Sustainable Development Goals in Health Courses in Higher Education

Elisa Chaleta , **Margarida Saraiva** , **Carla Semedo** ,
and Teresa Nogueiro

Abstract The fact that health is responsible for about 4.4% of global greenhouse gas emissions led us to analyse the mapping of the SDGs in the Health courses of a higher education institution in order to find out whether the concern is present in the type of SDGs marked by teachers. The data presented refer to the SDGs marked by teachers in the course units, with the exception of SDG4 (Quality Teaching) previously marked by the university. The results showed that the objectives most marked by teachers in all courses were SDG3 (Ensure healthy lives and promote well-being for all at all ages) and SDG10 (Reduce inequality within and among countries). We found that there are no differences between the SDGs reported in the three study cycles and that the data indicate the need for greater awareness of those involved in undergraduate and postgraduate training with a view to training models more focused on sustainability.

Keywords Sustainable development goals (SDG) · Undergraduate degree courses · Master's degree courses · PhD courses · Health · Higher education

E. Chaleta (✉)
University of Évora and CIEP- Center for Research in Education and Psychology, Évora, Portugal
e-mail: mec@uevora.pt

M. Saraiva
University of Évora, Évora and BRU—Business Research Unit-ISCTE-Instituto Universitário de Lisboa, Lisboa, Portugal

C. Semedo
School of Social Sciences, University of Évora and CIEP- Center for Research in Education and Psychology, Évora, Portugal
e-mail: cssemedo@evora.pt

T. Nogueiro
School of Business Sciences, Polytechnic Institute of Setúbal, Setúbal, Portugal

1 Introduction

Climate change and its effects, increasingly visible and catastrophic in many parts of the globe, have put the issue of sustainability in the spotlight at various summits. We highlight the United Nations Summit on Sustainable Development held in New York in 2015 which gave rise to the resolution "Transforming our world: Agenda 2030 for Sustainable Development" (Eurostat 2017). The resolution came into force on 1 January 2016 (UNRIC 2016) and constituted itself as the new global strategy for sustainable development. It proposes 17 SDGs, 169 targets and 232 indicators that translate into an action plan focused on people, peoples' prosperity and the promotion of peace through the establishment of partnerships between developed and developing countries and different sectors (European Commission 2016). It aims for collaboration, mutual aid and shared responsibilities and, in this sense, it becomes a universal, broad and ambitious agenda (UNRIC 2016).

Regarding its priorities, in terms of the country's development, Portugal identified six strategic SDGs: SDG4—Quality Education, SDG5—Gender Equality, SDG9—Industry, Innovation and Infrastructure, SDG10—Reducing Inequalities, SDG13—Climate Action and SDG14—Marine Life Protection (MNE 2017). Although the SDGs are not binding, it is proposed that governments take responsibility for their implementation and monitoring (Eurostat 2017), paying particular attention to the problems identified as most urgent in the world, from eradicating poverty and hunger to strategies that promote economic growth and address social needs, including education, health, social protection and employment opportunities, as well as climate change and environmental protection.

Since the Taillores Conference in France (Talloires Declaration 1990), Higher Education Institutions (HEI) have been concerned with sustainable development. Universities educate the majority of people and for this reason they have deep responsibilities in raising awareness, producing knowledge and developing technologies and tools capable of creating a more environmentally sustainable future. This declaration led to the commitment of universities to teaching and research that is more oriented towards sustainable development proposals (Figueiró and Raufflet 2015).

According to Chankseliani, and McCowan (2021), higher education institutions have great responsibility in achieving all SDGs and higher education is directly or indirectly, related to all these goals. It is in this context that universities are challenged to include the 17 SDGs teaching and learning activities, in producing knowledge and developing skills to meet the challenges of today's and tomorrow's world (Leicht et al. 2018).

Universities should try to make the most of the many opportunities that SDG(s) offer, not only in the field of teaching and research, but also in their university extension activities (Leal et al. 2019). According to Bautista-Cerro and González (2017), this commitment in universities is advancing with the help of academics (teachers and managers) who include it in their course units and course design. We know that universities occupy a privileged place in society and assume an unquestionable role in the creation and dissemination of knowledge. Over time, they have proven to be

powerful drivers of local, national and global innovation with an impact on economic development and human well-being (SDSN 2017).

Thus, the contribution of universities can be very broad, as they cover several fields such as: (i) learning and teaching, where they can provide knowledge, skills and motivation needed to understand and address the SDGs and, in general, education for sustainable development; (ii) research, through scientific production, technological solutions and innovation resulting from new national and international interdisciplinary or transdisciplinary approaches; (iii) governance, through university management and extension policies; and (iv) social leadership through strengthening the university's public commitment to the implementation of the SDGs (SDSN 2017). In particular, it is intended to ensure that all students acquire the knowledge and skills necessary to promote sustainable development (UNESCO 2021).

However, sustainability principles need to be at the core of higher education institutions' strategy (e.g. in curricula). The curricula of higher education courses are a key component in learning, as they define what students should know and be able to do at the end of their studies (Kioupi and Voulvoulis 2019). Consequently, these curricula contribute decisively to creating a mindset that facilitates the dissemination and successful implementation of the SDGs (Kioupi and Voulvoulis 2020).

Equally, sustainability principles need to be assimilated and communicated effectively in order to establish a mindset and successful implementation of sustainability initiatives (Lertpratchya et al. 2017).

For most higher education students, a degree course is the last stage of the educational level before entering the world of work, where they will play an influential role as professionals. Higher education is then fundamental to build the mindset of the future professional and implement the acquired knowledge in real life. Therefore, HEIs have an essential role in sustainability as they are transformative agents with a high impact on educating future professionals and leaders and contributing to a prosperous society (Žalėnienė and Pereira 2021). HEIs being the drivers of social transformation can guide future professionals, leaders and citizens towards sustainability through their educational programmes.

The integration of the SDGs in university curricula constitutes the great lever for their incorporation in future professionals, being necessary that this integration goes beyond the institutional dimension and advances to practical dimensions (Leal Filho et al. 2019). On the other hand, the perspective of application at the global level allows comparing indicators between the various institutions and knowing how the incorporation of the SDGs has evolved (De La Poza et al. (2021; Chowdhury and Koya 2017; Freidenfelds et al. 2018; Perovic and Kosor 2020). De La Poza et al. (2021) proposed an assessment of the alignment of the SDGs based on the ranking developed by Times High Education (THE). Annan-Diab and Molinari (2017) consider that professionals from different fields should take every opportunity to implement the sustainable development dimension, considering social, environmental and economic aspects, as well as issues related to decent working conditions and climate change. Interdisciplinarity is seen as key to understanding and acting on complex problems, and it is essential to align the expected outcomes of education for sustainable development with the SDGs. Despite the progress, there is still a lack of integrative approaches

to truly implement the SDGs in higher education. Educating university faculty on sustainability development is critical for them to adapt their programmes and methodologies (Saitua-Iribar et al. 2020) and to align perspectives globally (Niedlich et al. 2020). A new paradigm of student partnership and engagement in faculty approach to emerging issues such as planetary health and sustainable health care has shown positive results as they bring new ideas and enthusiasm as well as awareness and deep concern for sustainability (Tun et al. 2020).

With this commitment, the University of Évora started in April 2020 mapping the SDGs in its training offer and was one of the Portuguese Higher Education Institutions to strengthen the alignment with the guidelines outlined in the 2030 Agenda. In this context, the University marked SDG4 for all curricular units and challenged teachers to identify other SDGs that could be developed from the course units for which they were responsible. This process consisted in marking the SDGs in the university platform (SIIUE) where all the information about the courses is available. In this work, we analysed the SDGs marked in integrated health courses at undergraduate (1st cycle) and postgraduate (Master and PhD) levels.

In the area of health, the World Health Organization (WHO) has been warning of the threat of climate change effects on human health, with public health considered a central and defining problem of the twenty-first century (WHO 2019a). Climate change also threatens the integrity of health systems, especially in terms of responding to the most vulnerable populations, so resilient health systems are essential (WHO 2015). Health systems, however, are also part of the problem as they are carbon intensive and produce large amounts of waste. It is critical that healthcare delivery reorient itself to reduce its carbon footprint (neutrality). Mobilizing the health sector to achieve these outcomes requires informed and skilled health professionals.

The climate and ecological crisis has led to considerable global environmental degradation with serious implications for health and well-being. In this context, it is essential to ensure that the education of health professionals and the faculty that trains them take into account planetary and sustainable health from the initial undergraduate to postgraduate stages, and also in clinical practice (Green and Legard 2020). The concept of planetary health refers to the fact that human health depends on the health of the planet, both of which are in danger due to the unprecedented degradation of the Earth's natural systems (United Nations Framework Convention on Climate Change 2020). Health professionals have to deal with increasingly extreme and severe consequences, such as the Covid-19 pandemic, with warnings that future pandemics, more deadly and frequent, can only be avoided by ensuring the protection of nature (Settele et al. 2020).

As we mentioned earlier also the provision of health care contributes to environmental degradation. According to Karliner et al. (2019), about 4.4% of global greenhouse gas emissions are attributable to the healthcare sector, and a more sustainable model needs to be adopted (Ossebaard and Lachman 2020). There is agreement among scientists that the climate crisis is accelerating faster than expected and with greater severity than anticipated, with several planetary boundaries already crossed (Laybourn-Langton et al. 2019; Raworth 2017; Ripple et al. 2019; Steffen

et al. 2015). If behaviours are not changed we can expect successive environmental calamities (heat waves, floods, storms) and, as a consequence, infectious diseases and increased risk of non-communicable diseases in all age groups which inevitably poses major challenges to health systems (Frumkin and Haines 2019; Watts et al. 2019).

Sustainable healthcare focuses on improving health and improving care delivery rather than late intervention in disease, with consequent benefits for patients and the environment on which human health depends (Tun 2019; Tun et al. 2020). There are, however, some barriers that include a perception that sustainability is not relevant to health care and some difficulty in including yet another topic in curricula (Richardson et al. 2016; Tun 2019). Some authors refer that health professionals are not prepared to face the challenges that climate change poses to healthsystems (Madden et al. 2018, 2020; Neal-Boylan et al. 2019) and WHO (2019b) reinforces this idea considering that the current health workforce has limited understanding of climate change and its impact on health, which restricts their capacity to respond and change. Thus, the integration of sustainable healthcare into the curricula of health professions and also its application in everyday life and clinical practice is fundamental to raise awareness about the impact of many activities such as shopping, high energy and water consumption and large volumes of waste generated (IFMSA 2019; Schwerdtle et al. 2020). This should start at university, with the diagnosis of students' knowledge and gaps on these matters (Zamora-Polo et al. 2019), and teaching, through pedagogical tools and approaches, about the relationship between sustainability, global environmental change and health, so that they can subsequently transfer this knowledge to clinical practice (Huss et al. 2020). According to Madden et al. (2020), it is critical to measure, monitor and report on these approaches, which has not been done. In this context, three SDGs are critical SDG4 (Quality Education), SDG12 (Responsible Production and Consumption) and SDG13 (Climate Action).

In addition to these SDGs, health-related higher education courses should also contribute decisively to the implementation of SDG3. According to the latest report of the International Association of Universities (IAU 2017), significant gaps in SDG3 were observed, in addition to others, in Europe, Asia and the Pacific and Africa. Therefore, HEIs have a great responsibility to support the implementation of the ambitious goals of this SDG in order to ensure access to quality health and promote well-being for all at all ages. Indeed, HEIs can be driving agents of cultural change, based on the principles of sustainability and, in general, higher education can be the basis for the achievement of all SDGs.

For this study, we considered two university schools which integrate health area courses: the School of Health and Human Development (ESDH) and the São João de Deus School of Nursing (ESESJD), integrated in the University. In this case, we present data on the SDGs marked in the course units of undergraduate, master's and doctoral courses. In this context, the objectives of the study are:

(i) to identify the SDGs marked in the curricular units of Health area courses in general

 (ii) to identify the SDGs marked in the curricular units of the courses of each department
(iii) to identify possible differences in the mapping of the SDGs in the different study cycles.

2 Method

2.1 Data Collection

The study identifies the SDGs marked in the University platform that contains information about all the course units. The analysis was carried out taking into account the SDGs marked in all the course units of all the bachelor, master and doctoral courses registered in the Integrated Information System of the University of Évora (SIIUÉ), belonging to ESDH and ESESJD.

2.2 Quantitative Data Analysis

For statistical data analysis, we used IBM SPSS Statistics 24. To analyse the SDGs marked in the course units, we used simple descriptive statistics.

To analyse the differences between courses' degrees, we used analysis of variance (One-way ANOVA) because it allows us to compare the distribution of three or more groups in independent samples. We have proposed the following defined assumptions for the test:

H1: There are differences between the SDGs marked by teachers in the course units of the courses in the different Departments.
H2: There are differences between the SDGs marked by teachers in the graduate and postgraduate courses.

3 Results

In the mapping process of the SDGs at the University of Évora, the SDG4—Quality Education—is present in all course units (automatically marked by the institution). Regarding the marking of the other SDGs, it is the teachers responsible for the course unit who mark them. In this study, 733 curricular units (CUs) were considered, being 352 of Degree (Medical and Health Sciences 52; Sport and Health 52; Nursing 38), 275 of Master Degree (Medical and Health Sciences 11; Sport and Health 48; Nursing 88) and 106 of Doctorate (Medical and Health Sciences 16; Sport and Health3; Nursing 12).

The results by study cycle (Bachelor, Master and Doctorate) are presented below.

The analysis of Table 1 gives that, in the 3 degree courses, with the exception of SDG 4—Quality Education (40.3%), defined by the University of Evora, SDG 3 related to quality health (32.7%) is the most significant. In comparison, the remaining SDGs are not very significant, ranging from 0.3% of SDG 7 (renewable and affordable energy) and SDG 16 (peace, justice and effective institutions) to 7.7% of SDG 5 (gender equality). Teachers of the 1st cycle degree course Medical and Health Sc. Are those who map more SDGs within their course units, with a total of 42.2%, followed by the degree course of Sport and Health with 33.8% and, lastly, the degree course of Nursing with 25%.

Table 2 gives that, in the three 2nd cycle degree courses, with the exception of SDG 4 (53.5%), and similarly to the 1st cycle degree courses, SDG 3—Quality Health is the most relevant, with 25.1%, and a total of 69 course units. The remaining SDGs are not very significant, ranging from 0% (SDG 7, 13, 14 and 15) to 5.4% of SDG 5. The Nursing course has the highest percentage of course units contributing to a higher number of SDGs, corresponding to 58.5%, followed by the Sport and Health degree

Table 1 SDGs in the 1st cycle degree courses (Degree) by department

| SDG | Departments (a) | | | N | % |
	Medical and health	Sport and health	Nursing		
1	3	3	3	5	1.4
2	5	1	0	6	1.7
3	48	39	28	**115**	**32.7**
4	52	52	38	**142**	**40.3**
5	4	14	9	27	7.7
6	1	1	0	2	0.6
7	0	1	0	1	0.3
8	0	0	2	2	0.6
9	2	0	0	2	0.6
10	5	1	7	13	3.7
11	6	0	0	6	1.7
12	6	2	1	9	2.6
13	4	0	0	4	1.1
14	3	3	0	6	1.7
15	4	3	0	7	1.9
16	1	0	0	1	0.3
17	1	1	2	4	1.1
Total	145	119	88	352	100
%	41.2	33.8	25.0	100	

(a) Degree courses (1st cycle): medical and health sciences (52 Ucs); sport and health (52 Ucs); nursing (38 Ucs)

course with 33.1% and, finally, the Medical and Health Sciences degree course, with only 8.4%.

Table 3 gives the course units of the 3rd cycle degree courses Medical and Health Sciences, Sport and Health and Nursing, in a total of 31 that contribute to the SDGs. Similarly, to the 1st and 2nd cycles, with the exception of SDG 4—Quality Education (29.2%), SDG 3—Quality Health, SDG 10—Reducing Inequalities and SDG 11—Sustainable Cities and Communities are the most representative with 23.6%. The remaining SDGs do not receive any contribution from the course units of these three 3rd cycle degree courses. The degree courses Medical and Health Sciences and Nursing contribute to 4 SDGs (SDG 3, 4, 10 and 11) in a percentage of 60.4% and 36.8%, respectively. The Sport and Health degree course contributes only to SDG 4, with a percentage of 2.8%.

With regard to the health area (Table 4), we didn't find statistically significant differences between the Departments.

Considering H1: There are differences between the SDGs marked by teachers in the curricular units of the courses in the different Departments, we found that,

Table 2 SDGs in the 2nd cycle degree courses (Master's Degree) by department

SDG	Departments (b)			N	%
	Medical and health	Sport and health	Nursing		
1	0	1	4	5	1.8
2	0	1	1	2	0.7
3	9	32	28	**69**	**25.1**
4	11	48	88	**147**	**53.5**
5	1	3	11	15	5.4
6	0	1	0	1	0.4
7	0	0	0	0	0
8	0	1	3	4	1.5
9	2	1	4	7	2.5
10	0	2	10	12	4.4
11	0	0	1	1	0.4
12	0	1	1	2	0.7
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	3	3	1.1
17	0	0	7	7	2.5
Total	23	91	**161**		100
%	8.4	33.1	**58.5**	100	

(b) Master's degree courses (2nd cycle): medical and health sciences (11 UCs); sport and health (48 UCs); nursing (88 UCs)

Table 3 SDGs in the 3rd cycle degree courses (Doctorate) by department

SDG	Departments (c)			N	%
	Medical and health	Sport and health	Nursing		
1	0	0	0	0	0
2	0	0	0	0	0
3	16	0	9	**25**	**23.6**
4	16	3	12	**31**	**29.2**
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	16	0	9	**25**	**23.6**
11	16	0	9	**25**	**23.6**
12	0	0	0	0	0
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
Total	64	3	39	106	100
%	60.4	2.8	36.8	100	

(c) Doctoral programmes have the same number of courses

according to Table 4, there are no statistically significant differences between the departments. Therefore, with the exception of SDG 4, which was not analysed because it was mapped to all the CUs of the University, all the remaining SDGs present a p-value >0.05.

The analysis of the SDGs considering the 1st, 2nd and 3rd cycles degree courses (Table 5) also indicates that there are no statistically significant differences regarding the SDGs pointed out by teachers.

With regard to H2: There are differences between the SDGs marked by teachers in the graduate and postgraduate courses, it is also found that there is no statistical significance, since the p-value is always higher than 0.05 for all SDGs. This statistic shows that there are no differences between the SDGs identified by teachers in undergraduate and postgraduate degree courses.

Table 4 Analysis of SDG differences in the school of health and human development and nursing

SDG	M	SD	F	p
1. No poverty	1.11	1.45	0.304	0.748
2. Zero hunger	0.89	1.62	0.481	0.640
3. Good health and well-being	23.2	15.7	0.018	0.983
4. Quality education	–	–	–	–
5. Gender equality	4.67	5.34	0.677	0.543
6. Clean water and sanitation	0.33	0.500	1.50	0.296
7. Affordable and clean energy	0.11	0.333	1.00	0.422
8. Decent work and economic growth	0.67	1.19	2.63	0.152
9. Industry, innovation and infrastructure	1.00	1.41	0.429	0.670
10. Reducing inequality	5.56	5.46	2.08	0.206
11. Sustainable cities and communities	3.56	5.70	1.35	0.327
12. Responsible consumption and production	1.22	1.92	0.325	0.734
13. Climate action	0.44	1.33	1.00	0.422
14. Life below water	0.67	1.32	0.500	0.630
15. Life on land	0.78	1.56	0.520	0.619
16. Peace, justice, and strong institutions	0.44	1.01	0.700	0.533
17. Partnerships for the goals	1.22	2.28	1.56	0.285

Table 5 Analysis of SDG differences in the 1st, 2nd and 3rd cycles courses

SDG	M	SD	F	p
1. No poverty	1.11	1.453	1.471	0.302
2. Zero hunger	0.89	1.62	1.273	0.346
3. Good health and well-being	23.22	15.7	6.416	0.032
4. Quality education	–	–	–	–
5. Gender equality	4.67	5.34	3.453	0.100
6. Clean water and sanitation	0.33	0.500	1.500	0.296
7. Affordable and clean energy	0.11	0.333	1.000	0.422
8. Decent work and economic growth	0.67	1.12	1.091	0.394
9. Industry, innovation and infrastructure	1.00	1.41	3.545	0.096
10. Reducing inequality	5.56	5.46	0.515	0.622
11. Sustainable cities and communities	3.56	5.70	2.091	0.205
12. Responsible consumption and production	1.22	1.92	3.045	0.122
13. Climate action	0.44	1.33	1.000	0.422
14. Life below water	0.67	1.32	4.000	0.079
15. Life on land	0.78	1.56	3.769	0.087
16. Peace, justice, and strong institutions	0.44	1.01	0.700	0.533
17. Partnerships for the goals	1.22	2.28	0.740	0.516

4 Final Remarks

The University of Évora considers SDG 4 (Quality Education) as relevant in its strategy to define quality education. For this reason, all the course units regardless of their content and their real contribution to sustainability and to the 2030 Agenda are automatically marked as contributing to a quality education. The identification of other SDGs by the teachers of the different course units, both in the 1st cycle and postgraduate degree courses, namely in the 2nd and 3rd cycles, related to health, shows that SDG3 (quality health) is the second most relevant goal, which seems somewhat obvious to us, as they are degree courses in the health area. In the 1st cycle degree courses, all SDGs were identified in at least one course unit. In the 2nd and 3rd cycle degree courses, SDGs 7, 13, 14 and 15 were not identified by the teachers and in the 3rd cycle degree courses, besides those already mentioned, SDGs1, 2, 5, 6, 8, 9, 12, 16 and 17 were not marked.

The results obtained can be explained by the contents and nature of the course units assessed, but possibly also by the teachers' greater attention to quality health, gender equality and reduction of inequalities, current issues that are increasingly relevant and have a great impact on the future of institutions and people. The analysis carried out showed us that there were no statistically significant differences neither in the identification of the SDGs among the Departments, nor among the courses of the various study cycles.

We consider, however, taking into account the SDGs pointed out by teachers and that health is responsible for significant rates of global greenhouse gas emissions, that a greater awareness of those responsible for education in this area is needed in order to adopt curricula and training models with greater concern for sustainability.

One of the major limitations of this work is that it only reports the reality of two schools of a single higher education institution and cannot be extrapolated to other similar departments in other institutions. Another limitation is the fact that the study did not include, due to lack of information, the criteria that led to SDG4 being marked by the institution for all course units regardless of the subject or its nature. And also, whether these criteria could be adopted to map the other SDGs according to the specificity of each course unit.

As future research, it is proposed to extend the study to all schools of the institution and, subsequently, to carry out a comparative study with other institutions that are already implementing this measure. It will also be to carry out more focused studies in order to assess in practice how each teacher, from their course units, effectively contributes to the realization of the 2030 Agenda.

References

Annan-Diab F, Molinari C (2017) Interdisciplinarity: practical approach to advancing education for sustainability and for the sustainable development goals. Int J Manage Educ 15(2):73–83. https://doi.org/10.1016/j.ijme.2017.03.006

Bautista-Cerro Ruiz MJ, Díaz González MJ (2017) La sostenibilidad en los grados universitarios: presencia y coherencia. Teoría de la educación. Revista Interuniversitaria 29(1). https://doi.org/10.14201/teoredu2017291161187

Chankseliani M, McCowan T (2021) Higher education and the sustainable development goals. High Educ 81(1):1–8. https://doi.org/10.1007/s10734-020-00652-w

Chowdhury G, Koya K (2017) Information practices for sustainability: role of iSchools in achieving the UN sustainable development goals (SDGs). J Am Soc Inf Sci 68(9):2128–2138. https://doi.org/10.1002/asi.23825

De la Poza E, Merello P, Barberá A, Celani A (2021) Universities' reporting on SDGs: using the impact rankings to model and measure their contribution to sustainability. Sustainability 13(4):2038. https://doi.org/10.3390/su13042038

European Commission (2016) Next steps for a sustainable European future. Strasbourg: European Commission. https://ec.europa.eu/commission/presscorner/detail/en/MEMO_16_3886

Eurostat (2017) Sustainable development in the European Union—monitoring report on progress towards the SDGs in an EU context, Luxembourg: Publications Office of the European Union. https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-02-20-202

Figueiró P, Raufflet E (2015) Sustainability in higher education: a systematic review with focus on management education. J Clean Prod 106:22–33. https://doi.org/10.1016/j.jclepro.2015.04.118

Freidenfelds D, Kalnins SN, Gusca J (2018) What does environmentally sustainable higher education institution mean? Energy Procedia 147:42–47. https://doi.org/10.1016/j.egypro.2018.07.031

Frumkin H, Haines A (2019) Global environmental change and noncommunicable disease risks. Annu Rev Public Health 40(1):261–282. https://www.annualreviews.org/doi/abs/https://doi.org/10.1146/annurev-publhealth-040218-043706

Green M, Legard C (2020) Peer-teaching could help bring sustainable healthcare into the medical education curriculum. Med Teach 42(5):598–599. https://doi.org/10.1080/0142159X.2019.1659945

Huss N, Ikiugu MN, Hackett F, Sheffield P, Palipane N, Groome J (2020) Education for sustainable health care: from learning to professional practice. Med Teach 42(10):1097–1101. https://doi.org/10.1080/0142159X.2020.1797998

IAU (2017) Higher education paving the way to sustainable development: a global perspective. Report of the IAU global survey on higher education and research for sustainable development. Paris, 27. https://www.iau-aiu.net/IMG/pdf/higher-education-paving-the-way-to-sd-iau-2017.pdf

IFMSA (2019) International federation of medical students' associations. Medical students for SDGs, 1029. https://issuu.com/ifmsa/docs/medical_students_for_sdgs_vf

Kioupi V, Voulvoulis N (2019) Education for sustainable development: a systemic framework for connecting the SDGs to educational outcomes. Sustainability 11(21):6104. https://doi.org/10.3390/su11216104

Kioupi V, Voulvoulis N (2020) Sustainable development goals (SDGs): assessing the contribution of higher education programmes. Sustainability 12(17):6701. https://doi.org/10.3390/su12176701

Karliner J; Slotterback S, Boyd R, Ashby R, Steele K (2019) Healthcare's climate footprint. Verfügbar unter. https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

Leal Filho W, Shiel C, Paço A, Mifsud M, Ávila LV, Brandli LL, Molthan-Hill P, Pace P, Azeiteiro UM, Vargas VR, Caeiro S (2019) Sustainable development goals and sustainability teaching at universities: Falling behind or getting ahead of the pack? J Clean Prod 232:285–294. https://doi.org/10.1016/j.jclepro.2019.05.309

Laybourn-Langton L, Rankin L, Baxter D (2019) This is a crisis: facing up to the age of environmental breakdown. IPPR. https://www.ippr.org/files/2019-11/this-is-a-crisis-feb19.pdf

Leicht A, Heiss J, Byun W (2018) Education on the move. Unesco. https://doi.org/10.54675/YELO2332

Lertpratchya AP, Besley JC, Zwickle A, Takahashi B, Whitley CT (2017) Assessing the role of college as a sustainability communication channel. Int J Sustain High Educ 18(7):1060–1075. https://doi.org/10.1108/IJSHE-09-2016-0172

Madden DL, McLean M, Brennan M, Moore A (2020) Why use indicators to measure and monitor the inclusion of climate change and environmental sustainability in health professions' education? Med Teach 42(10):1119–1122. https://doi.org/10.1080/0142159X.2020.1795106

Madden DL, McLean M, Horton GL (2018) Preparing medical graduates for the health effects of climate change: an Australasian collaboration. Med J Aust 208(7):291–292

MNE (2017) Relatório nacional sobre a implementação da Agenda 2030 para o Desenvolvimento Sustentável, por ocasião da Apresentação Nacional Voluntária no Fórum Político de Alto Nível das Nações Unidas, Lisboa: Ministério dos Negócios Estrangeiros. https://www.cig.gov.pt/wp-content/uploads/2017/07/Portugal2017.pdf

Neal-Boylan L, Breakey S, Nicholas PK (2019) Integrating climate change topics into nursing curricula. J Nurs Educ 58(6):364–368

Niedlich S, Bauer M, Doneliene M, Jaeger L, Rieckmann M, Bormann I (2020) Assessment of sustainability governance in higher education institutions—A systemic tool using a governance equalizer. Sustainability 12:1816

Ossebaard HC, Lachman P (2020) Climate change, environmental sustainability and health care quality. Int J Qual Health Care. https://doi.org/10.1093/intqhc/mzaa036

Perovic M, Kosor M (2020) The efficiency of universities in achieving sustainable development goals. Amfiteatru Econ 22(54):516–532

Raworth K (2017) A doughnut for the anthropocene: humanity's compass in the 21st century. Lancet Plan Health 1(2):e48–e49. https://doi.org/10.1016/S2542-5196(17)30028-1

Richardson J, Allum P, Grose J (2016) Changing undergraduate paramedic students' attitudes towards sustainability and climate change. J Paramedic Pract. 8(3):130–136. https://doi.org/10.12968/jpar.2016.8.3.130

Ripple WJ, Wolf C, Newsome TM, Barnard P, Moomaw WR (2019) World scientists' warning of a climate emergency. BioScience https://academic.oup.com/bioscience/advance-article, https://doi.org/10.1093/biosci/biz088/5610806.

Saitua-Iribar A, Corral-Lage J, Peña-Miguel N (2020) Improving knowledge about the sustainable development goals through a collaborative learning methodology and serious game. Sustainability 12(15):6169. https://doi.org/10.3390/su12156169

Schwerdtle PN, Maxwell J, Horton G, Bonnamy J (2020) 12 tips for teaching environmental sustainability to health professionals. Med Teach 42(2):150–155. https://doi.org/10.1080/0142159X.2018.1551994

SDSN (2017) General assembly. The role of higher education to foster sustainable development: Practices, tools and solutions. www.sdsn-mediterranean.unisi.it/wp-content/uploads/sites/30/2017/08/Testo-positional-CON-FIG-1.pdf

Settele J, Díaz S, Brondizio E, Daszak P (2020) COVID-19 stimulus measures must save lives, protect livelihoods, and safeguard nature to reduce the risk of future pandemics. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), Bonn. COVID19 Stimulus IPBES Guest Article_English_0.pdf

Steffen W, Richardson K, Rockström J, Cornell SE, Fetzer I, Bennett E, Biggs R, de Vries W (2015). Planetary boundaries: guiding human development on a changing planet. Science 347(6223), [1259855]. https://doi.org/10.1126/science.1259855

Talloires Declaration (1990) Talloires Declaration of University leaders for a sustainable future. Available at: http://ulsf.org/wp-content/uploads/2015/06/TD.pdf

Tun MS (2019) Fulfilling a new obligation: teaching and learning of sustainable healthcare in the medical education curriculum. Med Teach 41(10):1168–1177. https://doi.org/10.1080/0142159X.2019.1623870

Tun S, Wellbery C, Teherani A (2020) Faculty development, and partnership with students to integrate sustainable healthcare into health professions education. Med Teach 42(10):1112–1118. https://doi.org/10.1080/0142159X.2020.1796950

UNESCO (2021) Global education monitoring report 2021: inclusion and education: all means all. FULLTEXT01.pdf (diva-portal.org)

United Nations Framework Convention on Climate Change (2020) Momentum for change: planetary health. Bonn, Germany: UNFCCC. https://unfccc.int/climate-action/momentum-for-change/planetary-health

UNRIC (2016) Guia sobre Desenvolvimento Sustentável: 17 Objetivos para Transformar o Nosso Mundo. Centro de Informação Regional das Nações Unidas para a Europa Ocidental, Lisboa. https://www.cidadaniaemportugal.pt/wp-content/uploads/recursos/Guia_sobre_Desenvolvimento_Sustentavel.pdf

Watts N, Amann M, Arnell N, AyebKarlsson S, Besova K, Boykoff M, Byass P, Cai W, Campbell-Lendrum D, Capstick S et al (2019) The 2019 report of the Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate. Lancet 394(10211):1836–1878. https://doi.org/10.1016/S0140-6736(20)32290-X

WHO (2019a) Climate change and health. https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

WHO (2019b) Global strategy on health, environment and climate change. https://apps.who.int/iris/bitstream/handle/10665/331959/9789240000377-eng.pdf?ua=1

WHO (2015) World health statistics 2015. World Health Organization. https://apps.who.int/iris/handle/10665/170250

Žalėnienė I, Pereira P (2021) Higher education for sustainability: a global perspective. Geogr Sustain 2(2):99–106. https://doi.org/10.1016/j.geosus.2021.05.001

Zamora-Polo F, Sánchez-Martín J, Corrales-Serrano M, Espejo-Antúnez L (2019) What do university students know about sustainable development goals? A realistic approach to the reception of this UN program amongst the youth population. Sustainability 11(13). https://doi.org/10.3390/su11133533