

The Interrelationships Between the Sustainable Development Goals and Higher Education Institutions: A Systematic Literature Review

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Received: July 26, 2022 Accepted: August 29, 2022 Published: August 30, 2022

doi:10.5296/jet.v10i1.20227

URL: <https://doi.org/10.5296/jet.v10i1.20227>

Abstract

The objective of this systematic literature review (SLR) is to analyse the interrelationships between the Sustainable Development Goals (SDGs) and Higher Education Institutions (HEIs) based on the search for papers in the Web of Science (WoS) and SCOPUS databases. It was found that these interrelationships exist and are significant. The education and skills offered by the HEIs are essential for the development and understanding of the issues that arise and that urgently need to be resolved, namely compliance with the SDGs. On the other hand,

HEIs must integrate the SDGs in their internal processes and in the course syllabuses, raising awareness and training students on issues related to the SDGs. Thus, those responsible must adopt educational policy at Higher Education (HE) that raise awareness of faculty and students all over the world to contribute with their knowledge, creativity and skills to the pursuit of the SDGs.

Keywords: sustainable development goals, sustainability, education, universities, higher education

1. Introduction

According to *World Population Prospects: The 2019 Revision*, world population is about 7.8 billion and will be 8.5 billion by 2030. If this growth rate continues it will take three planet Earths to provide the resources needed to maintain current lifestyles (Lauret et al., 2019).

The 2030 Agenda is the natural sequence of the Millennium Development Goals (MDGs) proposed in 2000 (with 8 major goals and 22 targets) to be achieved by 2015. Having achieved these goals, despite a significant reduction in inequality, many problems persisted. Extreme poverty continued to affect 836 million people, hunger affected 12.9% of the world population and the climate threat gained renewed momentum every year (UN, 2020). The United Nations (UN) then established the 17 SDGs (Figure 1), and the corresponding 169 targets and 230 indicators (UN, 2015). For the first time, all nations agreed on this set of goals (Sachs et al., 2019).

It is important to understand that education is not only an SDG in itself, but also a mean of achieving the others (United Nations, 2015).

Therefore, HEIs play a key role in the implementation of the 2030 Agenda (Yemini, 2021), as developing sustainability skills is a way to promote it (Albareda-Tiana, 2019). Universities are in a unique position to lead the implementation of the SDGs as they educate and train people, developing and transferring knowledge and leveraging research (Mawonde & Togo, 2019), as recognised by UNESCO (UNESCO, 2017) when proposing the establishment of learning objectives oriented towards the SDGs.



Figure 1. The SDGs proposed by the UN in 2015

Source: <https://sdg-tracker.org/>

Sustainable development (SD) means meeting the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland & Khalid, 1987; Loureiro, Ferreira & Simões, 2019; Loureiro, Ferreira & Simões, 2021a; Loureiro, Ferreira & Simões, 2021b). Sustainability is understood in a global, interdisciplinary and multifaceted dimension, focusing on people's lives and their values (Loorback et al., 2017), covering all its dimensions so that the world achieves, as a priority, greater social well-being in an inclusive way for all.

Two SLRs on SDG4.7 and education have been found (Edwards Jr. et al, 2020; Chiba et al, 2021) but none that helps understand the relationship between HEIs and the SDGs, so this SLR fills this gap.

The research question was to understand how the SDGs and HEIs are interrelated.

2. Methodology

An SLR provides a comprehensive overview of the literature on a given topic, synthesising previous studies and strengthening knowledge creation (Paul & Criado, 2020). It minimises the occurrence of biases in the conclusions because it uses scientific research whose results and conclusions were published with a content review, ensuring its quality and credibility (Tranfield, 2003). It constitutes an important basis for research, enabling the development of knowledge, the creation of guidelines for policy and practice, providing evidence of a given effect and, if carried out well, acting as a support for the development of new ideas, new lines of research and new theories (Snyder, 2019; Tranfield, 2003).

The present SLR focused on the topic "The interrelationships between the Sustainable Development Goals and Higher Education Institutions" started with a search for papers in the WoS, conducted on 19 April 2021, with the search equation based on the terms "Sustainable Development Goals" AND "Universities" AND "Higher Education" in topic, having obtained 463 documents. After filtered by Education Educational Research or Business, between the years 2016 and 2021, since it was only in September 2015 that the UN defined these goals, we obtained 161 documents.

These filters increase the likelihood of finding papers that address the SDG/HEIs interrelationship by focusing primarily on research in education and HEIs. After reading, the documents that did not focus on the SDG/HEIs interrelationship were excluded, obtaining 31 documents. From the search in SCOPUS with the same search equation, 28 documents were obtained, 4 of them were in the previous search and 11 were outside the scope of the study, with 13 documents remaining. To decide what papers should be included or not, all the authors read all the papers and in the end the results were analysed together. The final number of documents used in this study was 44 (Figure 2).

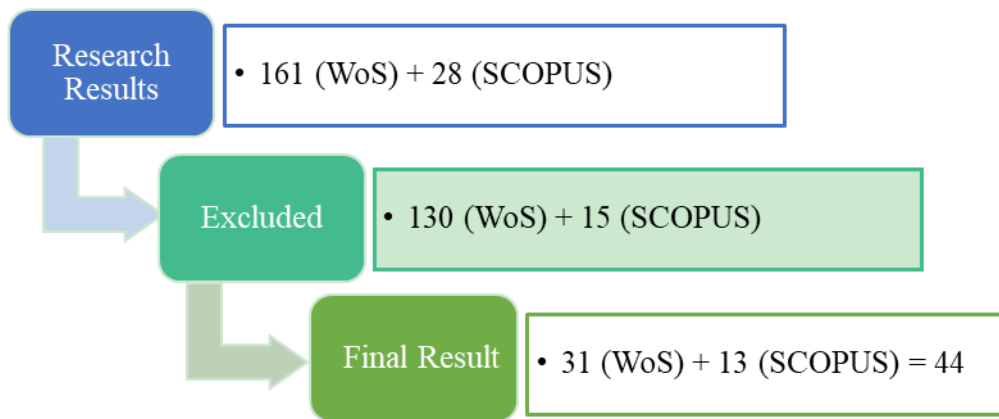


Figure 2. Paper collection process

Figure 3 describes the selection process used to obtain the final number of papers for analysis

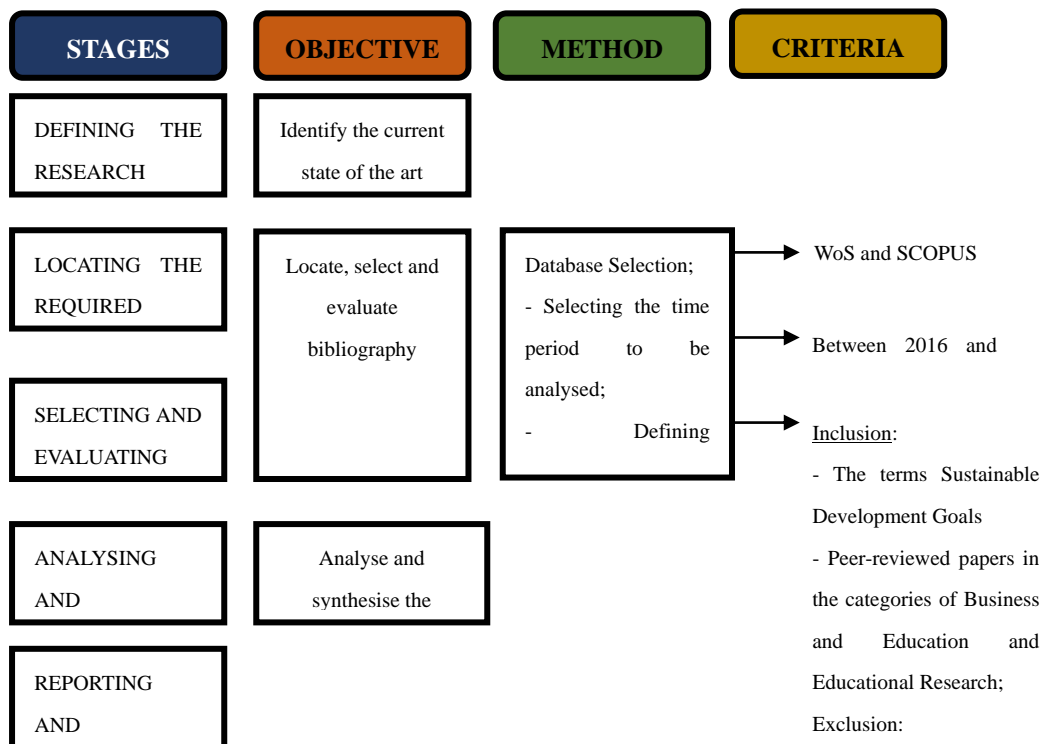


Figure 3. Description of the paper selection process

3. Results and Discussion

Based on the final list of papers from the two databases it was found that the journals that publish the most on this topic are the International Journal of Sustainability in Higher Education, Higher Education, International Journal of Management Education and Journal of Geography in Higher Education with 13, 8, 3 and 2 papers (Figure 4) respectively.

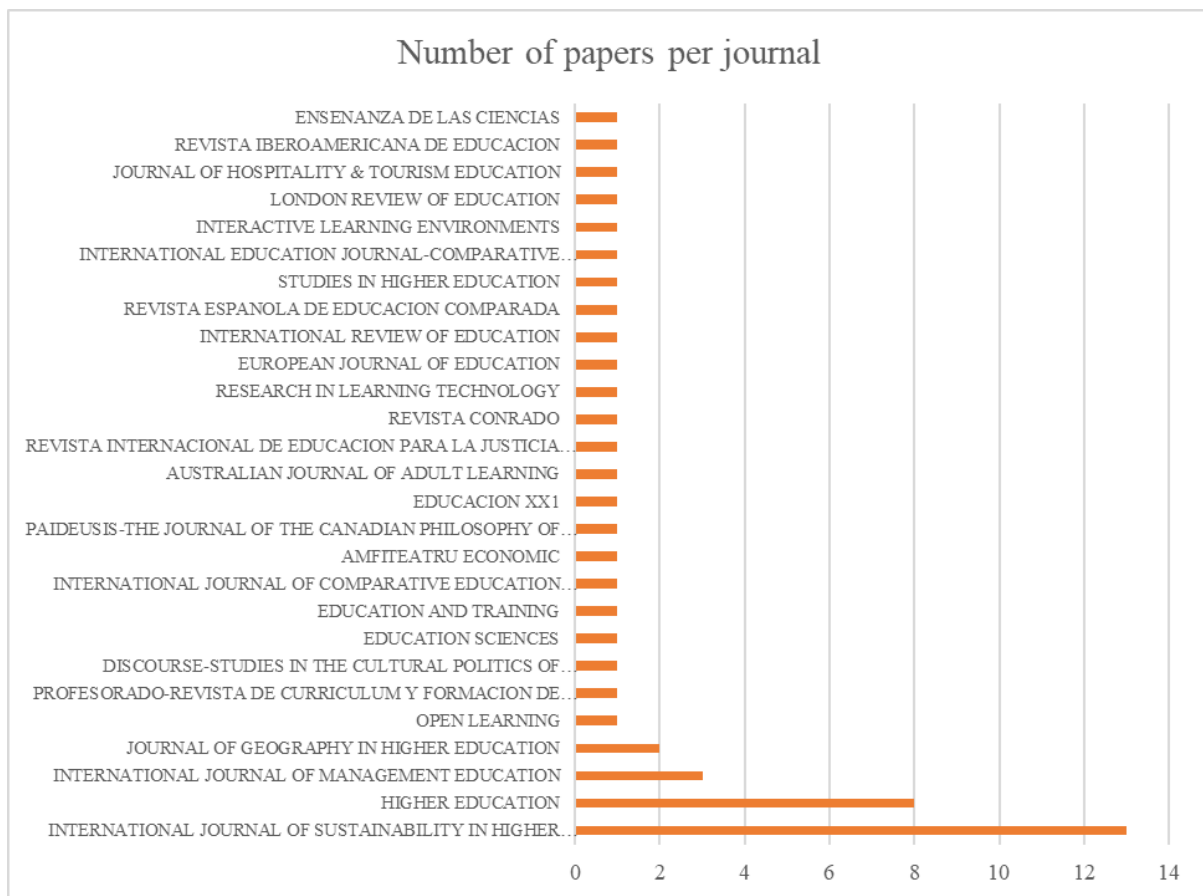


Figure 4. Number of papers per journal

The year 2018 is the one with less publications and 2020 had the most (Figure 5), and 2021 will probably surpass 2020 due to the growth rate observed.

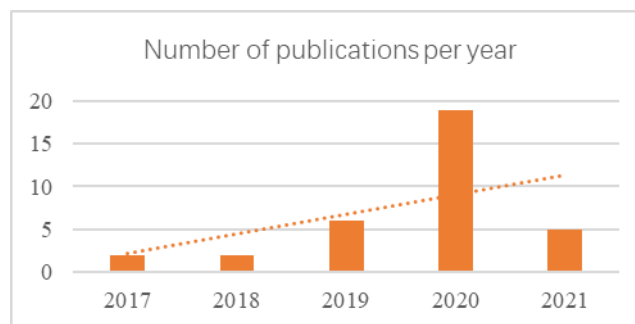


Figure 5. Number of publications per year

The present SLR allowed the identification of the main topics related to HEIs and SDGs: the contributions of the HE/HEIs to the SDGs, the incorporation of the SDGs in HEIs syllabuses and internal processes (Table 1).

Table 1. Clusters and respective authors

Topic	Authors
1. HEIs/HE contributions to the SDGs (18 papers)	<ul style="list-style-type: none"> - Abeywardena et al., 2019 - Cai, 2020 - Chankseliani et al., 2020 - Ferguson & Roofe, 2020 - Hirsu et al., 2021 - Jamison & Madden, 2021 - Kolb et al., 2017 - Lange Salvia et al., 2020 - Manolis & Manoli, 2020 - Milton, 2021 - Owens, 2017 - Owusu-Agyeman, 2020 - Perales Franco & McCowan, 2020 - Rebelatto et al., 2019 - Sanabria-Suárez et al., 2020 - Sonetti et al., 2019 - Wubah et al., 2020 - Yemini, 2021
2. Incorporation of SDGs into HEIs' syllabuses (14 papers)	<ul style="list-style-type: none"> - Albareda-Tiana et al., 2017 - Albareda-Tiana et al., 2018 - Aleixo et al., 2020 - Argento et al., 2020 - Bell et al., 2017 - Chaleta et al., 2021 - Crespo et al., 2017 - Hadjeris, 2021 - Lembani et al., 2019 - Mawonde & Togo, 2019 - Michalopoulou et al., 2019 - Quadrado et al., 2019 - Ramos Torres, 2020 - Veiga Ávila et al., 2019
3. Incorporation of the SDGs into HEIs' internal processes (5 papers)	<ul style="list-style-type: none"> - Fleacă et al., 2018 - Hamdan, 2020 - Kioupi & Voulvoulis, 2020 - Leal Filho, 2020 - Purcell et al., 2019
4. Other aspects relevant to the research (contributions of teacher training, scholarships, happiness and well-being, students with special needs) (7 papers)	<ul style="list-style-type: none"> - Chisingui & Costa, 2020 - Blanco-Portela et al., 2020 - Campbell et al., 2020 - Heleta & Bagus, 2020 - Antó et al., 2021 - Munar et al., 2020 - Diaz-Vega et al., 2020

Realising that the prosperity of people and societies is possible through inclusive economic growth in all countries and regions, sustainable development has drawn the attention of civil society, the business sector and the scientific community (Fleacă et al., 2018), recognising the impact of education on the ability to deal with the challenges and opportunities arising from development (Fleacă et al., 2018).

Based on the literature reviewed, a framework was built (Figure 6) relating the main aspects that allow to understand the relationship between the SDGs and HEIs, and the interrelationship between both is clear. HEIs, by creating and developing knowledge and skills, enhance research and innovation, contributing to all SDGs which, in turn, will be reflected in the HEIs through the inclusion of this topic in course syllabuses as well as in internal processes.

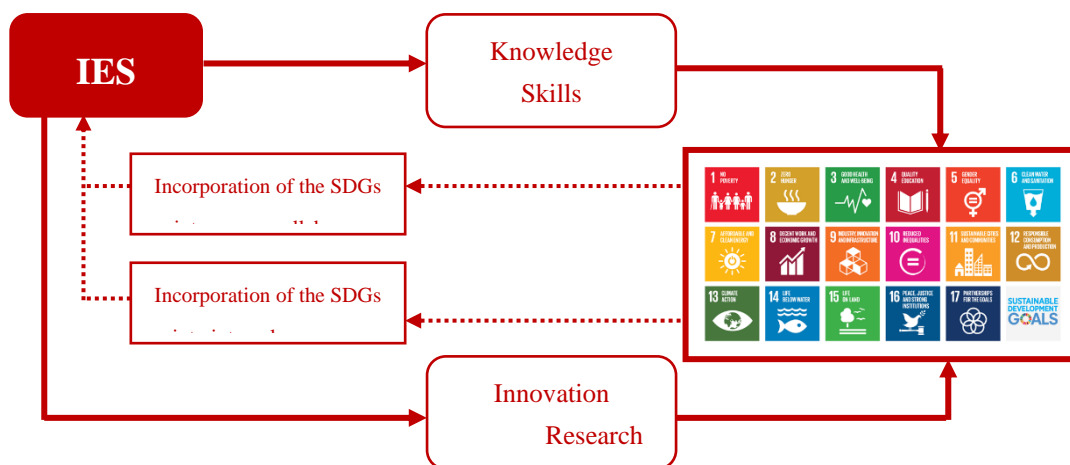


Figure 6. Framework on the impact of the SDGs on higher education and the other SDGs

The European Union has renewed its agenda for education by drawing attention to the importance of HE in society, promoting its effectiveness and efficiency, skills development, building inclusive HE, ensuring that HEIs contribute to innovation (Simões et al., 2014; Silva et al., 2014; Fleacă et al., 2018).

3.1 HEIs/HE Contributions to the SDGs

While communities strive to achieve the SDGs by 2030, university students' learning, experience and understanding of poverty remain unexplored, and it is essential to understand what they think and how they see poverty and other current issues, and it is imperative to increase their skills and understanding to contribute to the SDGs (Cai, 2020).

Within the framework of the SDGs, HE plays a key role in social challenges, poverty reduction, ensuring sustainable livelihoods and environmental protection and should be deeply involved in the process (Ferguson & Rooft, 2020). There has been a lack of imagination in the institutional forms that can help sustain this vision, which Perales Franco and McCowan (2020) show exist in the Universidad Intercultural Veracruzana (Mexico). To respond to SDG4 the university must open its doors to marginalised populations to, through teaching, research and community engagement, contribute to environmental protection, health, livelihoods, gender equality, among other SDGs (Perales Franco & McCowan, 2020).

HE is also reflected in SDG5 by contributing to gender equality and girls' empowerment (Hirsu et al., 2021), however in several countries there are still huge differences between men and women, who see their careers penalised when they become pregnant, for example. Results from studies in Iran and the Philippines show that while recent gender policies have allowed women to develop robust careers, contributions beyond the university remain limited due to long-standing patriarchal structures, mistrust in women's professionalism and unchanged systemic constraints. However, there are places where women want to maintain traditional social and family roles while having professional careers (Hirsu et al., 2021).

Kolb et al. (2017) consider that an education of quality has a direct impact on several SDGs such as: 8 (decent work and economic growth); 9 (innovation and infrastructure); 12 (sustainable production and consumption) and 17 (partnerships for development). Thus, by improving the education of managers, better results are achieved in these SDGs. Decent work and economic growth (SDG8) are possible by reducing child labour or increasing the number of women-owned businesses in the supply chain. Innovation is driven by education, which boosts cleanliness, water quality and sanitation (SDG6), clean and affordable energy (SDG7), underwater life (SDG14) and life on land (SDG15). All these SDGs require innovation to meet the challenges of the future. Responsible consumption and production (SDG12) are crucial for the sustainable future of businesses, and it is necessary to improve consumer education and integrate them sustainably into company strategy (Romero-Jordán et. al., 2013; Kolb et al., 2017). The same authors point out that managers need empathy and agility to articulate and advocate a sustainable value approach, which is not easy. Relationship management is another critical aspect in building resilience, with a direct impact on SDG17 (Kolb et al., 2017). Today, management training focuses heavily on the social and personal skills that are indispensable for establishing partnerships to achieve the SDGs. By setting their priorities regarding SDG4 business schools are indirectly contributing to the other SDGs (Kolb et al., 2017). The figure 7 shows how SDG4 impacts all the others SDGs, as shown above.

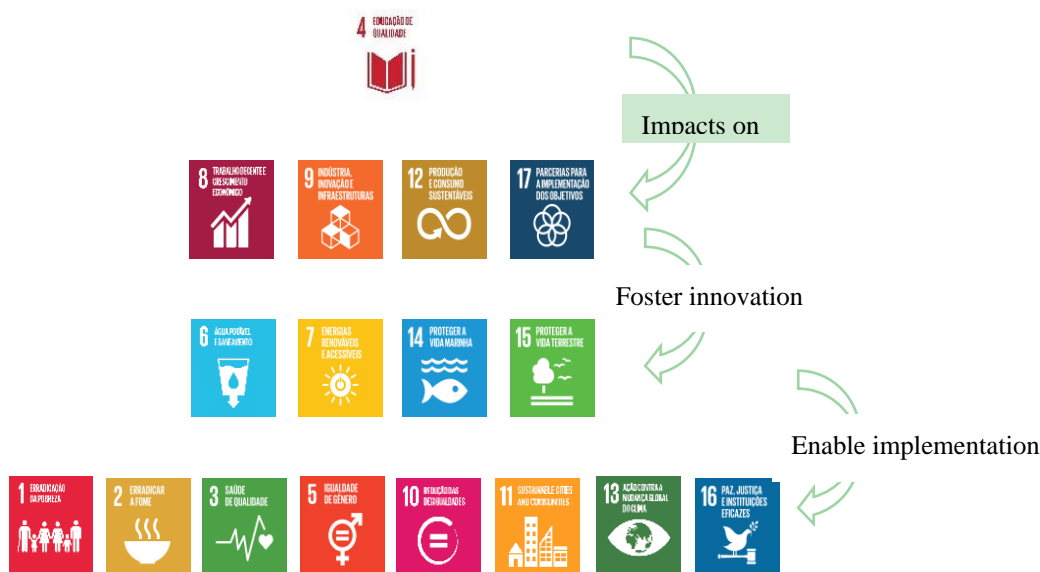


Figure 7. The impact of the SDG4 on the others SDGs

Source: adapted from Kolb et al (2017).

HEIs and HE can contribute to energy efficiency by implementing systems in their facilities that contribute to energy sustainability and by training and raising awareness of these issues among their students (Rebelatto et al., 2019 Lange-Salvia et al., 2020).

Milton (2021) focuses on the difficulty for fragile and conflict-affected countries to achieve SDG16 (peace and justice), analysing how HE can contribute to this SDG through training,

research, governance and external leadership, looking at four dynamics that influence universities in these difficult contexts: resource mobilisation and the public good; securitisation; academic freedom, insecurity and politicisation.

One of the critical aspects for the pursuit of the SDGs is communication, which is essential in raising students' awareness of sustainability issues (Manolis & Manoli, 2020). They studied how students in Georgia and Kazakhstan view the contribution of universities in addressing sustainable development challenges and how universities work with government and the private sector to fulfil their development potential, finding that limited academic freedom and institutional autonomy prevent the full realisation of HE potential (Chankseliani et al., 2020).

Jamison and Madden (2021) refer that greater capacity for civic engagement can contribute to sustainable development and that, although alumni experiences vary, most have greater engagement after completing their studies. The most relevant skills that may have contributed to this engagement include improved research skills through the development of hard and soft skills, widening of their networks and greater confidence due to the high education they have achieved (Jamison & Madden, 2021).

Owens (2017) concludes that there are two key factors for HE to play a relevant role in the sustainable development framework: publicly funded research and regional partnerships in HE. The lack of understanding of the importance of education for sustainable development by many individuals and institutions creates a gap in knowledge and practice in HE. Thus, Owusu-Agyeman (2020) proposes the adoption of an "ecosystem" that incorporates research networks, national sustainable development activities, institutional structures and leadership and the SD concept of the 2030 Agenda into the syllabuses of Ghanaian HEIs. A study whose objective was to provide an example of how HEIs can use a successful infrastructure project to fund a successful platform through a student and faculty-led community working on the SDGs, concluded that as HEIs face increasing financial challenges, opportunities arise for capitalisation through philanthropic and other donations to support community prosperity and enhance university vitality through a shared responsibility paradigm centred on the SDGs (Wubah et al., 2020).

Open educational resources are teaching, learning and research materials that take place through any medium - digital or otherwise, are in the public domain and have free and unrestricted access (Abeywardena et al., 2019), so they contribute to SDG4 by extending access to education to populations that might otherwise struggle to access it.

3.2 Incorporating the SDGs into the Syllabuses

It is important to incorporate education for sustainable development and the SDGs in university syllabuses (Albareda-Tiana et al., 2018; Ramos Torres, 2020) through participatory processes, involving everyone and including sustainability skills in teaching-learning processes through consistent, ethical, holistic, complex, global and interdisciplinary methodologies that foster university social responsibility (Albareda-Tiana et al., 2018).

There are still gaps in syllabuses and various difficulties in the promotion of SD in higher education by institutions (Albareda et al., 2017). Michalopoulou et al. (2019) discuss how a

chemistry course can be reviewed from a SD perspective by adopting interdisciplinary approaches based on systemic thinking and the SDGs, showing the need to develop new types of scientists, with deep knowledge about their discipline, but with a holistic view of the relationship with the others and with skills that enable them to contribute to the solutions of a human-environment interaction system.

Also, in engineering education it's necessary to introduce the SD principles in the training process (Quadrado et al., 2019) that allows future professionals to apply them.

In Portugal, Aleixo et al. (2020) studied the vertical integration of the SDGs in public HEIs concluding that universities have more courses in SDG areas than polytechnics schools and that masters' degrees adopt the SDGs more than undergraduate degrees, with the majority of courses addressing the SDGs in the areas of social sciences and humanities and natural and environmental sciences. Transdisciplinary is important to integrate sustainability into syllabuses not overlooking the differences between scientific areas (Argento et al., 2020) and the importance of dialogue. The University of Évora (Chaleta et al., 2021) analysed the incorporation of the SDGs into the courses syllabuses and found that, in addition to SDG4, the most cited were related to SDG5, 8, 10 and 16. The Economics and Management department had more objectives related to work and economic growth, while the others mentioned more objectives related to inequalities, gender and others (Chaleta et al., 2021). The main barriers to initiatives for sustainability in universities are the lack of planning and focus, of an environmental committee, of applicability and continuity of actions and resistance to change (Veiga Ávila et al., 2019).

In Vigo University, Spain (Crespo et al., 2017) student papers from the Master of Science in Thermal Engineering were analysed to assess the students' ability to incorporate sustainability principles in their work. It was found that they generally do not consider, or consider to a lesser degree, the economic criteria as opposed to the environmental, technical and social dimensions. The environmental sub-criterion was applied to a greater extent in the development of the works. However, the technical and social dimensions were included to a greater or lesser degree, depending on the type of work developed (Crespo et al., 2017).

Higher education is undergoing profound changes due to technology, demographics, globalisation and longer life expectancy (Bell et al., 2017). The unanticipated transition from traditional face-to-face education to distance learning due to COVID-19 has not only posed challenges in different contexts globally, but also caused disparities in access to education (Hadjeris, 2021). This opportunity for distance learning (Mawonde & Togo, 2019) still has barriers to overcome, yet it can be a key factor in SD education allowing access to higher education for many students who would otherwise struggle to gain access (Bell et al., 2017).

However, access to distance education cannot be separated from the debate around the access to information and communication technologies (Lembani et al., 2019). The responses of the different HEIs during the Covid-19 crisis showed that equity at the global level does not exist. The different online teaching models implemented, the practices and methods used by HE teachers under this new teaching model and the different challenges encountered during this transition, showed the prevailing disparities: difficult internet connections, software,

motivation, online teaching culture and teacher education and training (Hadjeris, 2021), which hinders quality education for all. HEIs and governments will need to address issues such as internet access and quality, the timeliness and distribution of hardware and software, lack of motivation and culture of online teaching, issues that pose difficulties for teachers without education and training in this area (Hadjeris, 2021).

Sanabria-Suárez et al. (2020) propose a methodology for assessing the academic capacities of HEIs in Bogotá in relation to the SDGs. The context in which universities can collaborate and contribute to the triggering of values, attitudes and behaviours for the sustainability of the future of societies was studied by Sonetti et al. (2019). Yemini (2021) noted the relevance of the role of HEIs/HE in the implementation of the SDGs and studied the impact of higher education on the adoption of the SDGs in Israel, identifying inconsistencies between the role of HE in the SDGs and the political discourse, namely the misalignment between the structure and function of higher education in relation to the internationalisation strategies adopted and the role attributed to HE in the SDG discourse.

3.3 Incorporation of the SDGs into HEIs' Internal Processes

Considering the role of higher education in the progress of society through promoting sustainable development, respect for human rights, fighting corruption and developing citizenship, innovation and entrepreneurship, Fleacă et al. (2018) addressed the lack of capacity of HEIs to incorporate these principles and practices. These authors analysed university processes and developed a model to guide HEIs through changing their daily operations necessary to meet SD goals, which can be customised and harmonised according to the different circumstances and priorities of HEIs. Kioupi & Voulvoulis (2020) developed a framework for assessing the contribution of HEIs in relation to their programmes to sustainability, reviewing the alignment of intended learning outcomes with sustainability based on the SDGs.

Hamdan (2020), Pacheco et al. (2021a) and Pacheco et al. (2021b) propose fundamental changes in education and HE, namely in innovation and entrepreneurship, which are essential to achieve the SDGs.

Leal Filho (2020) recalls the urgency of accelerating the process so that we do not reach 2030 without meeting the SDGs, presenting areas where acceleration is needed in a university context, namely specific funding for the SDGs, better integration between topics related to the 17 SDGs in syllabuses and greater use of the know-how and skills of academics by governments and the UN. Universities are the engines of social transformation by educating global citizens and providing knowledge and innovation for society (Purcell, 2019) indispensable to the pursuit of the SDGs, so collaboration and transdisciplinary are essential.

3.4 Other Aspects Relevant for the Study

3.4.1 Teacher Training

Research studies in universities in Spain, Colombia, Peru and Chile (Blanco-Portela et al., 2020) have shown that, although training of university teachers in sustainability is crucial,

there is still a lack of support, commitment and recognition. However, there are synergies and interpersonal and interinstitutional networks that overlap the obstacles and favour the exchange of management models and teaching practices (Loureiro et al, 2018; Blanco-Portela et al., 2020).

Chisingui and Costa (2020) studied how initial teacher training promotes the SD Agendas (2030 and 2063 for Africa) concluding that it is not yet taken into consideration in the biology syllabus of the institution where the study was conducted, nor are there guidelines for it to become so. Despite this, several documents regarding student work show that future teachers tend to select topics related to the environment and local social problems such as deforestation and social inclusion due to genetic problems like albinism, which can be considered linked to the SDGs.

3.4.2 Scholarships.

One of the UN's proposals to encourage the populations of poorer countries to access HE is through international scholarships, opening the doors of universities in rich and developed countries to them (United Nations, 2015).

A scholarship programme analysis in Ghana and Nigeria found that alumni consider education, formal or informal, to be the key element for social change and development in their countries, highlighting that education leads to social change through university education and citizenship and human rights education (Campbell et al., 2020). However, Heleta and Bagus (2020) argue that while SDG4, target 4.3, calls for ensuring equal access to affordable and quality technical, vocational and tertiary education for all women and men worldwide by 2030, the SDGs lack targets to make this a reality in many countries where HE requires reform and restructuring. According to these authors, it would be better to support these countries to (re)build and strengthen their fragile HE systems and institutions. Target 4.7 (SDG4) aims to give an opportunity to a privileged group of individuals to study at universities in developed countries. These measures have failed in the past and will only lead to the creation and maintenance of dependence on foreign aid, with a chronic lack of capacity continuing to exist in many of these countries, which still run the risk of seeing the best students staying in the countries where they studied, because in their countries of origin they do not have the same opportunities and conditions, creating a vicious cycle that is impossible to break in this way (Heleta & Bagus, 2021).

3.4.3 Happiness in the Workplace

Munar et al. (2020) assess how perceived organisational happiness in the context of higher education institutions (HEIs) can support the SDGs. Six dimensions of organisational happiness are considered: meaning, trusting relationships, positive emotions, engagement, achievement and recognition, and personal and professional development. The results showed that there is a favourable outlook on workplace happiness and well-being across all dimensions in all countries, with implications for formulating effective policies for sustainable workplaces based on organisational happiness (Munar et al., 2020).

At a global level, Antó et al. (2021) draw attention to the alarming situation of the planet, the

importance of the SDGs being met by 2030, referring to the crucial importance of basic research to innovate and develop innovative resources to solve current problems, based on the planetary wellbeing approach, following The Planetary Wellbeing Initiative promoted in 2018 by the Rockefeller Foundation and the Lancet.

3.4.4 Special Needs Students

A relevant aspect regarding access to education - and HE in particular - is related to students with special needs (Diaz-Vega et al., 2020) who may suffer from exclusion due to teachers' lack of training that may render them unable to deal with disability, limiting the inclusion of all students. It is then necessary to provide teachers with skills to deal with the various special needs of students, creatively making inclusion possible for all.

4. Conclusions, Implications, Limitations and Research Agenda

This SLR shows the interrelationship between the SDGs and HEIs and HE, in the sense that education - and higher education in particular - is inextricably linked to sustainability and the 2030 proposals.

The research covers several topics, focusing on the contributions of HEIs/HE to the SDGs and their incorporation into course syllabuses. The importance of incorporating SDGs into higher education programmes and into the internal processes of HEIs should be highlighted, with clear benefits for society. Students acquire knowledge and skills appropriate to the global context, therefore graduates improve their contribution to the SDGs and to a sustainable future (Paço, 2019), thus answering the stated research question.

One implication of this work is that the SDGs and the HEIs are interrelated in multiple ways and in multiple dimensions, all of which are relevant to increasing the likelihood that by 2030 these goals will be met in most countries. Hence, policy makers need to understand the scope of this interrelationship and the multiple ways in which it impacts on sustainability to adopt educational policies, primarily at the HE level, that raise awareness of teachers and students around the world to use their knowledge, creativity and skills to contribute to the pursuit of the SDGs.

The limitations of this study are related to the possibility that documents from other databases were not included. Other filters could also have been used to access more information.

In the future, it should be further investigated how HE and HEIs can contribute to sustainability and the SDGs, how to incorporate this topic into course syllabuses and HEIs' internal processes, and how marketing can contribute to the dissemination and awareness of the importance of sustainability for the quality of life on Earth. It is also important to investigate how to increase teachers' skills, motivation and recognition. It is crucial that monitoring studies of the results are conducted over time to ensure that improvement is realised, and the SDGs are achieved by 2030.

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