sustainability

MDPI

Article

Inclusion of Education for Sustainable Development in Environmental Engineering. A Systematic Review

Pedro Mauricio Acosta Castellanos [1,2], Araceli Queiruga-Dios [3] and Lina González Álvarez [2,*]

[1] Doctoral School, University of Salamanca, 37008 Salamanca, Spain; pedro.acosta@usantoto.edu.co
[2] Environmental and Civil Engineering Faculty, Universidad Santo Tomas, Tunja 150009, Colombia
[3] Department of Applied Mathematics, High School of Industrial Engineering, University of Salamanca, 37700 Salamanca, Spain; queirugadios@usal.es
* Correspondence: lina.gonzaleza@usantoto.edu.co; Tel.: +57-3124534318

Abstract: Sustainable development (SD) is a global commitment, in the economic, social, and environmental terms of the 21st century. The SD integrates conventional development models that seek economic growth and human development, within the framework of respect and sustainable use of natural resources. This challenge must involve all levels of society. Higher education is not an exception, since universities must strive for knowledge, research, and innovation to promote SD. To achieve this, education for sustainable development (ESD) has been especially promoted by the United Nations. ESD is an indirect measurement instrument for the inclusion of SD in higher education curricula. Environmental engineering is one of the areas of most recent creation and expansion of engineering, this undergraduate program seeks to solve the environmental problems generated by the economic development of human beings, applying the theory, techniques, and technologies of engineering. With this systematic literature review (SLR), we were able to answer different research questions posed towards the most relevant competencies, techniques, and tools for the inclusion of ESD in the environmental engineering curriculum. This SLR was developed by searching the Science Direct, Scopus, and ERIC databases. We were able to identify success stories for the inclusion of ESD and some gaps in promoting ESD within undergraduate programs in environmental engineering. Likewise, we find the most applied activities, tools, and competencies within this engineering field that are part of ESD and promote SD from the curriculum.

Keywords: education for sustainable development; educational strategies; environmental engineering; university education; systematic review

Citation: Castellanos, P.M.A.; Queiruga-Dios, A.; González Álvarez, L. Inclusion of Education for Sustainable Development in Environmental Engineering. A Systematic Review. *Sustainability* **2021**, *13*, 10180. https://doi.org/10.3390/su131810180

Academic Editors: Fermin Sanchez-Carracedo, Jordi Segalàs Coral and Gemma Tejedor

Received: 25 June 2021
Accepted: 18 August 2021
Published: 12 September 2021

1. Introduction

Today's world has an environment of globalization, made up mainly of capital and technological innovation [1]. In this context, environmental problems are increasingly recurrent and have been generated as a consequence of changes in life cycles, loss of biodiversity, overexploitation, and imbalance in the irrational use of natural resources. In the same way, the predominant global development model is based mainly on excessive economic production standards, achieving unlimited development [2]. Therefore, the protection and conservation of natural resources have not been the priority.

The current environmental crisis is largely caused by anthropogenic factors [3], which makes us set our sights on science and technology since these could be the adequate response to the depletion of natural resources and environmental pollution [4]. The lack of economic resources in some societies pressures the depletion of natural resources. In the same way, some developed societies generate high rates of consumption and environmental depredation [3]. It has been recognized that these crises are not only problems of innovative development, but are also the product of a lack of environmental knowledge and behavior [5]. The only viable solution to face and overcome difficulties is governed by a

challenge of optimization and adjustment of a better quality of education in environmental terms [6].

Facing environmental, economic, technological, and social challenges is not easy since it is necessary to promote the acquisition of values, behaviors, and collective environmental awareness, where natural resources are assured and protected in the best way [7]. Environmental education (EE) deals with solving anthropogenic environmental problems, depending on the emergence of activities and behaviors of a responsible nature with the environment [3].

From another point of view, SD implies a high level of personal and humanistic training. In this way, ESD proposes an educational transformation and a moral change, achieving social and political action for environmental sustainability. The institutional commitment establishes a strategic vision of sustainability that must be embraced in higher education institutions. In other words, formal environmental teaching reinforces the inclusion of sustainability. Not only at the student level, but also at the teacher level, where research encourages the development of active knowledge in favor of SD [8].

ESD refers to a restructuring approach to teaching in higher education institutions, providing answers to current problems in society [9]. The said approach is based on the complementation of the engineering curricula, to provide ponderable knowledge, values, and behavior. Today, these models form an environmentally sustainable society. Therefore, a proper understanding of ESD is essential, focused on the incorporation of a teaching process based on active learning and critical or systemic thinking, through dynamic methods that motivate students to acquire knowledge, skills, strategies, and methodologies to forge a sustainable future [10].

The main task of universities is to train students and the next generations of professionals in all fields of research and in innovative technological designs that are friendly to the environment, to increase the levels of SD and quality education. Environmental engineers deal with structures, equipment, and systems. They are responsible for protecting, improving the quality of the environment, health, and public welfare [11].

In the specific case of Environmental Engineering, the incorporation of ESD into the curricular plans allows a methodological reorganization, as a fundamental support tool for both teachers and students, spreading a disciplinary verticality committed to SD [12]. Cultural, social, economic, and biological diversity motivate a change in the conception of social and professional responsibility. Where the learning and capacity of the competencies or skills that are required increases, that is, not only an individual change but also Social [8].

Bearing in mind the importance of ESD within universities, and in turn in environmental engineering, the following three research questions were proposed to establish the state at the investigative level and inclusion of ESD within this engineering:

Q1: What are the competencies that are proposed or used to achieve SD in environmental engineering programs?
Q2: What strategies do universities use to promote SD and include the Sustainable Development goals (SDG) in their work?
Q3: What are the methodologies applied to include ESD in the teaching of Environmental Engineering in higher education?

In the SDG, universities are the fundamental axes since they promote a change in social behavior through technological and economic development with environmental responsibility. An effective way to achieve and consolidate this is the application and understanding of ESD. For universities, it is not unknown to involve transversal human competencies, being common to see them involved in the study plans of the different disciplines. Engineering is not alien to these processes, since what is sought is comprehensive student development [13]. In this sense, for that ESD to be viable in engineering and especially in environmental engineering, different approaches must be taken to evaluate teaching strategies, methods, and guidelines. That they are based not only on cognitive learning but also on the social-emotional and behavioral aspects [14].

According to the results obtained. The transition that ESD has undergone has been evidenced since 1996, showing a significant increase since 1998. The Johannesburg (South Africa) summit in 2002 called the period from 2005 to 2014 "United Nations Decade for ESD". It is in this period that most publications are related to ESD and environmental engineering. [15].

ESD requires integrating into discourses and practices education for all, whose main goal is human well-being. The common objective of all proposals and projects must be directed towards SD. This is an instrument of social transformation, to advance towards a balanced, fair, and sustainable society [16].

However, in 2020 and 2021 we find that education is being oriented towards sustainability, promoting responsible, ethical, and supportive participation in caring for the environment. To achieve this, responsible academic planning and social, economic, and environmental purposes must be carried out. The above must be supported by multiculturalism, allowing respect for diversity and cultural identity. In this sense, young people participate effectively when making decisions that are focused on the common good, such as public policies, plans, and related programs [17].

2. Materials and Methods

To solve the research questions, an SLR aimed at the inclusion of ESD in Environmental Engineering was used. Likewise, it was sought to orient the research to the influence of ESD within universities and its influence on adequate environmental behavior. [18]. The SLR was developed under the standards of the "PRISMA" statement [19].

To make this possible, a total of 93 articles indexed in the databases were analyzed: Scopus, ERIC, and Science Direct. The search for the results was carried out since 1987 when the SD began to gain strength with the "Brundtland Report" of the UN, until June 2021. This is to identify acceptance in ESD investigations.

The protocol used was PICOC, namely: Population: Research in ESD in environmental engineering. Intervention: Geographical location, methods, characteristics, and success stories. Comparison: ESD adaptation versus EE adaptation. Outcome: incorporating quality and fair education for the transition from ESD to higher education. Context: Higher education.

2.1. Search Criteria

The selection criteria of the databases are based on their lines of deepening or research topics. In the case of ERIC, it mainly includes research on teaching, training, and education. This source is endorsed by the National Institute of Education of the United States Department of Education [20]. Science Direct stands out for having mostly publications focused on engineering with some scientific and academic topics [21]. For its part, Scopus is recognized for being the highest quality scientific navigator with references on science and technology, with miscellaneous topics. [21]. With this distribution of databases, it was sought to have wide coverage of publications. As well, have a wide spectrum from the geographical point of view.

The same entry criteria were selected for each of the databases, that is, publications with the keywords "Education for Sustainable Development" and "Environmental Engineering". Only articles published in scientific journals were taken into account as search criteria, to limit the search only to research with corroborated results, therefore, conference proceedings were excluded. The search was restricted to documents written in English or Spanish. The acronym for ESD was taken into account. The general search equation used was: TITLE-ABS-KEY (("ESD" OR "Education for sustainable development") AND "environmental engineering") AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT -TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Spanish")). The summary of the methodology process, search results, and other criteria can be seen in Figure 1.

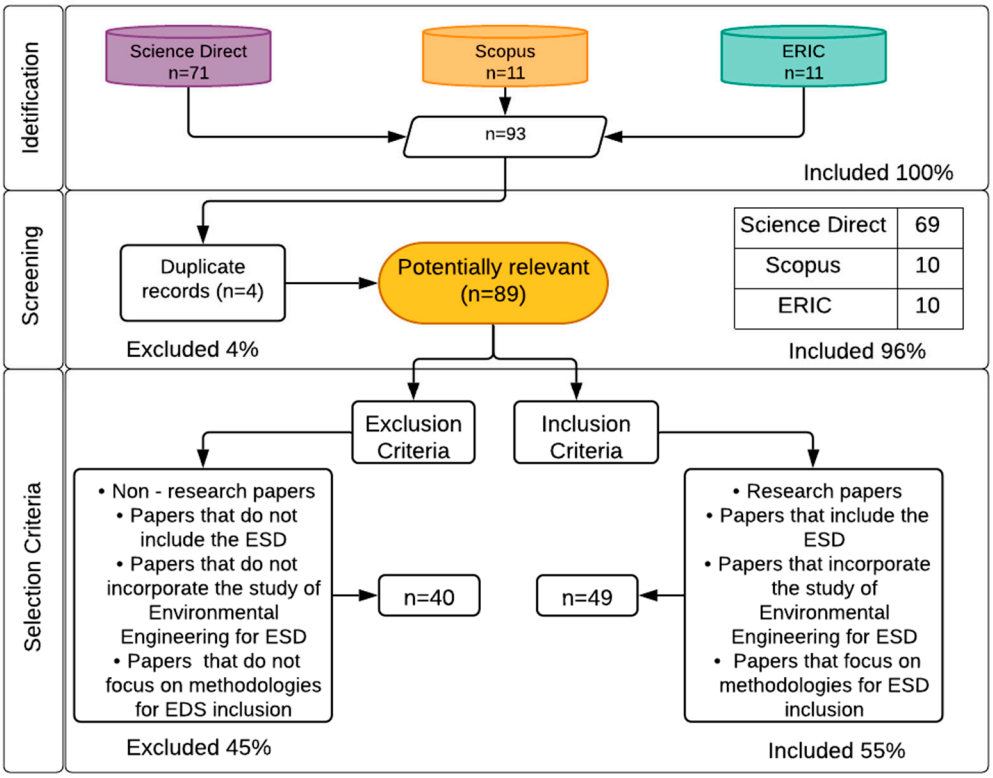

Figure 1. Search flow adapted from methodological flow suggested by PRISMA.

2.2. Data Extraction and Analysis

Of the three databases, 89 articles were obtained after applying the inclusion and exclusion criteria. This is to extract only the information to answer each of the research questions. Within the planning phase, there is also the quality evaluation checklist, allowing to visualize the results with a greater relation to the search terms, there a weight qualification was assigned for each one, that is, it satisfactorily complies 4; highly complies with: 3; meets acceptably: 2; meets: 1 and does not meet: 0. Knowing that each article meets the general criteria to a greater degree than others, these being evaluated in ranges of lesser importance.

For the conductivity phase, an organized data extraction form was made to answer the research questions; In this step, the research team carried out an exhaustive reading of each article, to have as much data extraction as possible.

3. Results

With this SLR, it seeks to answer the research questions that were posed, however, we also observed that it was important to classify the results by geographical regions. Therefore, the environmental problems require participatory teaching and learning methods that motivate and generate autonomy. Not only at the educational level, but also at the social level, to facilitate the application of measures to archive SD [22]. The geographical distribution of ESD in environmental engineering is shown in Figure 2. Europe stands out notably for understanding the practical bases of ESD and the importance of this as a reference guide for refining the standard of quality education in regions such as Sweden, France, United Kingdom, Spain, Austria, Switzerland, Holland, Germany, Greece, Denmark, and Finland.

In the case of the United Kingdom, it has the support of the British Council organization in charge of providing university educational opportunities for communities [23]. The higher education system is capable to prepare professionals linked to the elaboration and execution of advanced sustainable engineering projects [24]. In Spain, environmental and sustainability issues began in 1992, allowing specific actions of environmental management

and curricular greening and environmental research. However, most universities have used the discourse of quality management in their institutional management processes, where strategic plans are taken as a valid instrument for reconceptualization in light of the acquisition of values, objectives, and forms. In this way, over time a balanced and SD model is achieved [25].

However, in Asia, ESD was established in China, Oman, Israel, Iran, Vietnam, Palestine, and Japan. This geographical area has a social culture that encompasses multidisciplinary and interdisciplinary thinking. It should be noted that UNESCO seeks to support the undertaking of quality education, where universities are participatory axes in the construction of a green curriculum. It is noteworthy that the educational system is unequal in underdeveloped regions, where a formulation of supportive policies and an increase in educational financing is required, as a key to progress in the rapidly expanding quality of education [26].

America is not an exception, ESD is established in regions such as the US, Canada, Ecuador, and Mexico, where they are related to each other, declaring that education is a common good. Taking this situation into account, education has been reorienting towards SD through areas such as incorporating the notion of citizenship. Among the main objectives of the study plans, reoriented towards sustainability, are the teaching, learning, and evaluation systems, which account for the moral and ethical virtues and the capacity for collective work [27].

In the case of Africa, it is established in regions such as South Africa and Morocco, where universities have moved from having an education based on the social and human sciences to an education based on ESD. Thanks to the arrival of the international development community, led by the World Bank, investment indices are mainly destined for education. On the contrary, in Oceania, Cruz Verde Australia launched the EE program: the "Green Life Diary", based purely on environmental sustainability. Therefore, undergraduate students had the opportunity to develop and learn the skills of active citizenship, ethical understanding and critical thinking, integrated creativity, to protect and maintain the environment. Environment, in favor of regions and future generations [28].

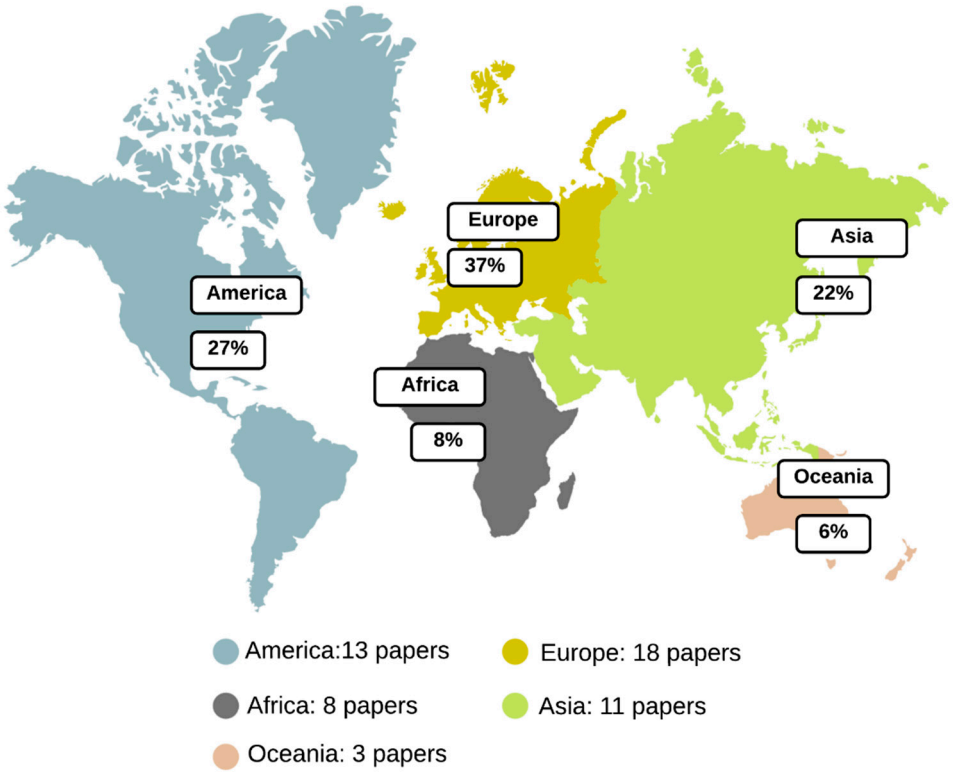

Figure 2. Inclusion of ESD by continent.

3.1. Competencies for Environmental Engineering Relating to ESD

The constant improvement of curricula is something inherent in education. These improvements are being sought from many areas and organizations. In the case of ESD, the United Nations have mentioned that it is a strategy that should be considered in this sense. The inclusion of ESD in the curricula raises the academic standards. As well, strengthens the capacity of individuals, groups, communities, organizations, and countries to pass judgments and elections to improve SD. It should be noted that self-criticism and ethics are two instruments that help to achieve a sustainable balance from the society-nature relationship [29].

Table 1 shows the different competencies included in environmental engineering, to improve the understanding and promotion of ESD in the curricula or the study plan. At this point, it should be clarified that the competencies are considered as the capacity for collective analysis in different domains (environment, society, technology, and economy). That is why decision-making focuses on knowledge that improves thinking systems [14].

Table 1. Results of the types of competencies used to achieve ESD.

Competencies	Percentage of Items
Work in the interdisciplinarity	19%
Critical thinking	13%
Anticipated self-knowledge	12%
Design capabilities of ethical-environmental systems	12%
Professional and ethical planning skills	11%
Understanding of a professional and ethical responsibility	10%
Ability to solve environmental, social, and economic problems	9%
Regulatory competencies	9%
Teamwork	5%

It is important to consider all these competencies as preliminary axes for the integration of knowledge and the management of complexity to formulate judgments that allow discerning a reflection or view of reality on the social and ethical responsibilities of the engineer [30].

3.2. University Strategies for Promoting SD

The globalizing trend of ESD generates in Higher Education Institutions allowing to direct the planning of the so-called "inter-learning". Promoting the different knowledge and knowledge that promote the SD. This can generate greater motivation, articulation, and interest in students and this case future environmental engineers [31].

The learning process cannot be neutral in the current situation of the social and environmental crisis that the planet is experiencing. ESD must be critical and active in the face of economic, environmental, and social development policies. In this sense, it should emphasize the deregulated and uncontrolled market generated by industries and entities that affects the environment. This means that for the SD to be accepted by some universities, managing to adjust it to social, economic, and environmental realities, without losing its meaning or essence [32].

In this sense, it can be observed in Table 2. The different eco-educational strategies are evidenced, focused exclusively on ESD within the environmental engineering programs. It was possible to show that these have been implemented to improve pedagogy and raise the indexes of quality and inclusive education. The purpose in all cases is similar and is the search to solve or overcome each of the global challenges related to environmental degradation, poverty, and inequalities.

Table 2. Results of the different strategies that promote SD and the SDG.

Strategies	Percentage of Items
Promote sustainable attitudes and environmental education behaviors	21%
Development of plans and projects	18%
Curricular structures	14%
Development of environmental and social reasoning programs	13%
Systemic thinking	12%
Investigation of social problems	11%
Multiple environmental strategies	11%

3.3. University Methodologies That Promote SD

University education focused on curricular sustainability can be defined as a way of directing and redirecting consciences and addressing the importance of eco-social values in engineering. To achieve this, the development of new ideas and sustainable engineering projects must be promoted to be shared with the community. The role of recent graduates is to become environmental leaders with social responsibility [33].

That said, Table 3 shows the university methodologies that favor the development of each of the competencies that are essential for strengthening ESD. This in turn stimulates cognitive, ethical, and affective aspects. Through the articles that were analyzed, it was hinted that university methodologies are intended to strengthen, promote and complement an inclusion of ESD [18].

Table 3. Results of university methodologies that promote SD.

Methodologies	Percentage of Items
Sustainable implementation of an educational curriculum	21%
Green engineering programs	16%
Sustainable research programs	15%
Sustainable technological projects	13%
Performance analysis models of sustainable systems and tools	10%
Models for economic decision making and project evaluation	9%
Introductory case study modules	8%
Perspectives of sustainability in educational approaches	8%

4. Discussion

The environmental and social challenges of the 21st century show the need for a lifestyle change in society. This is why education plays an important role in achieving the formation of balanced societies, based on the pillars of SD, the economy, technology, and the environment [16]. However, the first efforts to incorporate education on environmental issues in formal and informal educational settings under these precepts were not the best, due to the lack of will and institutional support [34].

The result of the SLR indicates that the university curricula of environmental engineering require greater incorporation of ESD. Implementation must go hand in hand with participatory teaching and learning methods [16]. ESD promotes the adoption of competencies such as critical thinking, the elaboration of hypotheses for the future, and the collective adoption of decisions, these promote the change of formal education where quality education is the objective [26].

The United Nations, especially in the period between 2005 and 2014, has promoted the formal inclusion of ESD in higher education so that universities are promoters of SD. Curricula must adopt a reflective character around sustainability as a field or concept, through the competencies of an interdisciplinary, diverse, and multimodal learning pedagogy [35]. Universities must also understand the importance of implementing evaluations or management plans that help determine the degree of incidence or understanding of the competencies, methods, and strategies that contribute to the implementation of sustainable projects [36].

From the point of view of other SLR, students must know the sustainability of each of the socially implemented projects [10]. The awareness of environmental engineering students about sustainability in the short, medium, and long term must be constant and with a lot of effort. In this sense, students must demonstrate their sustainability analysis skills before graduating [18].

Higher education standards around the world take SD into account. These are measured and certified by entities, such as ABET. These carry out accreditation processes in engineering, which include the importance of environmental sustainability [22]. This means that universities are constantly in educational innovation processes and always keeping in mind the demands of the planet that are disclosed from the UN [37].

On the other hand, today it is possible to think that the young teacher's program could be carried out, which allows the exchange of knowledge between different higher education institutions at the national and international level. This generates a strengthening of multiculturalism by creating common standards based on the inclusion and implementation of ESD. One of the strategies is to achieve this through projects that integrate sustainability and academic outings. To achieve this, there must be a restructuring and innovation of the study plans. With this research, it is possible to identify the competencies, strategies, and methodologies that can be applied in the curricula to advance in the achievement of SD with quality education [38].

On the other hand, regarding the SLR carried out in this study, it has been found that a large part of the articles found has a descriptive approach; therefore, it is difficult to show a broad panorama of the problems that concern ESD in higher education institutions. This is one of the differentiating points of this research. Since the focus on competencies, strategies, and methodologies that must be handled within the study plans for environmental engineering predominate. This is in comparison to other studies because in this one we also focus on promoting the inclusion of critical thinking and pedagogy with environmental activism [39]. In this way, the emergence of quality education, social education, or education for equality within the framework of ESD is guaranteed [40].

Among the most relevant results of the research, it is noted that the production of works on ESD in higher education institutions has multiplied exponentially; which allows the advancement of the scientific community around major current events such as the 2030 agenda [17].

On the other hand, it is noteworthy that the focus of this article leads to ESD being developed within the framework of critical pedagogy. That involves actors from the environmental, social, and economic environment. Thus, in this way, the creation of knowledge that is disseminated within the framework of environmental activism is encouraged. Within the concept of environmental activism, ESD is also involved as an influencing factor in the commitment to the environment and the possible actions that are carried out from science and the techniques learned. These generate solutions to economic, environmental, and social problems. These are the aspects of the context in which the dynamics of knowledge are carried out [35].

Strategic planning, in turn, generates innovation in SD, defining the values that enhance the economic, social, and environmental models. This strategy promotes the application of a multidisciplinary and comprehensive approach to education within the framework of SD, including modes of action based on responsibility, commitment, humanism, and justice. Implementing in this way environmental activism as a result of the commitment to the environment [35]. This ideology, in addition to having a comprehensive interdisciplinary approach, involves critical thinking as indispensable competency in the educational work of universities [41].

It is important to mention that the pedagogical approach continues to be a problem since it depends on the degree of inclusion of ESD in the curriculum. One possible effective response is green or green engineering research or projects, which should build on society and foster relevant activities with transformative goals [38]. In addition to taking into account a pedagogy with a critical approach as mentioned above. This theme, when

implemented, encourages a permanent questioning about the conflicts in the environment. Finally, to implement a route towards sustainability, it is necessary to integrate and in some cases create a sustainable methodology that denotes an eco-social educational curriculum [32]. In this sense, the curriculum must be capable of assertively transmitting knowledge and social realities, allowing ESD in higher education institutions to generate a clear focus on sustainability and multidisciplinary [17].

5. Conclusions

The ESD is an important tool for the cognitive, ethical, and socio-affective formation of society and students [39]. The research questions focused on identifying the competencies, strategies, and methodologies that are used within the study plans of environmental engineering in higher education institutions. To do so, indicate that green programs and innovative tools are part of environmental pedagogy with a multidisciplinary approach based on systemic thinking [26].

ESD pedagogical tools, methodologies, and models are found in this research. They highlight the innovation and implementation of green or ecological engineering, as well as the use of ecological plans and collaborative research projects. These together with the use of basic science and engineering allow solving social problems [36]. The execution of the study plan allows carrying out the systematic evaluation of each of the curricular contents, which provides an opportunity to improve it [5].

It is important to highlight the complexity of the current situation since the standards of economic and global understanding that have been achieved in recent years do not allow us to see the true social and environmental context that has been generated long ago [19]. This is why environmental engineering requires actively guiding personal transformation, through a curricular change that fosters experiences, practices, methods, research workshops, green engineering projects, and young teacher programs (YMP).

With this it will try to transform the teaching and learning process of the students. Through improvement in the quality of the curriculum, and guaranteeing the quality of the innovative, environmental, ethical, and social commitment of engineers to serve the progress of SD [42].

After analyzing the actions that have been carried out and the 2030 agenda of the United Nations, ESD should be considered "very important" within universities and especially within environmental engineering [13]. This concept was born with the World Conference on Education for All (EFA) in 1990 and is maintained in the World Forum on education in 2000. stimulating the United Nations Decade of ESD 2005–2014 [13].

The determination of ESD is an emergent and dynamic approach, which implies a new vision of education, to generate responsible actions and attitudes in society in favor of the construction of the context of SD [36]. That is why universities have a constant ethical and collective commitment not only to research, technological innovation, and the generation of knowledge, but also to propose sustainable solutions that persevere in the short, medium, and long term [43]. However, economic development and administrative entrepreneurship, in many cases prevent the transformation of actions, tasks, and operations to viable projects that confirm a social and environmental effectiveness worldwide [22].

This is why it is recommended that society and the current young generations be committed to a greater degree with SD through quality and inclusive education, sustained under current standards and principles of innovative globalization [43]. That said, the research carried out using the SLR was effective, since it was possible to express and guide the competencies, strategies and methodologies that are subject to the pedagogical training of environmental engineering. However, it is necessary to develop more research and literature publications at the national and universal level that propose ideas and projects that seek the implementation of a balanced vision in favor of the environment, technology and the economy within engineering careers.

Author Contributions: P.M.A.C., A.Q.-D. and L.G.Á. contributed equitable and balanced to the elaboration of this paper, since all collaborated for the development, validation, evaluation of the edition, and execution of the implemented tools. All authors have read and agreed to the published version of the manuscript.

Funding: The APC was funded by the University of Salamanca.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data is contained within the article.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Sauvé, L. Environmental Education between Modernity and Postmodernity: Searching for an Integrating Educational Framework. *Can. J. Environ. Educ.* **1999**, *4*, 9–35.
2. Gijón Cuello, A. Problemas ambientales y educación ambiental en la escuela. *Cent. Nac. Educ. Ambient.* **2003**, *91*, 1–24.
3. Mora Penagos, W.M. Educación ambiental y educación para el desarrollo sostenible ante la crisis planetaria: Demandas a los procesos formativos del profesorado. *Cent. Investig. y Desarro. Científico Univ. Dist. Fr. José Caldas.* **2009**, *26*, 7–35. [CrossRef]
4. Herrera Travieso, D.M. Science, Technology and Environmental Health. *Inst. Nac. Hig. Epidemiol. y Microbiol.* **2007**, *7*, 1–19.
5. Acosta Castellanos, P.M.; Queiruga-Dios, A.; Encinas, A.H.; Acosta, L.C. Environmental Education in Environmental Engineering: Analysis of the Situation in Colombia and Latin America. *Sustainability* **2020**, *12*, 7239. [CrossRef]
6. Martínez Castillo, R. La importancia de la educación ambiental ante la problemática actual. *Rev. Electrónica Educ.* **2010**, *14*, 97–111. [CrossRef]
7. Domínguez, R.; Sánchez, J.; León, M.; Samaniego, J.; Sunkel, O. Recursos Naturales, Medio Ambiente y Sostenibilidad: 70 años de Pensamiento de la CEPAL. 2019. Available online: https://www.cepal.org/es/publicaciones/44785-recursos-naturales-medio-ambiente-sostenibilidad-70-anos-pensamiento-la-cepal (accessed on 17 August 2021).
8. Ramírez, R. La educación superior para el desarrollo sostenible. In Proceedings of the XI Coloquio Internacional de Gestión Universitaria; INPEAU: Florianópolis, Brazil, 2012; pp. 1–22. Available online: https://repositorio.ufsc.br/xmlui/handle/123456789/97851 (accessed on 17 August 2021).
9. Martínez Iñiguez, J.E.; Tobón, S.; Romero Sandoval, A. Problemáticas relacionadas con la acreditación de la calidad de la educación superior en América Latina. *ALEPH* **2017**, *17*, 1–18.
10. Litzner Ordóñez, L.I.; Ries, W. Education for Sustainable Development in the context of higher education in Bolivia. Perceptions of university professors. *Ed. Univ. Salamanca* **2019**, 149–173. [CrossRef]
11. Moghaddam, M.R.A.; Taher-Shamsi, A.; Maknoun, R. The role of environmental engineering education in sustainable development in Iran: AUT experience. *Int. J. Sustain. High. Educ.* **2007**, *8*, 123–130. [CrossRef]
12. William, R.; Avendaño, C. La educacion ambiental (EA) como herramienta de la responsabilidad social (RS). *Red Rev. Científicas América Lat. el Caribe España y Port.* **2012**, *35*, 94–115.
13. de la Rosa Ruíz, D.; Armentia, P.G.; de la Calle Maldonado, C. Education for sustainable development: The role of the university in the 2030 agenda transformation and design of new learning environments. *Prism. Soc.* **2019**, *25*, 179–202.
14. Sahakian, M.; Seyfang, G. A sustainable consumption teaching review: From building competencies to transformative learning. *J. Clean. Prod.* **2018**, *198*, 231–241. [CrossRef]
15. Casalvázquez Hernández, G. Educación para el Desarrollo Sostenible. Una nueva mirada para abordar los problemas desde la educación permanente. *E-Innova* **2015**, *44*, 1–10.
16. De la Peña, G.; Vinces, M. Acercamiento a la conceptualización de la educación ambiental para el desarrollo sostenible. *Cuba. Educ. Super.* **2020**, *39*, 39–52.
17. Zapater, J.L.M. La Educación Ambiental como catalizador del desarrollo sostenible en la educación superior 2015–2020. Revisión Sistemática. *Crescendo* **2021**, *11*, 443–462. [CrossRef]
18. Gonzalo Muñoz, V.; Sobrino Callejo, M.R.; Benítez Sastre, L.; Marín Coronado, A. Revisión sistemática sobre competencias en desarrollo sostenible en educación superior. *Rev. Iberoam. Educ.* **2017**, *73*, 85–108. [CrossRef]
19. Moher, D.; Liberati, A.; Tetzlaff, J.; Altman, D.G. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med.* **2009**, *6*, e1000097. [CrossRef] [PubMed]
20. Chacón Alvarado, L. ERIC Educational Resources Information Center. *Esc. Bibl. Doc. e Inf.* **2006**, *8*, 26–34.
21. Codina, L. Science Direct: Base de datos y plataforma digital de Elsevier. Available online: https://www.lluiscodina.com/science-direct-elsevier/ (accessed on 17 August 2021).
22. Vásquez Vargas, M.J. Educación para el desarrollo sostenible (EDS). *Friedrich Eberrt Stift. Am. Cent.* **2014**, *7*, 1–12.
23. Sauvé, L.; Brunelle, R.; Berrryman, T. Educar para el deba a el debate Políticas nacionales y educación ambiental. *Red Rev. Científicas América Lat. el Caribe España y Port.* **2006**, *8*, 75–88.

24. Jermey, D.; Donnelly, M. Capacidades de Enseñanza y Formación del Reino Unido. Available online: www.gov.uk/ukti-education (accessed on 17 August 2021).
25. Benayas del Álamo, J.; Marcén Albero, C.; Alba Hidalgo, D.; Gutiérrez Bastida, J.M. Educación para la Sostenibilidad en España. Reflexiones y propuestas. Available online: https://www.miteco.gob.es/es/ceneam/recursos/pag-web/educacion-sostenibilidad-espana.aspx (accessed on 17 August 2021).
26. Xiong, H.; Fu, D.; Duan, C.; Liu, C.E.; Yang, X.; Wang, R. Current status of green curriculum in higher education of Mainland China. *J. Clean. Prod.* **2013**, *61*, 100–105. [CrossRef]
27. Moreno Plata, M. La agenda de la educación para el desarrollo sostenible en la planeación del desarrollo nacional en México. *Int. J. Stud. Educ. Systes* **2013**, *1*, 51–68.
28. Erbacher, L. *Enfocándonos en lo esencial: Infundir Valores de Sostenibilidad en la Educación Experiencias de EDS con la Carta de la Tierra*, 1st ed.; Vilela, M., Jiménez, A., Eds.; Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura: San José, CA, USA, 2014; ISBN 978-9977-925-95-0.
29. Jickling, B. A Future for Sustainability? *Water. Air. Soil Pollut.* **2000**, *123*, 467–476. [CrossRef]
30. Perpignan, C.; Baouch, Y.; Robin, V.; Eynard, B. Engineering education perspective for sustainable development: A maturity assessment of cross-disciplinary and advanced technical skills in eco-design. *Procedia CIRP* **2020**, *90*, 748–753. [CrossRef]
31. Ramírez Castillo, J.F. *Criterios de la Educación en Torno al Desarrollo Sostenible Para Cumplir el Objetivo de Calidad en la Educación en la Comunidad Educativa (Caso Liceo Psicopedagógico Ebenezer–LPE) Bogotá–Colombia*; Maestría en Proyectos de Desarrollo Sostenible Virtual: Bogotá, Colombia, 2021.
32. Sánchez, O.Z. El reto de las universidades públicas de México para incorporar una educación pertinente acorde con la sustentabilidad. *RIDE Rev. Iberoam. para la Investig. y el Desarro. Educ.* **2021**, *11*, 1–23. [CrossRef]
33. Arango, S. *Educar Para la Sostenibilidad en la Universidad: Una Propuesta Didáctica Para el Fortalecimiento de Competencias*; Universidad de Ciencias Aplicadas y Ambientales: Bogotá, Colombia, 2020.
34. Bilge, P.; Seliger, G.; Badurdee, F.; Jawahir, I. A Novel Framework for Achieving Sustainable Value Creation through Industrial Engineering Principles. *Procedia CIRP* **2016**, *40*, 516–523. [CrossRef]
35. López-Ruiz, C.; Flores-Flores, R.; Galindo-Quispe, A.; Huayta-Franco, Y. Pensamiento crítico en estudiantes de educación superior: Una revisión sistemática. *Rev. Innova Educ.* **2021**, *3*, 374–385. [CrossRef]
36. Rahmat, R.A.O.K.; Rashid, K.A.; Chik, Z.; Badaruzzaman, W.H.W. Capstone Project to Satisfy EAC Criteria. *Procedia Soc. Behav. Sci.* **2012**, *60*, 615–619. [CrossRef]
37. Queiruga-Dios, M.; Santos Sánchez, M.J.; Queiruga-Dios, M.Á.; Acosta Castellanos, P.M.; Queiruga-Dios, A. Assessment Methods for Service-Learning Projects in Engineering in Higher Education: A Systematic Review. *Front. Psychol.* **2021**, *12*, 2817. [CrossRef] [PubMed]
38. González, M.E.; Londoño, S.S.; Méndez, L.C.; Martínez, M.V. Educación Para La Sostenibilidad En Ingeniería Ambiental Como Aporte Al Desarrollo Social. *Encuentro Int. Educ. en Ing.* **2020**, *32*, 12–36.
39. Gutiérrez-Allccaco, K.F.; Medina-Zuta, P. El pensamiento crítico reflexivo: Competencia esencial en la formación del arquitecto. *Maest. y Soc.* **2021**, *18*, 199–216.
40. Alonso-Sainz, T. Educación para el desarrollo sostenible: Una visión crítica desde la Pedagogía. *Rev. Complut. Educ.* **2021**, *32*, 249–259. [CrossRef]
41. Díaz-Canel Bermúdez, M.; Ortiz, R.A. Potencial humano, innovación y desarrollo en la planificación estratégica de la educación superior cubana 2012–2020. *Rev. Educ. Cuba* **2020**, *39*, 104–117.
42. Bascop, M.; Perasso, P.; Reiss, K. Systematic Review of Education for Sustainable Development at an Early Stage: Cornerstones and Pedagogical Approaches for Teacher Professional Developmen. *Sustainability* **2019**, *11*, 719. [CrossRef]
43. Chacón, R.; Montbrun, N.; Rastelli, V. La educación para la sostenibilidad: Rol de las universidade. *ARGOS* **2009**, *26*, 50–74.