., 2018 [156]	University–community partnerships	Case study
Sterling and Witham 2008 [157]	Project of an organization supporting HEIs on the path towards ESD	Case study

Barnes and Phillips [151] studied the benefits that can arise from partnerships between HEIs and local environmental organizations, concluding that these, like HEI networks, generate added value in the environmental sector and promote sustainability. This added value exceeds the value retained in a single organization. Leal Filho et al. [152] analyzed regional SD initiatives of 22 HEIs in industrialized and developing countries, concluding that the lack of incentives and resources and lack of coordination hindered this type of coordination the most. Mader et al. [153] targeted networks between HEIs and regional actors in the SD field, examining the different roles HEIs have in these co-operations. Our review reveals that HEIs take on diverse roles depending on their level of involvement and/or the network type. The roles often overlap in terms of the fields of activities, such as education, research, outreach, and/or management. The diverse nature of the HEIs’ activities and initiatives in regional development means that their roles within these networks are correspondingly diverse.

Munro et al. [154] investigated a sustainability partnership between a single HEI and the city in the form of a co-curricular internship program developed to achieve sustainability targets. Although this program received positive feedback from participating students, it incurred high resource and personnel costs. Furthermore, executive support was needed to recruit students. Mehling and Kolleck [155] critically analyzed an urban SD program that was a cooperative project between an HEI and the city administration, examining cross-sector partnerships between HEIs and non-academic partners, the differences between the partners’ identities, and the constructive dilemma, namely, whether these partnerships were understood as projects, an organization, or a network. The authors proposed to conduct more research on professional and organizational identities in this context. Trott et al. [156] described how frameworks that allow undergraduate students to gain research experience are combined with addressing community-defined challenges.

Sterling and Witham [157] outlined ESD project work conducted by a specific organization to support HEIs.

3.6. SD through on-Campus Experiences

Fewer articles, six in total, addressed SD through on-campus experiences, as represented in Table 12.

Table 12. Articles from the category of SD through on-campus experiences.

Article	Research Theme(s)	Research Method(s)
Fichter and Tiemann 2018 [158]	HEI support systems for sustainable entrepreneurship	Case study
Filho et al., 2019 [159]	Integration of social responsibility and sustainability initiatives at HEIs	Survey
Mtutu and Thondhlana 2016 [160]	Encouraging pro-environmental behavior (environmental awareness)	Case study
Pereira et al., 2014 [161]	Greening of the organizational culture	Case study
Schopp et al., 2020 [162]	Competences and knowledge to set SD in practice	Case study
Xiong and Mok 2020 [163]	Sustainable campus consortium	Case study

Fichter and Tiemann [158] explored factors influencing HEI support for sustainable entrepreneurship and proposed a conceptual framework to design such a support system. Conducting a student survey to assess their interest in topics such as sustainability, entrepreneurship, and sustainable venturing could measure the need for teaching and transfer activities related to sustainable entrepreneurship. Our review enabled us to identify a lack of assessment and ranking schemes regarding entrepreneurial culture.

Filho et al. [159] analyzed how effectively HEIs integrate social responsibility and sustainability initiatives, placing a particular focus on practices and principles, the scope of responsibility, and the scale of involvement. The authors proposed to conduct additional research by gathering more responses and identifying appropriate key performance indicators. Mtutu and Thondhlana [160] studied the relationship between the reported behavior on energy use and recycling and personal values and situational factors, identifying areas where pro-environmental behavior could be promoted. In future research, these authors planned to identify pre-conditions for intervention strategies that promote this behavior and to assess the importance of the motivational and psychological factors (i.e., how they enable or block such behavior). The behavioral differences identified, depending on the level of study, could indicate the types and nature of intervention strategies needed. Furthermore, the authors planned to evaluate the implemented strategies to identify areas for further improvement. In general, our review of these papers indicates that researchers need to know more about personal values and demographic variables to more effectively predict potential drivers and barriers of pro-environmental behavior.

Pereira et al. [161] examined the relationship between environmental management practices developed on a specific HEI campus and the greening of its organizational culture. The authors identified barriers to green organizational culture. Schopp et al. [162] surveyed key SD actors to assess their knowledge and values, as well as the competences and knowledge needed to support SD practically. The authors noted that little research has been conducted to assess the faculty's and staff's perception of their role in supporting sustainability. Future research was proposed to examine the differences between stakeholder groups in HEIs. Xiong and Mok [163] reviewed good practices and achievements at a specific HEI, examining the role and challenges of a sustainable campus consortium.

3.7. Assessment and Reporting

The category “assessment and reporting” in the context of sustainability and SD in HEIs had several research streams. These are dealt with below in greater detail.

3.7.1. Sustainability Assessment Tools (SATs)

Alghamdi et al. [164] analyzed 12 SATs, whereas Berssoza and Bernaldo [13] shifted the focus from analyzing the SAT content and indicators to practically applying them in a specific HEI to determine their scope. Bullock and Wilder [165] used comprehensiveness as a proxy metric to assess the validity of SATs. Findler et al. [166] analyzed the extent to which SATs could be used to measure HEI impacts on SD, Fischer et al. [6] depicted the dominance and marginalization of different HEI assessment areas in the analyzed SATs, and Urbanski and Filho [167] reported HEI data submitted in one of the SATs. The review of these papers showed that although many SATs are available, the sustainability progress of HEIs is not clearly measurable. Further research is needed to address practical details of and operationalization methods for core SAT items, i.e., indicators, and the causes and relative importance of the gaps in the available SATs need to be further explored. Other dimensions of SAT validity beyond their comprehensiveness, such as the quality and relevance of individual indicators, also deserve further research. The relative weights of indicators in SATs can emphasize different issues and should be investigated further. More work is needed to evaluate the “process validity” of these assessments and the methods used to gather and report data. Design characteristics other than validity, such as usability and intelligibility, should also be analyzed and compared. SATs largely neglect the impacts that HEIs have outside their organizational boundaries, mostly focusing on operations. Still, education and research are commonly referred to as core areas and fields of action in HEIs. This gap should be addressed in further research; hence, more sustainability assessments of education and research should be performed. De Araújo Góes and Magrini [168] and Parvez and Agrawal [169] examined how existing SATs could be adapted to a specific country or an HEI, generally concluding that SATs may not fit local needs and that developing a tailored model can be more advantageous to a country or an HEI. A full summary of articles focusing on SATs in the context of HEIs is represented in Table 13.

Table 13. Articles from the assessment and reporting category focusing on sustainability assessment tools (SATs).

Article	Research Theme(s)	Research Method(s)
Alghamdi et al., 2017 [164]	Sustainability assessment tools (SATs)	Desk study
Berssoza and Bernaldo 2017 [13]	Sustainability assessment tools (SATs)	Case study
Bullock and Wilder 2016 [165]	Comprehensiveness of sustainability assessment tools (SATs)	Evaluation using modified framework
Findler et al., 2019 [166]	Sustainability assessment tools (SATs) and impact on SD	Mixed-method approach, using descriptive statistics and an inductive content analysis
Fischer et al., 2015 [6]	Sustainability assessment tools (SATs)	Comparative analysis
Urbanski and Filho 2015 [167]	SAT: Sustainability Tracking, Assessment and Rating System (STARS)	Content analysis
De Araújo Góes and Magrini 2016 [168]	Characteristics of sustainability assessment tools (SATs)	Desk study
Parvez and Agrawal 2019 [169]	Adaptation of existing rating systems to the needs of individual HEIs	Survey

3.7.2. Campus Sustainability Assessment (CSA)

Abubakar et al. [170], Alghamdi et al. [171], and Arroyo et al. [172] addressed only one aspect of HEI sustainability assessment, namely, the campus sustainability assessment (CSA). Abubakar et al. [170] indicated that further research on CSA that involved other stakeholders, and not only students, was needed. Alghamdi et al. [171] assessed the HEIs' water, energy, and carbon flows, suggesting future research is needed to assess the detailed environmental impacts that occur over the HEI's lifetime, including all phases, and construction as well as operation. Arroyo et al. [172] examined roles played by CSAs in the organizational change processes, indicating that future investigations should shift from studying one specific role to the co-occurrence of roles. Furthermore, these authors proposed to analyze factors that cause these roles to vary and role dominance.

3.7.3. Individual Frameworks, Models, Methods, and/or Tools for Sustainability Assessment in HEIs

Alshuwaikhat et al. [173], Beringer et al. [174], and De Castro and Jabbour [175] applied individual frameworks to assess sustainability in specific HEIs. Alshuwaikhat et al. [173] used a framework based on five components, i.e., teaching and curriculum, research and scholarship, campus operations, management and community, and financial management. Beringer et al. [174] used a specific SAT to assess HEIs' sustainability in a specific region, proposing to conduct more comparative and best-practice studies to address success factors, barriers, key persons, effective processes, communication, and methodological issues and shortcomings. De Castro and Jabbour [175] analyzed the adherence level of a specific HEI compared to the framework proposed by Alshuwaikhat and Abubakar [176], concluding that the framework was a useful assessment tool. Comparison studies were proposed to analyze the level of adherence of other available frameworks, such as the Graphical Assessment of Sustainability in Universities (GASU) framework, the STARS framework, and the Audit Instrument for Sustainability in Higher Education (AISHE) framework. Lambrechts [10] analyzed the contribution of sustainability assessment to policy development in HEIs, i.e., the assessment effect. The application of an assessment tool is only one factor in policy development. Overall, our review of these papers indicates that more in-depth case studies need to be performed in other HEIs.

Several authors proposed their own assessment model, method, tool, and index of framework. Instead of developing a brand-new one, some research groups combined existing models or methods. Blasco et al. [177] used a sustainability performance index based on different HEI rankings, applied this index, and evaluated it in different contexts, e.g., different regions, countries, and HEIs. Draheim et al. [178] tested an assessment model they developed, proposing to conduct other international studies where the model would be applied in different contexts to verify and improve the assessment process. Fadeeva and Mochizuki [179] described a project carried out to develop an alternative HEI sustainability assessment system. To make a significant impact on sustainability and SD in HEIs, they recommended modifying the available SATs. Gómez et al. [180] introduced an adaptable model for HEI sustainability assessment. This model could enable the sustainability assessment to be performed in different implementation stages and data availability scenarios. Our review revealed that the available assessment tools are difficult to apply in HEIs that are in the early stages of sustainability implementation.

Larrán Jorge et al. [181] proposed using a multi-item quantitative tool to measure sustainability performance at HEIs and to conduct further work, starting with a pilot group of HEIs, since the concept of SR and assessment in HEIs is relatively unclear. A summary of articles focused on these individual frameworks, models, methods, and/or tools for sustainability assessment in HEIs is presented in Table 14.

Table 14. Articles from the assessment and reporting category focusing on individual frameworks, models, methods, and/or tools for sustainability assessment in HEIs.

Article	Research Theme(s)	Research Method(s)
Alshuwaikhat et al., 2016 [173]	Sustainability assessment of specific universities	Survey
Beringer et al., 2008 [174]	Sustainability assessment of specific universities	Survey
De Castro and Jabbour 2013 [175]	Verifying the adherence of an existing framework	Case study
Lambrechts 2015 [10]	Contribution of sustainability assessment to policy development	Case study
Blasco et al., 2019 [177]	Sustainability and performance of universities	Empirical analysis
Drahein et al., 2019 [178]	Sustainability assessment tools (SATs)	Multiple case study
Fadeeva and Mochizuki 2010 [179]	Sustainability assessment tools (SATs)	Descriptive study
Gómez et al., 2015 [180]	Sustainability assessment model	Framework proposal
Larrán Jorge et al., 2016 [181]	Measuring tool for sustainability performance	Case study
Sandri et al., 2018 [182]	Assessment tool evaluation, assessment of sustainability attributes	Survey
Shi and Lai 2013 [183]	Sustainability assessment tools (SATs)	Comparative analysis/framework proposed
Waheed et al., 2011 [184]	Sustainability assessment tools (SATs)	Framework and tool proposed
Waheed et al., 2011 [185]	Sustainability index (SI)	Model proposed

Sandri et al. [182] evaluated an assessment tool based on a scenario/vignette question design, which can be used to capture data that assess the graduates' sustainability attributes, i.e., learning outcomes. These authors concluded that a considerable amount of research will be needed to develop confidence in the scenario/vignette approach. Shi and Lai [183] proposed using an alternative sustainable HEI assessment framework based on a sustainable HEI model proposed by Velazquez et al. [39]. The assessment criteria were assigned equal weights, and further research was proposed to investigate the relative importance of the criteria and to assign weights accordingly. Waheed et al. [184] developed a quantitative tool for sustainability assessment using a driving force–pressure–state–exposure–effect–action (DPSEEA) framework. This modeling tool can be applied to consider not only environmental, social, and economic categories but also educational performance. Later on, Waheed, et al. [185] proposed an uncertainty-based DPSEEA-Sustainability Index Model (uD-SiM) as a solution to evaluate a sustainability index for HEIs.

3.7.4. Reporting in HEIs

When investigating reporting in HEIs, the elements analyzed were either the HEIs' annual reports or sustainability reports. We noted that these papers usually examined only a single HEI or HEIs in a specific country. In Table 15, a summary of the papers focusing on reporting in HEIs is presented. These are dealt with below in greater detail.

Table 15. Articles from the assessment and reporting category focusing on reporting in HEIs.

Article	Research Theme(s)	Research Method(s)
Hassan et al., 2019 [186]	Integrated reporting in HEIs' annual reports	Content and comparative analysis
Schaffhauser-Linzatti and Ossmann 2018 [187]	Sustainability in annual HEI reports	Content analysis
Brusca et al., 2018 [188]	Sustainability reporting (SR) and integrated reporting of a specific HEI	Case study and comparative analysis
Chatelain-Ponroy and Morin-Delerm 2016 [189]	Characteristics of HEIs' SD reports	Multiple case study
Fonseca et al., 2011 [190]	State of sustainability reporting (SR)	Content analysis
Huber and Bassen 2018 [191]	Sustainability reporting (SR) guideline (modified sustainability code)	Content analysis
Scholtz et al., 2018 [192]	Framework and business intelligence tool for sustainability reporting (SR) support	Case study
Ferrero-Ferrero et al., 2018 [9]	Stakeholder engagement and materiality principle of sustainability reporting (SR)	Content analysis and survey
Sales de Aguiar and Paterson 2018 [193]	Knowledge creation through social and environmental reporting	Case study
Sassen and Azizi 2018 [194]	Importance of disclosure topics	Content analysis
Ceulemans et al., 2015 [195]	Relationship between sustainability reporting (SR) and organizational change management for sustainability	Survey
Sassen et al., 2018 [196]	Institutional characters in relation to sustainability reporting (SR)	Logistic regression
Yáñez et al., 2019 [197]	Organizational changes due to sustainability reporting (SR) process of a specific HEI	Case study

3.7.5. Integrated Reporting in HEIs

Hassan et al. [186] and Schaffhauser-Linzatti and Ossmann [187] analyzed HEIs' annual reports in a specific country. Hassan et al. [186] used the IR guidelines issued by the International Integrated Reporting Council (IIRC) to determine how clearly IR content elements were disclosed in these reports. The authors proposed to conduct further research on HEI IRs, e.g., to expand the analytical level to include the fundamental concepts and principles of the IR framework and not only IR content elements. Furthermore, they proposed to investigate the relationship between integrated thinking and IR, expressing a concern that HEIs are “greenwashing” when preparing IR document content to avoid the significant transformation of internal processes. Our review suggested that this matter should also be investigated more thoroughly in the future. Schaffhauser-Linzatti and Ossmann [187] studied sustainability information (SI) published in several HEIs' annual reports, identifying a lack of SI, but expressed a desire to conduct further research on this topic in other countries. Similar to Hassan et al. [186], Brusca et al. [188] also used the IIRC framework, shifting the focus from annual reports to the SR of a specific HEI. Based on the comparative analysis of an SR and IIRC framework and literature on the topic, the authors concluded that SR in HEIs is still in the early stage and that IR is rarely implemented. For this reason, further research on the SR and IR topic was proposed.

3.7.6. Frameworks and Guidelines for SR in HEIs

Chatelain-Ponroy and Morin-Delerm [189], Fonseca et al. [190], and Huber and Bassen [191] used either available SR frameworks and guidelines or developed individual

ones. Although evaluations of the available frameworks and guidelines were conducted, SR was also evaluated using frameworks and guidelines. Chatelain-Ponroy and Morin-Delerm [189] examined SR in a specific country, basing the analysis on two dimensions proposed by Ansari et al. [198], i.e., extensiveness and fidelity. The proposed new areas of research were in-depth analyses, using case studies that could provide insights into the motivation of the first-time reporters. Our review indicates that SR interpretation, or rather, perception by its stakeholders, could also be an interesting research topic.

Fonseca et al. [190] developed a framework to evaluate the state of HEIs' SR in a specific country. This framework and its categories and indicators were based on Global Reporting Initiative (GRI) guidelines and campus SATs. The authors stated that a lack of knowledge about how to assess HEIs' contribution to sustainability is a clear barrier to SR. Further research studies on the state of and trends in HEIs' SR were proposed to promote regular and meaningful SR. Overall, our review of these papers indicates that the potential benefits of sustainability assessment and SR as well as interviews with HEI management on this topic should be topics of future studies. Comparative analyses, including different geographical, economic, and political contexts, could be conducted to identify SR motivations. The authors also proposed more investigations on the indicators and data-generating methodologies used in guidelines and frameworks.

Huber and Bassen [191] analyzed the reporting principles of SR frameworks and subsequently evaluated the proposed modification of the German Council for Sustainable Development sustainability code for HEIs based on select reporting principles. Research and teaching criteria were identified as underrepresented in the sustainability code for HEIs, indicating that further development of the sustainability code for HEIs is needed. The authors suggested that one topic urgently requires further research: how indicators are selected and developed to effectively measure the sustainability performance of HEIs and especially research and teaching activities. Scholtz et al. [192] provided a comprehensive theoretical guiding framework and described how to apply it; the results of this application led the authors to develop a sustainability business intelligence (BI) tool to assist in HEIs' SR. This tool can provide historic information as well as forecasts and incorporates all sustainability components, as it integrates the data sources. Future research testing the adoption of the proposed tool in other HEIs to verify the tool was proposed.

3.7.7. Stakeholders' Perspectives Regarding SR in HEIs

Ferrero-Ferrero et al. [9] and Sales de Aguiar and Paterson [193] addressed the stakeholder perspective regarding SR. Ferrero-Ferrero et al. [9] examined stakeholder engagement and the adaptation of the materiality principle in HEIs' SR, and compared the results with stakeholder expectations. Extending this research to additional SR, including other HEIs and stakeholders, was proposed to gain further insights into stakeholder engagement, their interrelationships, and their expectations regarding SR. Identifying factors such as the generation or type of employment or position could deliver information about barriers or drivers of sustainability in HEIs.

Sales de Aguiar and Paterson [193] collected teaching and learning experiences from students at a single HEI who were involved in compiling a social and environmental report (SER) for their campus. The SER project required students to communicate on sustainability issues with internal and external stakeholders. The project raised awareness for sustainability issues and equipped students with employability skills, e.g., group work, conflict resolution, and presentation and communication skills. Future research was proposed to explore the requirements to provide space for discussion of sustainability issues in HEIs.

3.7.8. Importance of Topics in SR of HEIs

Sassen and Azizi [194] investigated the importance of disclosure topics in disclosed HEIs' SR in a specific country. The results indicate that the HEIs' SR is still in its early stages.

The authors recommended conducting research on stakeholder expectations regarding SR in HEIs, as well as developing university-specific SR standards.

3.7.9. SR and Organizational Change

Ceulemans et al. [195], Sassen et al. [196], and Yáñez et al. [197] studied how organizational characteristics and organizational change are driven by the SR process. Ceulemans et al. [195] analyzed the relationship between SR and organizational change management regarding sustainability (OCMS), concluding that SR is not only communication, but also a dynamic tool that can be used to plan sustainability changes. Further research was proposed in the form of in-depth empirical studies on SR and OCMS in HEIs, e.g., on the process of SR institutionalization in HEIs and on the use of external stakeholder dialogue in the SR process to foster change. Another future research topic is how the SR process interacts with the different elements of SD integration in HEIs and how these drivers contribute holistically to SD change.

Sassen et al. [196] analyzed characteristic funding sizes and sources for HEIs that disclosed SR in a specific country, concluding that larger HEIs are more likely to disclose SR, whereas higher amounts of public funding decreases this probability. Overall, the authors identified a lack of SR institutionalization among HEIs, proposing that the development of theoretical SR concepts in HEIs requires more investigation, along with the HEI's motivation to disclose SR, and determinants of the SR in HEIs in other countries. Yáñez et al. [197] described changes occurring over eight years and three consecutive cyclical SR improvement processes, allowing the identification of positive impacts and potential benefits that the SR had on a specific HEI. The authors concluded that SR is an essential tool that can be used to promote a holistic and strategic vision aligned with sustainability principles to improve communication with stakeholders and encourage them to participate in management decision-making processes, contributing to the integration of sustainability indicators in the global management plan. The authors proposed further research on the topic, including other HEIs to identify the significance of sustainability, relevant issues, key aspects, and more potential benefits of SR.

4. Discussion

The results of this SSLR indicate that the amount of research on the topic of sustainability and SD in HEIs is steadily increasing. The challenges that sustainability and SD address [1], as well as HEIs' significant role regarding these challenges, are globally recognized [1–3,6,7,9–11,13]. However, taking into account the regional context, this literature review shows that most articles targeted HEIs in North America (USA and Canada), South America (Brazil), Asia-Pacific (Australia and China), Europe (Germany, Spain, Portugal, Sweden, and Belgium), and South Africa.

Previous literature recognized the positive influence of internal and external HEI stakeholders on their progress towards SD [1,3,7,10], yet, in this review, a lack of consensus on whether and how these stakeholders support the effective integration of SD in HEIs was identified [29,37,160,162].

Our review suggested that the field of sustainability and SD in HEIs can be categorized according to the seven elements of an HEI system identified in the available literature [3,5], i.e., institutional framework, campus operations, education, research, outreach and collaboration, SD through on-campus experiences, and assessment and reporting. The results of the final sample analysis show that the institutional framework, research, and assessment and reporting in the context of sustainability and SD in HEIs were the most heavily investigated categories during the study period, although education and research are commonly referred to as core areas and fields of action in HEIs [1–3,6,9–11,13,191].

In the category “institutional framework,” the articles mostly addressed organizational change to support sustainability and SD in HEIs, as well as how to apply and integrate them. The authors of these papers suggested that more in-depth investigations, empirical studies, and assessments of sustainability drivers and barriers and frameworks focusing on aspects

of change are needed [20,22,26,27]. They also indicated that the stakeholders' perceptions of each barrier require further study to derive the impacts of those perceptions and to identify and test ways to overcome barriers [20,23,24]. Future research involving a variety of stakeholders and analyses of HEI plans, policies, and strategies was proposed to gain deeper insights into sustainability implementation, best practices, and recommendations [5,42–48,56].

Communication of sustainability efforts was identified as a key to the effective management of SD implementation in HEIs [21], and SD policies were recognized as valuable tools for this communication [41]. However, a gap regarding SD policies and the aspects they address was identified. The aspects addressed in these policies were not equally emphasized, most addressed was campus sustainability, and research and education were mostly neglected [42]. A similar gap was identified when analyzing available tools, methods, frameworks and approaches [38], and HEIs' strategic plans [56]. This implies that contrary to previous literature [6], HEIs' impacts in the field of sustainability are not fully recognized [4].

As mentioned earlier, most SD policies addressed campus sustainability [42], but a significantly lower number of articles in this category indicated a lack of consensus between the practice and the literature. The articles in the category "campus operations" mainly addressed the EMS and its implementation process [64–68]. Further research, especially in the form of case studies, is needed in this category to identify and share best practices [65,69–75].

Studies in the category "education" examined curricular innovations and provided reviews of SD integration and the development of sustainability-focused courses and programs, whereas articles in the category "research" mostly reported research on ESD. Although much literature has been published on ESD, research on how the HEIs engage with the SDGs is lacking [134]. Further research was also proposed to assess the level of sustainability contribution, the competences covered and developed, and the pedagogical approaches used in one or more HEIs at all levels of education [123,137].

Furthermore, our review revealed a lack of indicators to assess and measure the integration of sustainability and SD in education and research [80–93,98,123,164–167], as well as in SD through on-campus experiences [158,159].

The category "outreach and collaboration" included studies that examined sustainability-oriented HEI networks as well as networks between HEIs and communities or local or regional institutions. Sustainability-oriented HEI networks play an important role in the sustainability transition [8,145–149], yet fewer articles were assigned to this category. Additionally, no comparative assessment of different HEI networks has been conducted [8,145–149]. Our review of the articles from the category "assessment and reporting" implied that SATs may not fit the local needs, and developing a tailored model can be more advantageous for a country or HEI [168,169]. These implications are aligned with the implications from the category "institutional framework," namely, organizational management tools should be adapted to HEIs' unique mission and impacts [35,111].

The analysis of the articles from the category "assessment and reporting" led to similar implications as stated before: HEIs' sustainability impacts are not fully recognized, and accordingly, the sustainability progress of HEIs is not clearly measurable [6,13,164–167].

SATs neglect the impacts that HEIs have outside their organizations, mostly focusing on operations [6,13,164–167]. A similar gap as before was also identified here, namely, one of the most urgent research topics proposed was the selection and development of indicators to measure the sustainability performance of HEIs, especially regarding research and teaching activities [191].

Researchers need more information about how to properly assess HEIs' contribution to sustainability; this lack of knowledge represents a clear barrier to SR [190].

This research has several limitations. The literature search was conducted in March and April 2020; therefore, research conducted after this period was not considered in this literature review. Several exclusion criteria were defined prior to conducting this literature review, and using another set of exclusion criteria could lead to slightly different

results in the final sample. Previous research [3,5] indicates that the HEI system consists of seven elements, which were used for the categorization of the final literature sample. In some cases, making a clear distinction between categories was difficult for several reasons, e.g., the categories were interrelated and the analytical results in one category were used or implemented in another one. For example, some articles were on the HEI network for SD in education. The category could be “outreach and collaboration” in the sense of the HEI network, or “education” in the sense of SD in education. Similar examples include articles on the effects of online learning on campus operations (“education” and “campus operations” categories) or articles on research on SD education (“research” and “education” categories). When the categorization was unclear, the article was assigned to the category according to its prevailing elements; however, this could have resulted in a certain author bias.

5. Conclusions

In this paper, an SSLR was conducted on sustainability and SD in HEIs. The focus was placed on peer-reviewed scientific journal articles. No time boundaries were set and the literature search was conducted in March and April 2020. The final literature sample consisted of 190 articles. The aim was to identify the main research theme(s) addressed and research gaps identified in the available literature.

The growing number of publications illustrates the significance of the topic. However, the analysis of these publications also reveals the inconsistencies that need to be addressed by HEIs in future research and in practice.

Although the number of publications on the topic is steadily increasing, the contrasts regarding the regional context and regarding areas of action addressed by HEIs show the lack of systematic approach when integrating and implementing sustainability and SD in HEIs.

The publications mostly targeted HEIs in North and South America, Asia-Pacific, Europe, and South Africa, and other regions were underrepresented. The categorization of the final literature sample according to the seven elements of an HEI system, i.e., institutional framework, campus operations, education, research, outreach and collaboration, SD through on-campus experiences, and assessment and reporting, also showed the underrepresented areas that need further investigation. Campus sustainability, education, outreach and collaboration, and SD through on-campus experiences were underrepresented among the investigated categories. This again implies a lack of systematic as well as holistic approaches when integrating and implementing sustainability and SD in HEIs.

In the SD policies of HEIs not all aspects were equally emphasized, which once more implies that more research is needed on systematic and holistic approaches of sustainability and SD integration and implementation in HEIs. Furthermore, fewer publications explicitly focused on the integration of SDGs in HEIs.

The lack of consensus in the available literature with regard to the role and effects that stakeholders have in the integration of sustainability and SD in HEIs also deserves further examination.

One of the major research gaps identified is a lack of indicators to measure the sustainability performance of HEIs. This lack of knowledge represents a clear barrier to SR in HEIs.

Overall, our review enabled us to identify a need for more research in the form of case studies, projects, approaches, and methods on the topic of sustainability and SD in HEIs. Such research facilitates the identification of best practices. Moreover, further information about and examples of less successful cases are needed to be able to derive lessons from these examples.

This paper represents a comprehensive overview of the literature on sustainability and SD in the context of HEIs for a broad understanding of the sustainability and SD in HEIs. The identified research gaps can serve as a starting point for a future research agenda.

From a practitioner's perspective, the results of this paper may be helpful for HEIs on their path towards redirecting their actions and addressing the sustainability and SD challenges.

Without systematic, holistic, and whole-institution approaches to implementing and integrating sustainability and SD in HEIs, involving all areas of action and all stakeholders, the struggles HEIs are facing with regard to fulfilling their role in society and addressing sustainability and SD challenges will remain. Furthermore, without understanding and evaluating their sustainability and SD contributions, HEIs will not be able to address the emerging areas of action in their own organizations.

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Appendix A

Table A1. Full list of included journals.

Journal Abbreviation	ISSN	H Index 3	CiteScore 4	SJR	SNIP	JIF 5	WoS Coverage 6
<i>Int. J. Sustain. High. Educ.</i>	1467-6370	47	2.290	0.542	1.061	1.437	1
<i>J. Clean. Prod.</i>	0959-6526	150	7.320	1.620	2.308	6.395	1
<i>Sustainability</i>	2071-1050	57	3.010	0.549	1.169	2.592	1
<i>Environ. Educ. Res.</i>	1469-5871	34	2.550	0.916	1.809	2.255	1
<i>High. Educ. Policy</i>	0952-8733	36	1.470	0.612	0.853	1.333	1
<i>Environ. Dev. Sustain.</i>	1387-585X	47	1.950	0.505	0.887	1.676	1
<i>Int. J. Educ. Dev.</i>	0738-0593	47	1.690	0.790	1.390	1.406	1
<i>Higher Education</i>	0018-1560	80	3.420	1.681	2.388	3.005	1
<i>Int. J. Sust. Dev. World</i>	1350-4509	35	2.480	0.651	0.977	2.811	1
<i>J. Geogr. High. Educ.</i>	0309-8265	41	2.080	0.525	1.011	1.533	1
<i>Sustain. Account. Manag. Policy J.</i>	2040-8021	18	2.890	0.778	0.946	1.745	1
<i>Sustain. Sci.</i>	1862-4065	42	4.610	1.433	1.615	4.669	1
<i>Account. Audit. Account. J.</i>	0951-3574	83	3.900	1.456	1.563	2.537	1
<i>Assess. Eval. High. Educ.</i>	0260-2938	72	2.720	1.517	2.021	2.473	1
<i>Eval. Program Plan.</i>	0149-7189	54	1.470	0.483	0.905	1.240	1
<i>International Review of Research In Open And Distance Learning</i>	1492-3831	56	2.870	1.202	1.774	1.830	1

Table A1. Cont.

Table A2. Full list of included journals.

Journal Abbreviation	ISSN	H Index 3	CiteScore 4	SJR	SNIP	JIF 5	WoS Coverage 6
<i>J. Integr. Environ. Sci.</i>	1943-815X	14	2.040	0.557	0.580	1.889	1
<i>Stud. High. Educ.</i>	0307-5079	83	3.280	1.888	2.271	2.854	1
<i>Sustain. Dev.</i>	0968-0802	51	4.380	0.989	1.585	3.821	1
<i>Waste Manag.</i>	0956-053X	127	6.150	1.523	2.193	5.431	1
<i>Adm. Soc.</i>	0095-3997	52	2.370	0.973	1.486	1.698	1
<i>Appl. Energy</i>	0306-2619	162	9.540	3.455	2.616	8.426	1
<i>Asia Pacific J. Mark. Logist.</i>	1355-5855	35	1.610	0.333	0.699	1.276	1
<i>Botanica Marina</i>	0006-8055	51	1.220	0.399	0.672	0.919	1
<i>British Journal of Educational Technology</i>	0007-1013	81	4.070	1.419	2.354	2.588	1
<i>Clean Technologies and Environmental Policy</i>	1618-954X	44	2.460	0.636	1.031	2.277	1
<i>Communist Post-Communist Stud.</i>	0967-067X	37	1.400	0.758	1.431	1.351	1
<i>Compare</i>	0305-7925	27	1.800	0.976	1.276	1.765	1
<i>Corp. Soc. Responsib. Environ. Mgmt.</i>	1535-3958	58	7.180	1.670	2.372	5.513	1
<i>Curr. Opin. Environ. Sustain.</i>	1877-3435	69	5.650	1.980	1.807	4.258	1
<i>Ecol. Econ.</i>	0921-8009	174	4.830	1.767	1.864	4.281	1
<i>Ecol. Soc.</i>	1708-3087	119	4.810	1.807	1.606	4.136	1
<i>Educ. Assess. Evaluation Account.</i>	1874-8597	23	1.610	0.607	0.742	1.722	1
<i>Educ. Technol. Res. Dev.</i>	1042-1629	79	3.290	0.977	1.945	2.115	1
<i>Energy Build.</i>	0378-7788	147	5.360	1.934	1.826	4.495	1
<i>Environ. Manage.</i>	0364-152X	102	2.630	0.908	1.064	2.376	1
<i>Environ. Sci. Policy</i>	1462-9011	95	5.580	1.919	2.004	4.816	1
<i>Futures</i>	0016-3287	69	3.140	0.958	1.334	2.214	1
<i>Habitat Int.</i>	0197-3975	59	4.330	1.524	1.898	3.846	1
<i>Health Promot. Int.</i>	0957-4824	75	1.940	0.883	1.176	1.913	1
<i>Innovation (North Syd)</i>	1447-9338	24	2.140	0.597	0.680	1.429	1
<i>Int. J. Educ. Technol. High. Educ.</i>	2365-9440	15	2.770	0.627	1.723	1.922	1
<i>Int. J. Eng. Educ.</i>	0949-149X	44	0.940	0.425	0.885	0.611	1
<i>Int. J. Environ. Sci. Technol.</i>	1735-1472	61	2.440	0.580	0.918	2.031	1
<i>Int. J. Logist. Manag.</i>	0957-4093	66	3.280	0.871	1.134	2.226	1
<i>Int. J. Strateg. Prop. Manag.</i>	1648-715X	23	1.820	0.548	0.792	1.597	1
<i>Int. J. Sustain. Transp.</i>	1556-8318	30	3.080	1.175	1.217	2.586	1
<i>J. Afr. Earth Sci.</i>	1464-343X	64	1.780	0.595	0.975	1.633	1
<i>J. Balt. Sci. Educ.</i>	1648-3898	12	1.020	0.387	0.916	1.024	1
<i>J. Bus. Ethics</i>	0167-4544	147	4.460	1.860	2.006	3.796	1
<i>J. Eng. Des.</i>	0954-4828	46	2.700	0.652	1.129	1.394	1

Table A2. Cont.

Table A3. Full list of included journals.

Journal Abbreviation	ISSN	H Index 3	CiteScore 4	SJR	SNIP	JIF 5	WoS Coverage 6
<i>J. Organ. Chang. Manag.</i>	0953-4814	62	1.830	0.595	1.067	1.185	1
<i>J. Stud. Int. Educ.</i>	1028-3153	49	3.480	1.573	2.431	2.547	1
<i>Minerva</i>	0026-4695	33	2.340	1.208	1.688	1.952	1
<i>Prof. Dev. Educ.</i>	1941-5257	29	1.750	0.835	1.085	1.258	1
<i>Public Adm. Dev.</i>	0271-2075	38	1.640	0.637	1.313	0.918	1
<i>Res. Policy</i>	0048-7333	206	6.560	3.409	2.949	5.425	1
<i>Resour. Conserv. Recy.</i>	0921-3449	103	6.820	1.541	2.258	7.044	1
<i>Saf. Sci.</i>	0925-7535	90	4.490	1.290	2.251	3.619	1
<i>Scott. J. Political Econ.</i>	0036-9292	44	0.930	0.252	0.599	0.449	1
<i>Soc. Indic. Res.</i>	0303-8300	90	2.150	0.881	1.363	1.703	1
<i>Strateg. Organ.</i>	1476-1270	47	3.560	2.546	1.423	3.109	1
<i>Telemat. Inform.</i>	0736-5853	48	4.940	1.206	1.820	3.714	1

³ H-Index obtained from <https://www.scimagojr.com/> (accessed on 31 March 2020). ⁴ CiteScore, SJR, and SNIP data from 2018 obtained from www.scopus.com (accessed on 31 March 2020). ⁵ JIF 2018 and WoS coverage data obtained from <https://mjl.clarivate.com/home> (accessed on 7 April 2020). ⁶ 1 indicates journal coverage in WoS.

Appendix B

Full list of revised and accepted keywords for each search string.

Search String 1	Search String 2
Higher Education	Sustainable Development
Sustainability	Higher Education
Sustainable Development	Sustainability
Higher Education Institutions	Higher Education Institutions
Universities	Education For Sustainable Development
Education For Sustainable Development	Universities
University Sector	University Sector
University	Higher Education Institutions (HEIs)
Higher Education Institution	University
Sustainability Education	Sustainability Assessment
Higher Education Institutions (HEIs)	Sustainability Education
Sustainability Assessment	Campus Sustainability
Sustainability Reporting	Higher Education Institution
Education for Sustainability	Higher Education For Sustainable Development
Campus Sustainability	Sustainable Development Goals
Environmental Sustainability	Education For Sustainability
Higher Education For Sustainable Development	Environmental Sustainability
Sustainable Campus	Sustainability Reporting
Sustainable Development Goals	Sustainable Campus
HEIs	HEIs
Sustainable University	Education For Sustainable Development (ESD)
Sustainability Indicators	Sustainability Practices
Education For Sustainable Development (ESD)	Sustainable Universities
Spanish Universities	Sustainable University
Sustainability in Higher Education	Sustainability In Higher Education
Sustainability Practices	Sustainability Indicators
Sustainable Universities	Sustainability Issues
	Sustainable Consumption
	Sustainability Transition

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