



# Higher education for sustainable development: actioning the global goals in policy, curriculum and practice

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## Abstract

Higher education for sustainable development (HEfSD) is being significantly shaped by the global sustainability agenda. Many higher education institutions, responsible for equipping the next generation of sustainability leaders with knowledge and essential skills, proactively try to action the sustainable development goals (SDGs) in HEfSD policy, curriculum and practice through scattered and isolated initiatives. Yet, these attempts are not strategically supported by a governing approach to HEfSD or coordinated effectively to tackle social and environmental sustainability. These predicaments not only widen the gap between HEfSD policy, curriculum and practice but also exacerbate the complexities between human and environmental interactions compromising overall sustainability. However, these efforts represent a potential for actioning the Global Agenda for Sustainable Development. Based on a qualitative research strategy, theory building methodology and various methodological techniques (surveys, policy and literature review, group and individual interviews), this research suggests that the advancement of HEfSD in policy, curriculum and practice depends largely on a better understanding of existing gaps, target areas, commonalities and differences across regional HEfSD agendas. This will hopefully provide higher education institutions and their stakeholders across regions with some conceptual and practical tools to consider strategically how HEfSD can successfully be integrated into policy, curriculum and practice in alignment with SDGs and with the overall mandate of the Global Agenda for Sustainable Development.

**Keywords** Higher education for sustainable development · Sustainability · Sustainable development goals (SDGs) · Policy · Curriculum · Stakeholders

## Introduction

A shift in Higher Education for Sustainable Development (hereafter HEfSD) policy, curriculum and practice is required around the globe for higher education to be in alignment with the global sustainability agenda. Based on theory building, as the governing methodological approach to this research, this study increases our understanding of the

current status of how HEfSD aligns with the SDGs and identifies limiting factors that impede higher education institutions and their stakeholders from translating HEfSD rhetoric into policy, curriculum and practice in relation to the SDGs.

A major transformation in higher education needs to occur across all disciplines and levels of study (Barth and Reickmann 2012; García-González et al. 2017). As Boron et al. (2017, p 38) indicates “The ultimate purpose of academic teaching programs orientated around ‘sustainability’ is to support the practical attainment of a sustainable future for industry, business and society”. At the present, many higher education institutions tend to ‘embellish and serve’ sustainability precepts, rather than challenge or fully implement them (Hall et al. 2010).

More than ever higher education institutions and their stakeholders, that is, students, staff, scholars, administration and management, research communities, alumni, businesses, social movements, consumer organizations, governments and professional associations (Jongbloed et al. 2008) need to

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rethink the notion of HEfSD in alignment with the Sustainable Development Goals (SDGs) which are both an approach to sustainable development and a tool for addressing global problems in a collaborative (United Nations 2015; Saito et al. 2017; Kanie and Biermann 2017; Yonehara et al. 2017) and interconnected (O’Byrne et al. 2015) manner. Aligning HEfSD agendas with the SDGs will hopefully provide more guidance for relevant HEfSD policy, curriculum and practice in the future (Siraj-Blatchford and Pramling-Samuelsson 2016). Shephard (2015) defines HEfSD as an approach to education aimed to ‘respond to societal expectations to address environmental, social, cultural and economic issues that threaten the sustainability of life on Earth’. However, our definition goes beyond this statement. HEfSD is here understood as an impact sustainability approach driven by higher education institutions themselves, or in collaboration with external stakeholders (governments, industry, civil society organizations), to tackle pressing sustainability issues emerging in the achievement of the Sustainable Development Goals (SDGs). The importance of HEfSD is paramount. Higher education institutions are playing a key role in fostering sustainable social and environmental transformations (Cortese 2003; Leal Filho 2011). It is also their social responsibility to help students and the broader community acquire competences for sustainable development (Lozano et al. 2015). Hence, the significance of exploring the achievement of the SDGs in the context of higher education, carefully.

Governance aspects of HEfSD, the lack of a governing approach to HEfSD, and issues around social and environmental interlinkages are key findings derived from this study. This research also builds knowledge upon existing scholarly debates on HEfSD by identifying commonalities, differences and lessons to be learned and exchanged across regions, namely the Americas, Asia and the Pacific, Africa and Europe.

The research reported in this article begins with a review of current debates within HEfSD, both in the scholarship and policy. It then presents research findings on the status of HEfSD in alignment with SDGs across four regions. The article finishes by drawing conclusions and identifying gaps for further research in this field.

## Literature review

The notion of Higher Education for Sustainable Development (HEfSD) is becoming a mainstream in scholarship. There is an increasing debate, both in the literature and at the policy level, about the role of higher education institutions in addressing the complexities across human and environmental interactions globally. By the start of the UNESCO Decade of Education for Sustainable Development

(2005–2014) (UNESCO 2014), universities had adhered to several approaches to rethink sustainable development. Brundtland (1987) became the baseline of many sustainable development approaches to date: “Meet(ing) the needs of the present without compromising the ability of future generations to meet their own needs”. Based on this foundation, the Triple Bottom Line was later introduced into the field of sustainability and subsequently Education for Sustainable Development (ESD)—including HEfSD—to encourage the present generation to meet their needs by keeping economic, social and environmental domains in a permanent equilibrium (Arima 2009). Following these precepts, the Halifax Declaration (Dalhousie University 1991) later mandated a real commitment to sustainability in higher education by teaching and practicing sustainable development principles. Thus, the overall objective of the decade was to incorporate the sustainability values and policy into all aspects of learning, and thus, to foster behavioral changes in view of a more sustainable society (Yarime et al. 2012).

Over the past four decades, the average number of academic articles examining HEfSD increased from 1 per year from 1970 to 1989 (20 total), 5.1 per year in 1990–2004 (77 total) and 13.2 per year in 2005–2013 (118 total). Within these respective time periods there seem to be three distinct spikes in output: first, in the mid-1970s; second, in the late 1990s; and third, from 2005 to present (Aikens et al. 2016). This trend shows that HEfSD policy is being widely researched and investigation in this field is likely to continue increasing in number of publications in the coming years (Avila and Leger, 2005; Azman et al. 2010; Blass et al. 2010; Hashimshony and Haina 2006; Snyder 2006; Vincent-Lancrin 2006; Amatariyakul and Tesaputa 2009; Steinfeld and Mino 2009; Milutinović and Nikolić 2014; Vaughtner et al. 2016).

Yet, limited attention has been paid to curriculum (Miller 2003; Ritzen 2006; Naeem and Peach 2011; Stephens 2011; Duderstadt 2012; Inayatullah et al. 2013) and HEfSD practice (McNay 1992; Conway 2003; Blass et al. 2010; Duderstadt 2012; Franco 2014) and questions on how stakeholders can foster HEfSD policy, curriculum and practice in alignment with the Global Agenda for Sustainable Development remain unanswered (Comm and Mathaisel 2008; Vaughtner et al. 2013; Milutinović and Nikolić 2014; Lozano et al. 2015; García-González et al. 2017).

Similar studies to explore the global context of HEfSD have been conducted both in the scholarship and at the policy level (Molderez and Fonseca 2018; Caniglia et al. 2018). Lozano-Garcia and Huisinigh (2006), for instance, undertook a compilation of transdisciplinary studies across regions grouped into five (5) categories, namely higher education and regional applications of sustainability; teaching sustainable development and environmental education; approaches to and tools for education for sustainable development;

implementing sustainable development and reporting within academic institutions and faculty-specific approaches to education for sustainable development. Yet, this compilation does not fully align empirical research findings with any global sustainability mandates.

At the policy level, a case in point is the guidelines on ‘Sustainability Science in Research and Education’ (UNESCO 2015). Based on a framework for the co-design, co-production and co-implementation of HEfSD, these guidelines provide higher education institutions with policy recommendations on how to action sustainability science in higher education. Enhancing interdependencies; better understanding of local contexts and values; further development of the interfaces between science, policy and society; transformation of the higher education system to fully integrate sustainability in both policy and practice, and fostering partnerships for sustainability are some of the recommendations drawn from this policy report. Building on this foundation, more recently, UNESCO (2017) launched the ‘Practical Guidelines to Apply Sustainability Science Frameworks’. The model presented in the guidelines enables sustainability science integration into HEfSD. The framework is a tool to implement sustainability science and generate dialogue amongst various stakeholders. It consists of five main steps: co-realization of a common project, co-envisioning of a future society, co-shaping into an envisioned future society, co-implementation, and monitoring and evaluation. The first four steps are carried out within a participatory process amongst stakeholders. This participatory model fosters cooperation and integration to assist stakeholders in adapting to changing circumstances and building stakeholder ownership along the process of sustainability science implementation (UNESCO 2017).

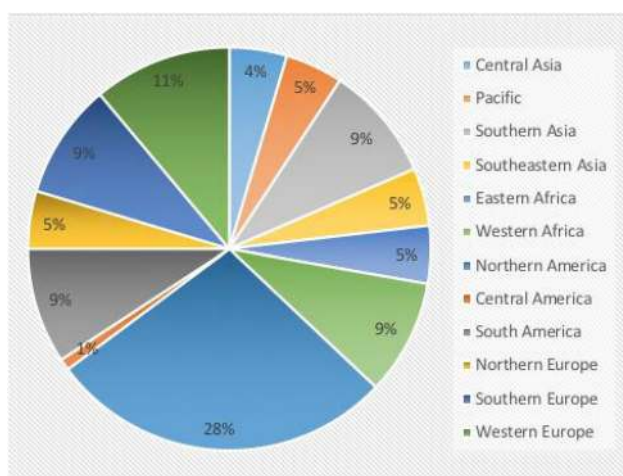
Despite the plethora of policy recommendations and studies, higher education institutions face enormous challenges to translate HEfSD rhetoric into policy, curriculum and practice. A review of selected Canadian universities, for example, reported that higher education institutions are “firmly embedding the objectives of sustainability in the planning framework for the institution as a whole” (Vaughter et al. 2016, p 24). However, this approach has been criticized, as sustainability policy should not only limit to environmental aims but as a “solution to environmental degradation, and as well as socio-cultural degradation” (Aikens et al. 2016, p 341). Milutinović and Nikolić (2014, p 108) add that “higher education does not fully understand the true nature of the challenge and that sustainable development is still considered as an innovative idea in most universities, and has not yet permeated all disciplines, scholars, and university leaders”. Although HEfSD is being widely debated, issues on how to move from HEfSD rhetoric to policy, curriculum and practice and in alignment with the global sustainability agenda remain under-investigated.

## Methodology

A qualitative strategy has been applied to this study. Thus, this investigation involved the combination of a number of qualitative methods and techniques, reducing methodological limitations (Singleton and Straits 2010). For the purpose of this research, triangulation of data sources and methods was applied to increase the reliability of the data collected (Yin 2009). Surveys, individual interviews, literature review, focus groups, field observations and policy analysis were some of the techniques applied. Data were initially collected from the literature and policy review.

The review was aimed to undertake analysis of secondary sources on global perspectives on higher education and research for sustainable development. Both scholarship and policy analyses were conducted. Overall seventy (70) manuscripts were reviewed, comprising journal articles, book chapters, policy documents and reports. Out of seventy (70), only around sixty (60) sources were considered relevant for the scope of this research. A more specific selection of sources was undertaken whilst conducting data analysis. Various databases were consulted such as Web of Science, ERIC and ProQuest. The review was also undertaken based on the following Boolean search categories to facilitate the selection of relevant sources: ‘trends and themes on higher education and research for sustainable development’, ‘sustainability policy in higher education and research’, ‘HEfSD and research’ and ‘case studies in HEfSD’. Whilst former categories helped us identify relevant themes globally, the latter assisted us in identifying regional gaps that were later triangulated against primary sources. Policy analysis was also pivotal in conducting this review. This analysis encompassed international mandates and sustainability policy statements across participant higher education institutions. It also involved the review of international policy frameworks, influencing the current debate on HEfSD.

Researchers were also interested in hearing the perspectives and evaluations of various Regional Centres of Expertise (RCE’s) on Education for Sustainable Development’s focal points and stakeholders to form a composite picture of target areas and HEfSD gaps. An RCE is a network of education institutions—including higher education institutions—that in collaboration with stakeholders advocate for fostering Education for Sustainable Development (RCE Network 2018). Twenty-eight (28) RCEs’ focal points participated in a global survey (see Graph 1). Two (2) focus groups and seven (7) individual interviews were conducted. The survey was translated into three languages, namely English, Spanish and Portuguese, to increase our understanding of the context of HEfSD in non-English-speaking countries. RCE members’ background varies.



**Graph 1** Global survey participants' infographics

Interviewees consisted of academics and professionals at higher education institutions. Likewise, a group of government, private sector and NGO representatives involved in their respective RCEs were also interviewed. Non-academic interviewees did not necessarily have a background in sustainability. Instead, they were project managers, trainers and government officials interested in exploring collaboration opportunities to achieve overall sustainability.

Participants' background from higher education institutions varied from practitioners, lecturers, researchers and representatives to senior executive teams engaged in sustainability science, education and practice at higher education institutions. Eight (8) participants identified themselves as civil society actors, two (2) as government representatives and two (2) as corporate actors. These actors collaborate actively with higher education institutions. The global survey showed a high participation from stakeholders from Northern America, twenty-eight percent (28%), followed by Western Europe, eleven percent (11%). Survey results showed low participation from Central America at one percent (1%) (Graph 1).

### Data collection

Researchers first conducted a review of the scholarship and policy to identify current themes and gaps in HEfSD. The review also documented case studies in four geographical areas (Asia and the Pacific, Americas, Africa and Europe) providing the research team with a better understanding of existing debates and gaps at the regional level. This review also helped to triangulate data from the global survey and interviews with RCE focal points and stakeholders. These data collection techniques were applied to explore the perceptions of RCEs and stakeholders and increased

understanding of existing target areas and HEfSD gaps. Participants were also asked to share their perceptions on current HEfSD target areas and gaps and to list existing projects and initiatives in alignment with the SDGs. Gaps are those areas in relation to the SDGs in which RCEs and their stakeholders did not report any active project or activity. Target areas are those in which RCEs and stakeholders report at least one (1) initiative in relation to the topic.

### Data analysis

The qualitative research strategy sought to inductively build new theory concerning HEfSD target areas and gaps. Theory building is an appropriate methodology as even though each of the regions explored has an extensive data and literature behind it and there is little known about how they intersect when consciously brought together. A qualitative strategy is needed to tease out these interactive links and identify HEfSD gaps and targeted areas, as well as to tease out the difference between perception and reality of those working in the field.

As such, our data analysis followed procedures for inductive theory building from each region as prescribed by Braun and Clarke's (2006) thematic analysis, and Yin's (2003) chain of evidence method to analyze data (see also Eisenhardt 1989). The chain of evidence method calls for clear links in moving from data to theory. Theory building is a process of data reduction based on cause–effect evidence. The process was to first group data into regions based on (1) features of the HEfSD approach in the form of projects and in alignment with SDGs and (2) subjective reactions of RCEs focal points and stakeholders and scholarly debates. From these two sets of themes researchers then induced theoretical inferences of cause–effect between features, projects and subjective reactions. Tables 1, 2, 3 and 4 record the data from this inductive theory-building process. In each table, the second column shows projects relevant to the region and in alignment with SDGs. Typically, these data came from surveys, interviews and focus groups.

The third column then shared quotes relevant to stating existing projects, citations of relevant scholarly literature and the subjective reactions of a diverse array of RCE focal points and stakeholders, which reflected how they thought about the existing HEfSD approach within their RCEs, as well as trends and gaps in the regions in which they are immersed. Quotes were selected which conveyed reflections and views towards existing HEfSD target areas and gaps. Participants' perceptions on HEfSD did differ across regions. However, commonalities were also found. Focal points across regions agree that various SDGs are widely targeted in higher education, specifically SDGs 4, 11, 12 and 15. However, they also reported that major gaps remain in the achievement of SDGs 1, 2, 3 and 10 in HEfSD. More



**Table 1** Data: the Americas

| SDG                              | Americas HEfSD projects  | Americas data and inferences   |
|----------------------------------|--|--|
| SDG 1 no poverty                 | No reported  | According to survey participants social and economic pillars of sustainability cannot be longer overlooked by stakeholders involved (Global Survey)<br>There is a common agreement amongst participants that social sustainability issues cannot longer be ignored. This is compromising the attainment of SDG1, SDG5, SDG8 and SDG10, as no initiatives have been reported in these areas (Global Survey)   |
| SDG 2 zero hunger                | Food sovereignty and community development in rural communities in Chihuahua, México<br>Friendship farm and interpretative paths   | Another case in point is Mexico where projects on renewable energy and food sovereignty have been implemented towards the attainment of SDG7 and SDG2 (RCEs in Mexico)   |
| SDG 3 good health and wellbeing  | Research project on land heritage, learning and conservation<br>Friendship farm and interpretative paths<br>Research project on strengthening human–animal relationships as a doorway to Indigenous wellness             | Attention is being paid to SDG3 Good Health and Wellbeing through a project aimed to strengthening human–animal relationships as a doorway to indigenous wellness (RCEs in Canada)   |
| SDG 4 quality education          | Ozires silva lecture on sustainable entrepreneurship   | Lack of research on sustainability uptake in broader disciplines, limited professional development training designed to facilitate the integration of sustainability concepts into their curricula and scarce content or time for ESD are major barriers for impactful ESD in higher education the Americas case (Puk and Behm 2003)<br>Findings of a training program in Ecuador showed that firstly it “provided academics with a broader understanding and more knowledge about sustainability-related issues.” Secondly teaching routines and professional performance were transformed, encouraging a more participative and, active approach (Barth and Reickmann 2012)<br>“ESD in higher education not only requires innovation in teaching and learning, but also challenges the capabilities of academic staff and is a question of lifelong learning” (Barth and Reickmann 2012, p 29)<br>Educators have a reasonable understanding of ESD (Barth and Reickmann 2012), major work needs to be conducted to increase students’ understanding of sustainability issues to achieve SDG4<br>The RCE Sustainability Education Network is working with eco- psychologists to create workshops to train students to learn about how develop hope and resilience in the face of challenging sustainability issues, how to face climate change, and how to address environmental injustice (RCE Greater Portland) |
| SDG 5 gender equality            | No reported  | An area identified as gap  |
| SDG 6 clean water and sanitation | Research project on land heritage, learning and conservation<br>Integral water management<br>Establishment of the research institute ‘Instituto de Ciência e Tecnologia de Estações de Tratamento de Esgoto Sustentável’ | A Brazil-based RCE, for example, reported the creation of the ‘Instituto de Ciência e Tecnologia de Estações de Tratamento de Esgoto Sustentável’ (Institute of Science and Technology of Stations of Treatment of Sustainable Sewage) showing RCE’s commitment in achieving SDG6 successfully   |

Table 1 (continued)

| SDG   | Americas HEfSD projects   | Americas data and inferences  |
|---|---|---|
| SDG 7 affordable and clean energy             | Renewable energy<br>High yields in corn and beans, soils restoration using natural soil nutrients and biological pest control   | Another case in point is Mexico where projects on renewable energy and food sovereignty have been implemented towards the attainment of SDG7 and SDG2   |
| SDG 8 decent work and economic growth         | Ozires silva lecture on sustainable entrepreneurship<br>Sustainable business models<br>Green businesses<br>Sustainable entrepreneurship<br>Fostering entrepreneurship in the Amazon<br>Establishment of the award and lecture<br>'Ozires Silva' on sustainable entrepreneurship   | Only project that address SDG 8 in the Americas<br>In achieving SDG 9, stakeholders have embarked in corporate sustainability initiatives such as sustainable entrepreneurship and sustainable business development. The establishment of the award and lecture 'Ozires Silva' on sustainable entrepreneurship is an example of RCEs' in Brazil commitment to SDG 9. Interlinkages with SDG 4 |
| SDG 9 industry, innovation and infrastructure | Sustainable business models<br>Green businesses<br>Sustainable entrepreneurship<br>Fostering entrepreneurship in the Amazon<br>Establishment of the award and lecture 'Ozires Silva' on sustainable entrepreneurship  | In achieving SDG 9, stakeholders have embarked in corporate sustainability initiatives such as sustainable entrepreneurship and sustainable business development. The establishment of the award and lecture 'Ozires Silva' on sustainable entrepreneurship is an example of RCEs' in Brazil commitment to SDG 9. Interlinkages with SDG 4  |
| SDG 10 Reduced Inequalities                   | Short term courses to insert refugees in the work market  | Only project addressing SDG 10 across all regions   |
| SDG 11 Sustainable cities and communities     | Urban solid waste<br>Urban agriculture<br>Sanitation<br>Projects on community sustainability through Ecomuseums<br>Establishment of a network on sustainable universities<br>Transdisciplinary centers on sustainability at higher education institutions<br>Research project on land heritage, learning and conservation<br>Urban agriculture project with graduate students<br>Friendship farm and interpretative paths<br>Organizations engaging communities in sustainability curriculum<br>Research project on agro-ecology and biodiversity research with local farmers and community gardens<br>YouTube series 'Walking throughout Colombia towards sustainability'<br>Capacity-building on green business development | SDG11 Sustainable Cities and Communities through the YouTube series 'Walking through Colombia towards sustainability' and linkages with SDG12 by building capacity for green business in rural areas of Colombia  |
| SDG 12 responsible consumption and production | Urban solid waste<br>Transport<br>Friendship farm and interpretative paths<br>Social networks and interactions to foster rural sustainability<br>Social responsibility for business competitiveness in Bogota<br>Building capacity for green businesses in rural areas of Colombia, particularly in the area of waste reduction<br>Sustainable gastronomy in Bogota   | RCEs in Colombia show a strong commitment to SDG 12, particularly in the areas of waste reduction, green business development. Sustainable gastronomy is also a constituent component of the agenda in the achievement of SDG 12  |

Table 1 (continued)

| SDG   | Americas HEfSD projects   | Americas data and inferences   |
|---|---|--|
| SDG 13 climate action                         | <p>Projects on climate change</p> <p>Projects on environmental protection</p> <p>Research project on land heritage, learning and conservation</p> <p>Program on climate change adaptation</p>   | <p>RCEs in Guatemala reported a strong commitment to SDG13 and SDG15, through projects on climate change adaptation, environment and ecosystem protection</p>    |
| SDG 14 life below water                       | No reported   | An area identified as gap  |
| SDG 15 life on land                           | <p>Projects on ecosystem preservation</p> <p>Research project on land heritage, learning and conservation</p> <p>Education about biology and cultural diversity. This initiative is aimed to build capacity amongst teachers to design intercultural curriculums about the major cultural and natural assets through visits to parks and old cities.</p>  | <p>RCEs in Guatemala reported a strong commitment to SDG13 and SDG15, through projects on climate change adaptation, environment and ecosystem protection</p>    |
| SDG 16 peace, justice and strong institutions | Projects on refugees  | <p>Participants agree that placing diverse and vulnerable community groups such as refugees at the center of ES agendas can</p>                                  |
| SDG 17 partnerships for the goals             | <p>Connecting businesses and higher education institutions for sustainable entrepreneurship</p> <p>Partnerships between the city of Portland and academic researchers in sustainability</p> <p>Establishment of sustainable universities</p> <p>World Environment Day Global Goals Fair: a large event highlighting groups throughout the Portland region that are engaging in efforts to address each of the issues covered in the 17 Sustainable Development Goals, from poverty and hunger to climate change and peace</p> | <p>Partnerships for the Goals, for example, are being operationalize by connecting businesses and higher education institutions, RCEs and local stakeholders</p> |

Table 2 Data: Asia and the Pacific

|   | Asia-Pacific HEISD projects  | Asia-Pacific data and inferences   |
|---|--|--|
| SDG   |  |  |
| SDG 1 no poverty                              | Project on Promoting Sustainable Agricultural Conditions for Poverty Reduction in Kampong Cham Province, Cambodia  | This project interlinks and target several SDGs simultaneously (SDG 1, 5, 8 and 12)  |
| SDG 2 zero hunger                             | No reported  | An area identified as gap  |
| SDG 3 good health and wellbeing               | No reported  | An area identified as gap  |
| SDG 4 quality education                       | Training camp on energy conservation/demonstration of alternative energy<br>Natural classroom for mangrove ecosystem in Thailand<br>Ecotourism promotion project in Thailand in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public<br>Secondary Schools Harvest<br>Go Mad challenge in Australia, an environmental leadership program for secondary schools' students<br>Ecology Program for School students Aboriginal Education on sustainable development | "Teachers are at the center of curricular development and responsible for the introduction of sustainable development to their students" (Ceulemans and De Prins 2010, p 46)<br>In a study of 38 Australian universities, "only a single institution offered its faculty training opportunities on incorporating sustainability into their curricula (Holdsworth et al. 2008)"<br>Similarly, Barth and Reikmann (2012) support the need for more teacher training on how to provide sustainability education. They also argue that "ESD in higher education not only requires innovation in teaching and learning, but also challenges the capabilities of academic staff and is a question of lifelong learning"<br>This project interlinks and target several SDGs simultaneously (SDG 1, 5, 8 and 12) |
| SDG 5 gender equality                         | Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public   | This project interlinks and target several SDGs simultaneously (SDG 1, 5, 8 and 12)  |
| SDG 6 clean water and sanitation              | Research on development on watershed ecosystem administration and management under climate change condition: a case study for Sindhorn International<br>Environmental park (SIEP) and adjacent areas<br>Community awareness (both rural and urban) on water conservation<br>Training camp on energy conservation/demonstration of alternative energy   | In Vietnam, there are projects interlinking SDG 6 and SDG 13<br><br>As cities grow in a multicultural country such as Australia, sustainability problems are greater and ESD initiatives have to somehow assist in tackling these issues (Local Government, Interview 2017)  |
| SDG 7 Affordable and Clean Energy             | Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public<br>Energy saving programs for vulnerable communities  | This project interlinks and targets several SDGs simultaneously (SDG 1, 5, 8 and 12)   |
| SDG 8 decent work and economic growth         | Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public   | This project interlinks and targets several SDGs simultaneously (SDG 1, 5, 8 and 12)   |
| SDG 9 industry, innovation and infrastructure | No reported  | An area identified as gap  |
| SDG 10 reduced inequalities                   | No reported  | An area identified as gap  |
| SDG 11 sustainable cities and communities     | Hawkesbury Harvest<br>Outbound mobility for students   | In the Australian case, participants agree, the major challenge in the region is connecting nature to people and sharing common ground to protect the environment (Global Survey)  |
| SDG 12 responsible consumption and production | Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public   | This project interlinks and targets several SDGs simultaneously (SDG 1, 5, 8 and 12)   |



Table 2 (continued)

| SDG   | Asia-Pacific HEiSD projects  | Asia-Pacific data and inferences  |
|---|--|---|
| SDG 13 climate action                         | <p>Research on development on watershed ecosystem administration and management under climate change condition: a case study for Sindhorn International Environmental Park (SIEP) and adjacent areas ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public</p> <p>Natural classroom for mangrove ecosystem Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public</p>   | <p>Research project interlinking SDG 6</p> <p>Research project interlinking various SDGs simultaneously</p>   |
| SDG 14 life below water                       | <p>Natural classroom for mangrove ecosystem Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public</p>   | <p>Current initiatives are targeting mainly students</p>  |
| SDG 15 Life on Land                           | <p>Project on Reforestation for Conserving Socio-ecological Production Landscapes in Kratie and Mondulkiri, Cambodia</p> <p>Natural classroom for mangrove ecosystem</p> <p>Research on Development on Watershed Ecosystem Administration and Management under Climate Change Condition: A case Study for Sindhorn International Environmental Park (SIEP) and Adjacent Areas Ecotourism promotion project in collaboration with the association for energy and environmental conservation and reinforcement of conservation awareness within the public</p> <p>Research project on Eco physiological characters of vegetation in 3 catchment areas of springs as models</p> | <p>Research is being undertaken in collaboration with higher education institutions in fields associated with SDG15</p>   |
| SDG 16 peace, justice and strong institutions | <p>No reported</p>   | <p>An area identified as gap</p>  |
| SDG 17 partnerships for the goals             | <p>Sustainability outreach campaign</p> <p>Green army</p> <p>Youth Advocate Forum</p>  | <p>A successful case in Australia, shows how universities in collaboration with governments are leading sustainability outreach campaigns, green army and the youth advocate forums (Local Government 2017)</p> |

Table 3 Data: Africa

| SDG   | Africa HE/SD projects  | Africa data and inferences   |
|---|--|--|
| SDG 1 no poverty                              | No reported  | An area identified as gap  |
| SDG 2 zero hunger                             | No reported  | “What moral base is there for maintaining that we need to ensure the survival of future generations when the present generation is dying as a result of lack of housing, healthcare and food?”<br>Bak (1995)   |
| SDG 3 good health and wellbeing               | No reported  | An area identified as gap  |
| SDG 4 quality education                       | Projects on lifelong learning<br>Indigenous education<br>Indigenous committee formation- to integrate modern and indigenous stakeholders | In Kenya, for example, “the education system presents students with ready-made problems, it does not prepare students to deal with the changing dynamics of the external forces of globalization (Kivati 2016, p 27)<br>To “prepare students for sustainability challenges, the education system should focus on problem-based learning to prepare students for life-long learning”, as sustainability issues are forever changing (Barth and Reickmanns 2012; Kivati 2016)<br>Participants in the global survey identified long life learning as a driver for fostering quality education<br>In addition, respondents agree that some initiatives that are fostering the achievement of SDG 4 on Quality Education consist of gender equality in the form of education for women and girls, mobile solar powered tech classrooms and restoration of environmental-protected areas |
| SDG 5 gender equality                         | Expanding access to girls’ education and learning for sustainability   | SDG 5 gender equality interlinks with SDG 4 quality of education as current projects assists women and girls to access education   |
| SDG 6 clean water and sanitation              | No reported  | An area identified as gap  |
| SDG 7 affordable and clean energy             | Mobile solar powered tech classrooms   | Interlinkages with SDG 4 quality of education  |
| SDG 8 decent work and economic growth         | No reported  | An area identified as gap  |
| SDG 9 industry, innovation and infrastructure | No reported  | An area identified as gap  |
| SDG 10 reduced inequalities                   | No reported  | An area identified as gap  |
| SDG 11 sustainable cities and communities     | Projects for indigenous community development  | Policy directives in countries like Nigeria do not “adequately empower the citizen for responsible environmental action” and that adequate environment education was needed to prevent “socio-cultural and environmental decay” (Adara 1996)   |
| SDG 12 responsible consumption and production | Soil analyses for suitable cash cropping   | An area identified as gap  |
| SDG 13 climate action                         | No reported  | An area identified as gap  |
| SDG 14 life below water                       | No reported  | An area identified as gap  |
| SDG 15 life on land                           | Restoration of R. Rwizi banks to migrate climate change effects, by the environment and sustainable development club                     |  |
| SDG 16 peace, justice and strong institutions | No reported  | An area identified as gap  |
| SDG 17 Partnerships for the goals             | No reported  | An area identified as gap  |

**Table 4** Data: Europe

| SDG   | Europe HEfSD projects   | Europe data and inferences  |
|---|---|---|
| SDG 1 no poverty                              | No reported   | An area identified as gap   |
| SDG 2 zero hunger                             | No reported   | An area identified as gap   |
| SDG 3 good health and wellbeing               | No reported   | An area identified as gap   |
| SDG 4 quality education                       | Introducing SD in the curricula for local training actors<br>Government funded project on Arts and SDGs. The project aims to enhance local interpretation of SDG's in the Swedish context through art<br>Footprint of carbon of schools in Mediterranean cities | There is an increasing concern about the lack of ESD implementation as a field of study in higher education in Europe (Adom̂ent et al.,2014; Milutinović and Nikolić 2014)<br>The issue being that “education about sustainable development means teaching and learning about the concept itself, politics, policies and sustainable development theories” (Milutinovic and Nikolic 2014, p 108)<br>Participants agree there is increasing interest but decreasing funding options (Global Survey)<br>It is also argued that the incorporation of ESD into Central Eastern Europe curricula is poorly documented, highlighting two cases from the Czech Republic and Bulgaria as two of a few examples of ESD in Eastern Europe. “One example depicts the evolution of teaching and supporting the sustainability paradigm in a devastated coal-mining area, the other relates to shifts in urban planning education in the course of societal changes in urban areas” (Adom̂ent et al. 2014)<br>Jóhannesson et al. (2011) suggest that the Icelandic approach to sustainability provides teachers and schools with more opportunities to deal with issues of sustainable development<br>Acknowledgement of the necessity of environmental education is centuries old as Froebel (1826) notes “The pupil will get the clearest insight into the character of things, of nature and surroundings, if he sees and studies them in their natural connection” |
| SDG 5 gender equality                         | No reported   | An area identified as gap   |
| SDG 6 clean water and sanitation              | Removing pharmaceuticals from the waste stream<br>Capacity-building for sustainable technologies  | Interlinkages with SDG 4 quality education  |
| SDG 7 affordable and clean energy             | Energy efficiency action plan for a municipality  | An area identified as gap   |
| SDG 8 decent work and economic growth         | No reported   | An area identified as gap   |
| SDG 9 industry, innovation and infrastructure | Project on circular economy in Italy  |   |
| SDG 10 reduced inequalities                   | No reported   | An area identified as gap   |
| SDG 11 Sustainable Cities and Communities     | Mapping ecosystem services in urban settings<br>Urban agriculture<br>Workshops on sustainable cuisine in Portugal<br>Project on social responsibility for innovation at Universidade Nova de Lisboa, Portugal   |   |
| SDG 12 responsible consumption and production | Project on Circular economy in Italy<br>Fair production project in Germany  | Interlinkages with SDG 17 and SDG 9   |
| SDG 13 climate action                         | Projects on climate change leadership   |   |
| SDG 14 Life Below Water                       | Green storm water infrastructure through ecological design  |   |
| SDG 15 life on land                           | Project on circular economy in Italy  | Interlinkages with SDGs 9, 12, 17   |
| SDG 16 peace, justice and strong institutions | Project on urban farming in Germany   | Interlinkages with SDG 11   |

**Table 4** (continued)

| SDG                               | Europe HEfSD projects   | Europe data and inferences |
|-----------------------------------|---|----------------------------|
| SDG 17 partnerships for the goals | International network 'City Food'<br>Project on Circular economy in Italy |                            |

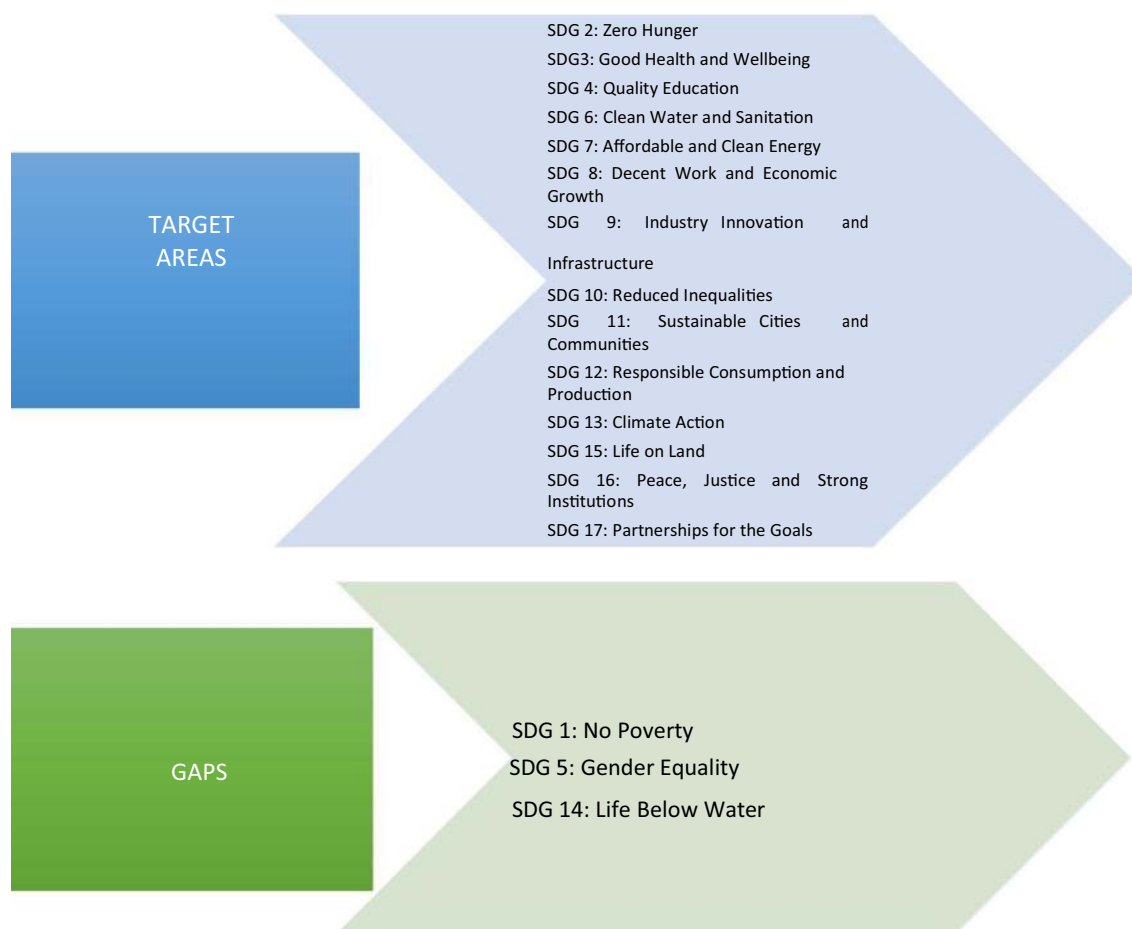
specific findings in this regard are found in the section “[Regional commonalities and differences](#)”.

The research team then analyzed these column entries for an overall narrative of a given region. Based on RCEs’ stakeholders’ perceptions, they then identified targeted areas and gaps for HEfSD in alignment with the SDGs in each region. The team then progressed the quotes into a story, which is presented in the narratives written in the following sections. Researchers took data and assessed whether RCE focal points and stakeholders thought the HEfSD approach was or was not relevant to given SDGs within their RCE and why this was the case. It was from this step of drawing theoretical interferences that important themes and perceived gaps of HEfSD in relation to the SDGs were found. These theoretical interferences then became the basis of Figs. 1, 2,

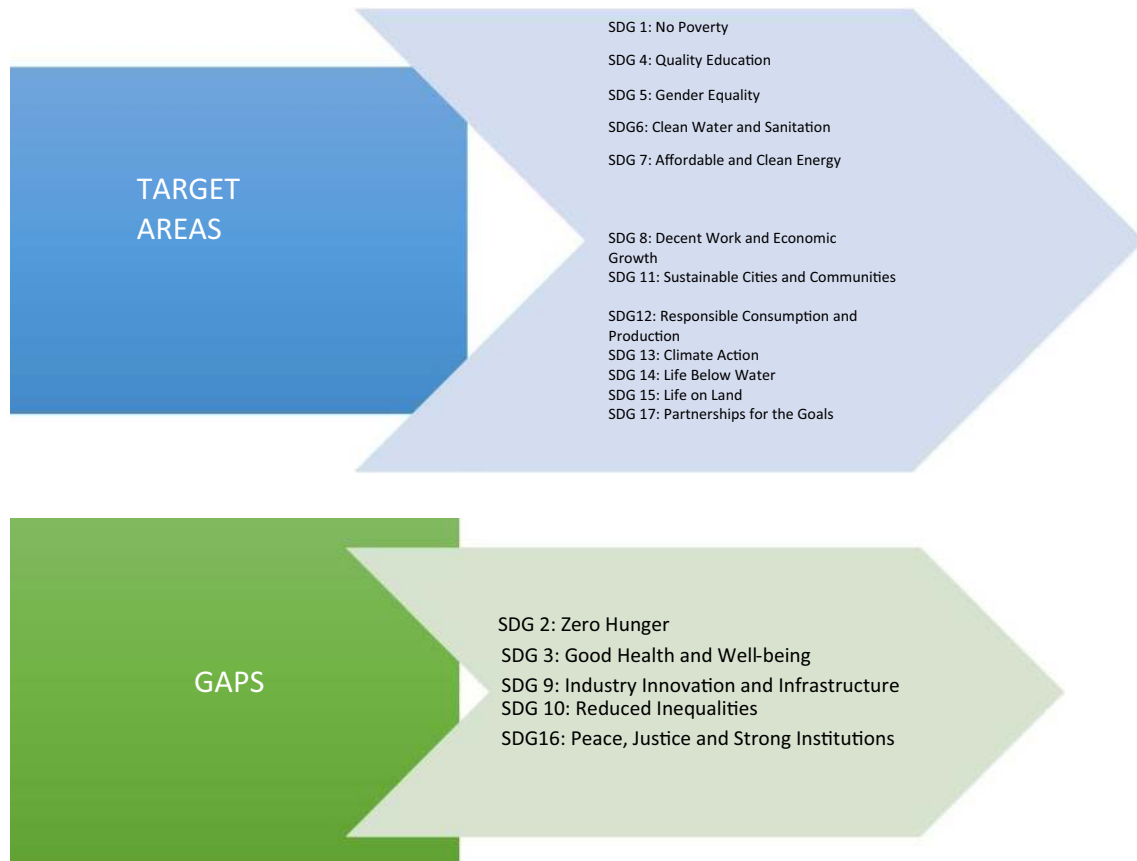
3 and 4. After obtaining results from four separate regions (Asia and the Pacific, Europe, Africa, and the Americas), a comparative analysis was undertaken to identify global commonalities and differences. Both perceived gaps and targeted areas in HEfSD were validated whenever possible with individual interviews and online survey results and presented at the end of the discussion and in the conclusion sections.

## Results and discussion

Based on theory building as the governing methodological approach of this research, the analysis and results here presented were validated using various methodological techniques such as survey, literature review, interviews and



**Fig. 1** ESD in the Americas: targeted areas and gaps



**Fig. 2** ESD in the Asia and the Pacific: targeted areas and gaps

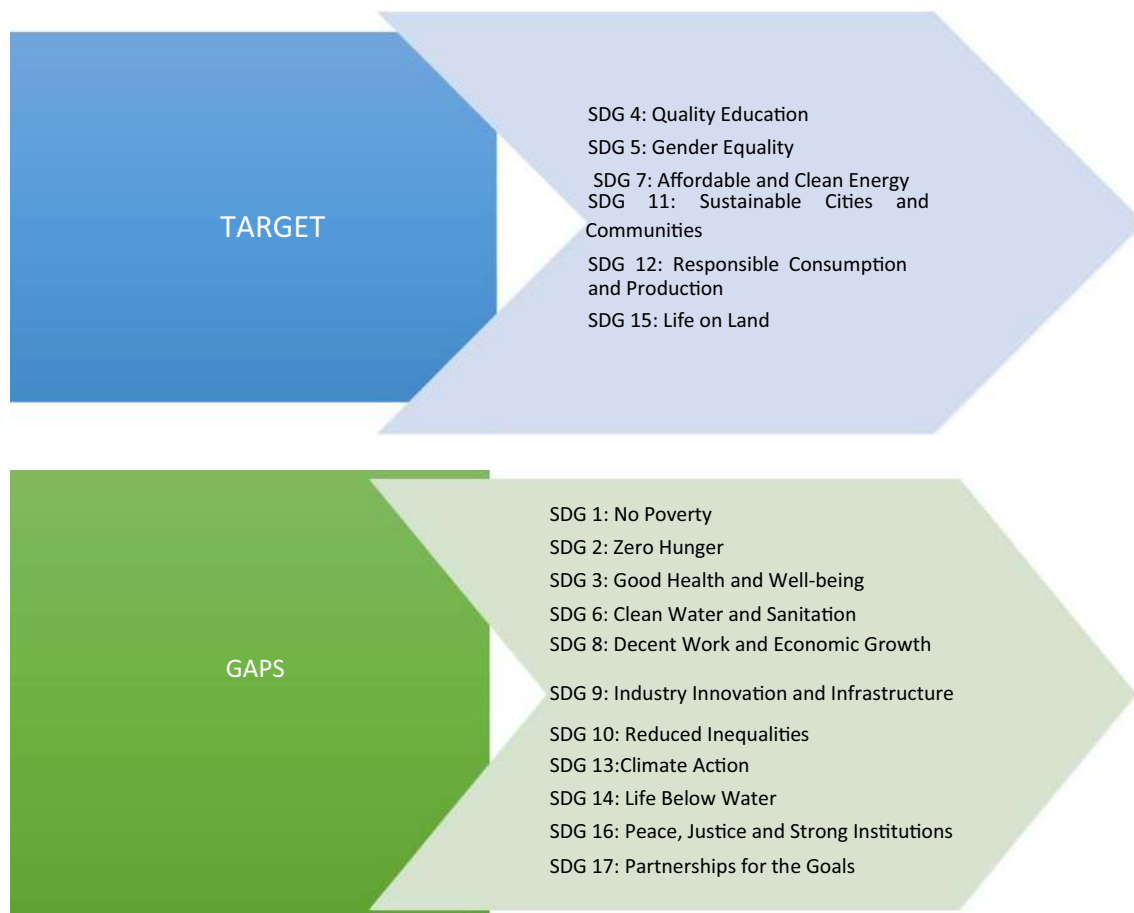
focus groups. The analysis begins reporting on findings in the Americas' case followed by research findings from Asia and the Pacific, Africa, and Europe. A section on regional commonalities and differences is also presented at the end of the discussion.

### HEfSD in the Americas: targeted areas and gaps

Evidence indicates that participants from RCEs in the Americas are increasingly showing a stronger commitment to HEfSD policy, curriculum and practice in alignment with the Global Agenda for Sustainable Development. For instance, survey participants from an RCE based in North America state that “(they) have a large variety of groups, across sectors, that collaborate via many networks, including RCE Greater Portland. (They) have hosted a variety of different events and collaborated with multiple partners, to serve diverse audiences, across sectors, integrating the skills and resources of a variety of partners, with numbers exceeding our targets”. However, issues on existing collaborative processes for HEfSD remain. With only three of the SDGs perceived as gaps in HEfSD by RCEs in the Americas, namely SDGs 1, 5 and 14 (Fig. 1), respondents

reported that more involvement of educators and students from higher education institutions in collaborative processes was perceived as a priority to advance towards HEfSD: ‘We continue to grow, with new programs and events, in addition to more volunteers, interns, and fellows, which all require coordination and management. It is not enough to depend on volunteers to meet our capacity needs. This led to inequity in workloads and burn out of our outgoing Director. The network has struggled due to the leaders being stretched too thin. We need funding to expand staff capacity’—research participants’ state. In addition, results indicate that social sustainability issues in the achievement of SDGs are not as proactively targeted as environmental sustainability matters.

Within the Americas, RCEs and stakeholders are embracing a collaborative approach to operationalize HEfSD. Nevertheless, participants’ perceptions show that stronger involvement of students and teachers from higher education requires greater attention. A major issue reported both in theory and practice in the achievement of SDG 4, for instance, concerns students’ involvement and lack of understanding and practice of ‘overall sustainability’ (Comm and Mathaisel 2008; Barth and Reickmann 2012) (Table 1, Column 2, Row 5). Lack of research on sustainability uptake in



**Fig. 3** HEfSD in Africa: targeted areas and gaps

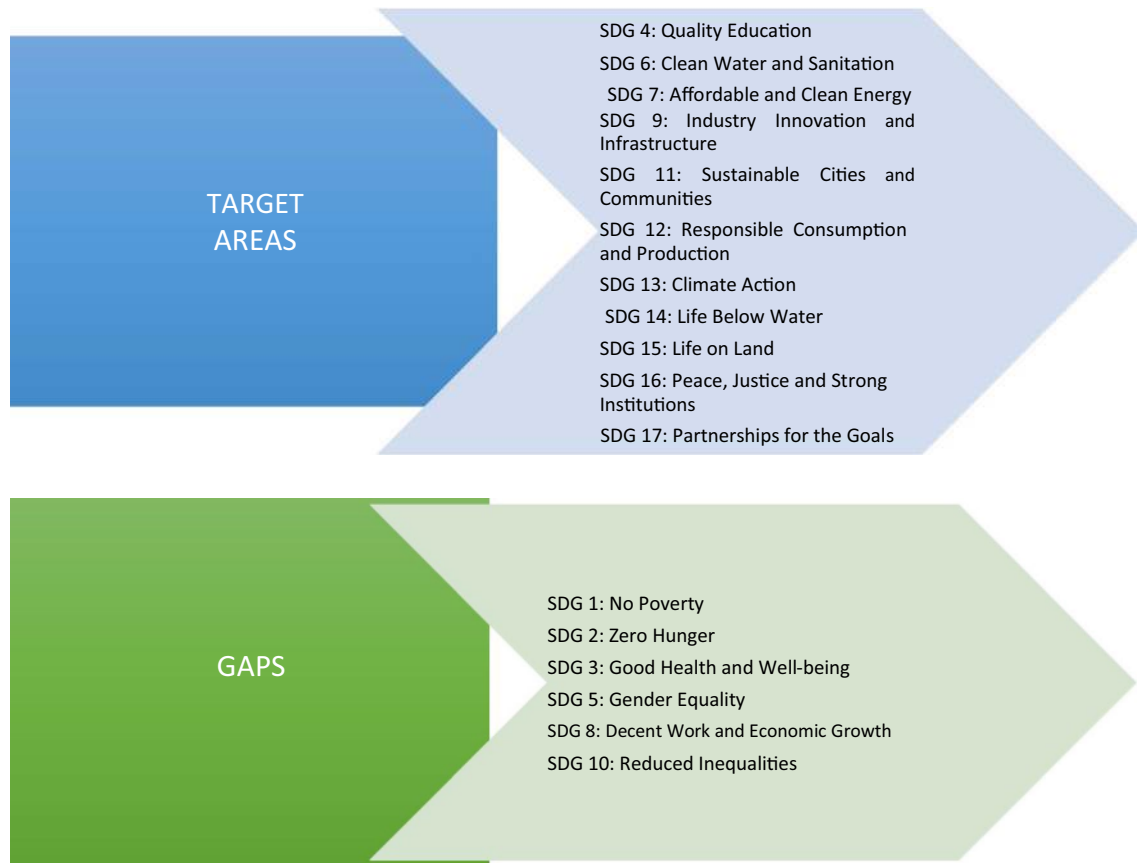
broader disciplines, limited training designed to facilitate sustainability integration into their curricula and scarce content or time for HEfSD are major barriers faced by teachers and students (Puk and Behm 2003). To address this issue, in North America, for instance, RCE Greater Portland is working with eco-psychologists to create workshops to train students to learn about resilience in the face of challenging sustainability issues, such as climate change and environmental injustice. This project interlinks and targets SDGs 4 and 17 and has led to ongoing collaboration between researchers and stakeholders in the City of Portland in North America (Table 1, Column 2, Row, 5).

Whilst in North America, the achievement of SDGs such as SDG 4 has a strong focus on students, participants in South America argue that major attention needs to be paid to educators in higher education. Hernandez et al. (2018) concluded that dissemination and implementation of international HEfSD frameworks in Latin America have been slow and sporadic. Although there are some signs to implement HEfSD into curricula in Brazil and Colombia, these practices have not been substantial or have not permeated higher Education institutions' sustainable development strategies

per se. A Brazilian RCE is tackling this issue by interlinking SDGs 4, 8 and 9 through the establishment of the 'Ozires Silva' lecture and award on sustainable entrepreneurship (Table 1, Column 2, Rows 5, 9 and 10). Successful cases have also been documented in the literature by Barth and Reickmann (2012) who reported the outcomes of a sustainability training program for educators in Ecuador. Findings show that first it provided academics with a broader understanding of sustainability issues. Second, teaching routines and professional performance were transformed, encouraging a more participatory and active approach from educators in higher education (Table 1, Column 2, Row 5).

Another major finding for HEfSD in the Americas concerns social sustainability issues, which according to participants have been overlooked when compared to environmental sustainability matters, a situation that they believe is compromising the attainment of SDGs 1 and 5 (Table 1, Column 2, Rows 2 and 6). Participants agree that placing diverse and vulnerable community groups such as indigenous communities and refugees at the center of HEfSD agendas can assist in addressing this issue and can also show a strong commitment to SDG 16 (Table 1, Column





**Fig. 4** HEfSD in Europe: targeted areas and gaps

2, Row 17). There is an increasing consensus that pressing social sustainability issues, such as the arrival of disruptive industries (e.g., extractives), climate change, community displacement from rural contexts to urban and periurban areas and increased conflict over land ownership are factors that are threatening vulnerable community groups (Franco, 2014). This issue is being addressed in HEfSD from various locations throughout the Americas. For example, a Canadian RCE is targeting SDG 3 through a project aimed to strengthening human–animal relationships as a doorway to indigenous wellness (Table 1, Column 2, Row 4).

Interestingly, in South America, a capacity-building project for refugees to access the labour market, led by a Brazilian RCE is the only initiative across all RCEs surveyed in the Americas in relation to the attainment of SDG 10 within HEfSD (Table 1, Column 2, Row 11). Other efforts that represent a potential to achieve social sustainability within HEfSD are being conducted in Colombia. For instance, SDG 11 is targeted through the educational YouTube series ‘Walking through Colombia towards sustainability’ (Table 1, Column 2, Row 12)—an initiative developed by the university that explores connections between the environment and groups in vulnerable conditions. Major attention is also

being paid to SDG 12 through projects on rural community capacity building through green business development and sustainable gastronomy (Table 1, Column 2, Row 13).

Results also show there is a plethora of environmental sustainability initiatives for HEfSD in the Americas. A Brazilian RCE, for example, reported the creation of the ‘Instituto de Ciência e Tecnologia de Estações de Tratamento de Esgoto Sustentável’ (Institute of Science and Technology for Sustainable Sewage Treatment) in alignment with SDG 6 (Table 1, Column 2, Row 7). Another case in point is and RCE in Mexico where projects on renewable energy and food sovereignty have been implemented towards the attainment of SDG 7 (Table 1, Column 2, Rows 8). In addition, a Guatemala-based RCE shows a strong commitment to SDGs 13 and 15, through projects on climate change adaptation, environment and ecosystem protection, respectively (Table 1, Column 2, Rows 14 and 16).

The current targeted environmental areas (Fig. 1) champion the rhetoric on misconceptions of global policy and how they are jeopardizing HEfSD practice. Barraza et al. (2003) argue that the element of North–South politics or the notion that “globally agreed is hampering HEfSD and that environmental education perspectives could be seen as

providing the ‘North’ with yet another means to re-shape and re-define people’s behaviors and thinking in the ‘South’, in what Escobar (1995) sees can become a subtle but effective control mechanism, and another expression of neo-colonialism”. In some cases, governments follow this statement and ministries of education have given relatively low priority to what they perceive (or better, misperceive) as a ‘fashionable trend’ (Dlouhá and Moldan 2013). This issue deserves closer attention within the region, as it can compromise the advancement of HEfSD in policy, curriculum and practice.

### HEfSD in Asia and the Pacific: targeted areas and gaps

Results indicate that environmental sustainability is also a key component in the HEfSD agenda in Asia and the Pacific. However, there is scarce attention on initiatives that address sustainability policy issues, such as governance and peace security, as well as social sustainability matters. Although higher education institutions in the region exist in a context where sustainable development policy is actively backed by strong government policies in nations such as Australia, China, Japan and the Philippines (Ryan et al. 2010), only two projects reported from RCEs in the region relate to the attainment of policy sustainability matters. An Australian-based RCE in collaboration with the local government reported the projects ‘Green Army’ and the ‘Youth Advocate Forum’ as two successful cases in the achievement of SDG 17 (Table 2, Column 2, Row 18). SDG 16 remains a gap that deserves nuanced attention, as no projects in relation to this Goal have been reported by participant RCEs (Table 2, Column 2, Row 18).

Research findings also show the major issues in further addressing social sustainability within HEfSD in relation to the attainment of SDG 4, particularly in regard to lack of educators’ capacity to teach sustainability. Similarly, as cities grow, more attention is needed to vulnerable communities and indigenous groups in multicultural settings. Little regard for these issues was perceived in a review of HEfSD initiatives for the region. Other gaps identified in the HEfSD agenda are as follows: SDGs 2, 3, 9, 10 and 16 (see Fig. 2). Targeted areas are also shown in Fig. 2 and are discussed below. Targeted areas those where there are existing projects while gaps indicate an absence of them.

Results show that environmental sustainability issues have been tackled through SDG interlinkages within HEfSD in the region. A case in point is an initiative for students on a ‘natural classroom’ to learn about mangrove ecosystems in South East Asia, linked to SDGs 4 and 14 (Table 2, column 2, Row 15), whilst in Vietnam, a research project on ‘Watershed Ecosystem Administration under Climate Change Condition’ interlinks SDGs 6 and 13 simultaneously (Table 2, Column 2, Rows 7 and 14). Scholars have also documented

interlinkages in the academic literature between SDG 13 and SDG 5, particularly in the case of Bangladesh. Corcoran-Nantes and Roy (2018), for instance, explore the gender-specific implications of climate change. The authors argue that although climate change impacts globally, its effects are not equal everywhere due to race and gender inequality, amongst other factors.

Interlinkages between SDGs were also found in HEfSD in Thailand. For example, a project for ecotourism within a Thai RCE currently targets SDGs 1, 5, 8, and 12 (Table 2, Column 2, Rows 6, 9 and 13). Findings show that in Bangladesh, efforts have been undertaken to forge sustainable livelihoods and achieve SDG 8. For instance, Sultana and Thompson (2007) documented the case of fisheries as a way to empower communities, access resources and foster overall sustainability. Evidence also shows that in Southeast Asian countries actions are taken towards the achievement of SDG 12 within HEfSD, particularly in relation to waste treatment and sustainable waste management (Ngoc and Schnitzer 2009). Similarly, two projects in Australia, one on ‘Outbound Mobility for Students’ and the ‘Hawkesbury Harvest for Sustainable Natural Resource Development’ are also being carried out to target SDG 11 (Table 2, Column 2, Row 12). According to participants’ perceptions, environment is a key area, as the major challenge in the region is connecting nature to people and sharing common ground to protect the environment. However, evidence shows that areas that need more attention are those related to the social sustainability (see Fig. 2).

Special attention needs to be paid to social sustainability matters for HEfSD in the region. For instance, in the achievement of SDG 4, there are ongoing issues on teacher training and preparation of the youth to face sustainability challenges is compromising the attainment of SDG 4. “Teachers are at the center of curricular development and responsible for the introduction of sustainable development to their students” (Ceulemans and De Prins 2010, p 46). In a study of 38 Australian universities, only a single institution offered its faculty training opportunities on incorporating sustainability into their curricula (Holdsworth et al. 2008). Participants agree there is a need for more teacher training on how to teach sustainability, an issue that had also been documented by Barth and Reikmann (2012, p 29). They argued that HEfSD “not only requires innovation in teaching and learning, but also challenges the capabilities of academic staff and is a question of lifelong learning”.

Another issue derived from the existing social sustainability gap concerns increasing vulnerability of various communities. As cities grow, sustainability problems within them will become greater, and any HEfSD initiatives addressing them will be required to become more inclusive. An Australia-based RCE, for example, is using HEfSD to conduct educational programs on energy saving in vulnerable and

multicultural communities—an initiative that targets SDG 7 (Table 2, Column 2, Row 8). This inclusive approach to HEfSD is helping students in higher education institutions learn more about vulnerable communities, particularly multicultural and indigenous community groups. With a focus on vulnerable communities, educators and students, key actors are required to foster connections between social and environmental sustainability matters in a more inclusive and holistic manner.

### HEfSD in Africa: target areas and gaps

Current trends on HEfSD in Africa have strongly been criticized. “What moral base is there... to ensure the survival of future generations when the present generation is dying as a result of lack of housing, healthcare and food?” (Bak 1995). According to Okolie (2003, p 1) “higher education in Africa should be rethought and restructured to better reflect the actual lived experiences of the vast majority of Africans”. The author proposes that this can be done by creat[ing] spaces for the expropriation of what is suitable in modern science and technology and their rearticulation with elements of Africa’s traditions, values, practices and relationship with nature to pursue development policies that are African-centered and more sustainable.

It is claimed that sustainability policy in African countries like Nigeria do not empower the citizen for responsible environmental action and that environmental education was needed to prevent “socio-cultural and environmental decay (Adara 1996). This issue is reflected in research findings showing that eleven (11) out of the seventeen (17) SDGs are not being widely covered as shown in Fig. 3. Participants agree in their perception that this is due to a lack of a governing approach to tackle pressing sustainability issues. Instead, there are a number of scattered initiatives aligned with various SDGs. Participants also stated that this is also due mainly to lack of capacity amongst stakeholders to develop an integrated approach to HEfSD across the region. In addition, findings indicate there is increasing interest in tackling social sustainability issues through SDGs interlinkages and a particular focus on vulnerable community groups, such as indigenous peoples. Likewise, evidence shows that environmental sustainability issues remain partially covered and several SDGs still need to be addressed, as follows: SDGs 1, 2, 3, 6, 8, 9, 10, 13, 14, 16, and 17 (See Fig. 3). Targeted areas are also shown in Fig. 3 and are discussed below.

Findings show there is a major focus on vulnerable community groups and the exploration of SDG interlinkages to achieve social sustainability. Such interest is reflected, for example, in HEfSD in the region focusing on the attainment of SDG 4. Evidence shows strong interlinkages between SDG 4 and other SDGs with a major focus on community groups and lifelong learning. It is argued that HEfSD should

prepare students for sustainability challenges by focusing on problem-based learning to prepare students for life-long learning and face forever changing sustainability issues (Barth and Reickmann 2012; Kivati 2016). At the present time “the education system presents students with ready-made problems, it does not prepare them to deal with the changing dynamics of the external forces of globalization” (Kivati 2016, p 27). Findings show that active projects interlinking SDG 4 and SDG 11 are focused on community empowerment to prepare future generations to face just these types of sustainability challenges. A case in point is a Nigerian-based RCE that is currently targeting SDG 11 through indigenous community capacity development (Table 3, Column 2, Row, 12). Strong interlinkages between SDGs 4, 5 and 7 were also found in review of a number of RCE projects on HEfSD in the region. A program to increase women’s and girls’ access to education through mobile solar powered tech classrooms is one such connection (Table 3, Column 2, Rows 5, 6 and 8).

Whilst nuanced attention is being paid to social sustainability in this region, scarce attention has been devoted to the achievement of environmental issues with the exception of a few isolated projects. For example, a Nigerian RCE is working on a HEfSD project on ‘soil analyses for suitable cash cropping’ that aims to address SDG 12 (Table 3, Column 2, Row 13). Another case in point is a Uganda-based RCE where the ‘Environment and Sustainable Development Club’ targets both SDGs 13 and 15 through HEfSD by leading the restoration of the Rwizi Banks to mitigate climate change effects (Table 3, Column 2, Row 16). Despite current attempts to contribute to the achievement of SDGs, work needs to be done to cover the eleven (11) SDGs that remain unaddressed from reported projects at this time (see Fig. 3).

### HEfSD in Europe: targeted areas and gaps

External governance factors have impacted HEfSD in Europe. This issue is reflected in current HEfSD gaps, namely SDGs 1, 2, 3, 5, 8, and 10 (See Fig. 4). Targeted areas are also shown in Fig. 4 and discussed below. Decreasing funding options, ‘dynamically flat’ stakeholder engagement and low accountability are some of the factors that hamper HEfSD policy, curriculum and practice in the region. Innovation as a driver for HEfSD and emphasis on urban sustainability have also been found to be key themes in the European HEfSD agenda.

The notion of HEfSD in the European case has been widely discussed and criticized. It is argued that “education about sustainable development means teaching and learning about the concept itself, politics, policies and sustainable development theories” (Milutinović and Nikolić (2014, p 108). Few practical HEfSD applications have been documented in the academic literature, with only a

few cases reported in Europe. One example in the Czech Republic depicts the evolution of teaching and supporting the sustainability paradigm in a devastated coal-mining area. A Bulgarian case relates to shifts in urban planning education within HEfSD in the course of societal changes in urban areas (Adom̄bent et al., 2014). Similarly, an examination of a Portuguese case shows how sustainability principles in education have been integrated successfully making use of technology and online strategies (Azeiteiro et al. 2015). Another case in point shows that government organizations across Europe have taken actions to integrate sustainability principles into the curriculum, including within higher education (Sleurs 2008; Mochizuki and Fadeeva 2010). The abovementioned cases show practical applications of how higher education institutions' commit to move from sustainability theory to impact.

Research findings also show that innovation has become a driver for the attainment of SDGs in HEfSD within Europe. In Sweden, for example, current initiatives to achieve SDG 4 include 'sustainable development integration in the curricula', programs to 'increase awareness of SDGs through the use of art' and projects on the 'footprint of carbon of schools in Mediterranean cities' (Table 4, Column 2, Row 5). Innovation as a driver for HEfSD has been documented in an Icelandic case where teachers and schools are given the opportunity to innovate to deal with sustainable development issues (Jóhannesson et al. 2011). Innovative approaches to environmental education are centuries old as Froebel (1826) notes "The pupil will get the clearest insight into the character of things, of nature and surroundings, if he sees and studies them in their natural connection". At the present time, innovative education programs in the form of capacity building are undertaken to achieve SDG 6 implementation, such as a 'capacity-building project for sustainable technologies and pharmaceuticals removal from the waste streams' (Table 4, Column, 2, Row, 7).

Evidence also shows there is a particular interest in exploring interlinkages to tackle urban sustainability as such within European HEfSD. A Germany-based RCE reported projects on 'mapping ecosystem services in urban settings' and 'urban farming' to target simultaneously SDGs 11 and 16 (Table 4, Column 2, Rows 12 and 17). Another case in point was reported by an Albanian RCE currently working in collaboration with the local government to develop 'energy efficiency action plans' at the municipality level. This initiative targets both SDGs 17 and 7 (Table 4, Column 2, Rows 8 and 18). In addition, an Italian RCE is conducting a project on the 'circular economy' that interlinks SDGs 9, 12, 15, and 17 simultaneously (Table 4, Column 2, Rows 10, 13, 16 and 18). Although findings show RCEs have been proactive in translating HEfSD into practice in the region with close alignment to the Global Agenda for Sustainable

Development, six (6) SDGs remain unaddressed in HEfSD from RCEs surveyed in this research.

## Regional commonalities and differences

Even with the release of the Brundtland report in 1987 and the issuance of the Global Agenda for Sustainable Development by the United Nations in 2015, there is still room for improvement to action the global goals in HEfSD to move forward with relevant policy, curriculum and practice. Evidence from this research examining RCEs working with HEfSD indicates that five (5) SDGs are widely targeted in higher education across all regions, namely SDGs 4, 7, 11, 12 and 15 (see Table 5). Findings also show that major gaps remain in the attainment of SDGs 1, 2, 3 and 10. Interestingly, SDG 10 is being paid limited attention across all regions with only one project on 'capacity-building for refugees' reported in the Americas (Table 1, Column 2, Row 11). Findings also indicate that more attention needs to be devoted to HEfSD in the African region where eleven (11) SDGs were perceived as gaps in HEfSD among the RCEs surveyed. This is opposed to the Americas where only three (3) of the SDGs were perceived as gaps in HEfSD by RCEs.

Participants agree that current challenges and opportunities in practicing HEfSD in alignment with the Global Agenda for Sustainable Development comprise several factors, with limited understanding of regional-based differences being one of the most critical. Regional disparities and similarities cannot be overlooked and need to be further explored. Neglecting regional differences may hamper HEfSD and stakeholders' ability to comparably and successfully action the Global Agenda for Sustainable Development. A case in point is SDG 13, perceived as a priority for HEfSD in the Americas, Asia and the Pacific, and Europe. Yet, it is perceived as a gap for HEfSD in Africa (See Table 5, Column 4, Row 14). Lessons can be learned across regions and in doing so, enhanced collaboration is required across geographical locations, as well as the RCEs, higher education institutions and key stakeholders within them.

## Research limitations

A further exploration of regional commonalities and differences was compromised due to existing research limitations. A methodological limitation encountered, however, was the lack of the literature in the field in languages other than English. Yet, researchers surveyed RCE focal points from Spanish- and Portuguese-speaking countries and translated research findings wherever possible. As this is a global study, questions remain regarding scholars' perceptions in non-English-speaking countries, particularly those coming from the Global South. This issue had already been risen by Aikens et al. (2016, p 335) who argue that in "their attempts

**Table 5** HEfSD: regional targeted areas and gaps

| <b>SDG</b>   | <b>Americas</b> | <b>Asia-Pacific</b> | <b>Africa</b> | <b>Europe</b> |
|--|-----------------|---------------------|---------------|---------------|
| SDG 1<br>No Poverty                                    |                 | —                   |               |               |
| SDG 2<br>Zero Hunger                                   | —               |                     |               |               |
| SDG 3<br>Good Health and<br>Wellbeing                  | —               |                     |               |               |
| SDG 4<br>Quality Education                             | —               | —                   | —             | —             |
| SDG 5<br>Gender Equality                               |                 | —                   | —             |               |
| SDG 6<br>Clean Water and<br>Sanitation                 | —               | —                   |               | —             |
| SDG 7<br>Affordable and Clean<br>Energy                | —               | —                   | —             | —             |
| SDG 8<br>Decent Work and<br>Economic Growth            | —               | —                   |               |               |
| SDG 9<br>Industry, Innovation<br>and Infrastructure    | —               |                     |               | —             |
| SDG 10<br>Reduced Inequalities                         | —               |                     |               |               |
| SDG 11<br>Sustainable Cities<br>and Communities        | —               | —                   | —             | —             |
| SDG 12<br>Responsible<br>Consumption and<br>Production | —               | —                   | —             | —             |
| SDG 13<br>Climate Action                               | —               | —                   |               | —             |
| SDG 14<br>Life Below Water                             |                 | —                   |               | —             |
| SDG 15<br>Life on Land                                 | —               | —                   | —             | —             |
| SDG 16<br>Peace, Justice and<br>Strong Institutions    | —               |                     |               | —             |
| SDG 17<br>Partnerships for the<br>Goals                | —               | —                   |               | —             |



to provide a comprehensive survey of the policy literature to date, (they) recognize the limits of surveying only English language literature”. Nevertheless, a vast majority of the HEfSD literature came from English-speaking countries, with few studies from Latin America, Asia, and non-anglophone Europe. For some scholars this is due to the fact that some international organizations “only valued and, therefore gave voice to, the experiences and perspectives of representatives from developed countries” (González-Gaudiano 2006). This is a limitation that needs nuanced attention in further studies.

Another research limitation has to do with scared data to investigate economic aspects of sustainable development. Findings show that social and environmental factors are perceived by participants as more relevant and limited attention has been placed on the economic arena. This is an issue that requires major attention.

## Conclusions

Evidently, increasing sustainability challenges have resulted in difficulties to action global goals in HEfSD, most of which call for a complete overhaul of the university system. In doing so, this research suggests closer attention to essential factors to advance HEfSD, policy, curriculum and practice are essential, as follows: governance aspects of HEfSD, a governing approach to HEfSD and Social and Environmental Interlinkages in HEfSD.

### Governance aspects of HEfSD

A major finding derived from this study shows that a more effective collaborative governance approach within higher education for HEfSD is essential. As sustainability issues exacerbate and become more interconnected, collaboration becomes not only more essential but also more challenging. Findings show that major issues in collaborative processes include but are not limited to lack of involvement of key stakeholders such as educators and students, a lack of communication amongst stakeholders, low accountability, scarce funding opportunities, and limited stakeholders’ capacity to successfully operationalize HEfSD. These are issues that require closer attention and further research.

### Governing approach to HEfSD

Another major finding has to do with the governing approach and thematic focus on HEfSD. There is a focus on environmental sustainability, in the Americas, Asia and the Pacific and Europe. Yet, dissimilar results were found in Africa where social sustainability matters are perceived as major priorities within higher education institutions. In addition,

evidence from the African case shows the lack of a governing approach to HEfSD which has resulted in a plethora of scattered activities. However, this should be perceived as an opportunity to further explore how SDGs can be effectively integrated as a governing approach to HEfSD in policy, curriculum and practice. Further exploration on interlinkages amongst SDGs in HEfSD and rigorous investigation on existing gap areas and factors preventing the attainment of those are opportunities for further research.

### Social and environmental interlinkages

Stronger interlinkages between social and environmental matters are needed to fill existing social sustainability gaps in HEfSD. For example, in the Americas and Asia-Pacific, a lack of interconnectedness between these two areas is hampering the attainment of SDG 10. Closer attention should be paid to vulnerable community groups, particularly indigenous peoples when exploring socio-environmental interlinkages.

Overall it is important that findings here presented and recommendations for research are taken seriously to action the Global Agenda for Sustainable Development in HEfSD. This will not only contribute to build knowledge on current scholarly debates on HEfSD but may also assist higher education institutions and their stakeholders in moving forward towards more relevant HEfSD policy, curriculum and practice.

Linkages with economic aspects of the sustainable development goals will be addressed in future research. As per research limitations encountered, research findings show that social and environmental arenas are key priorities for participants. For instance, SDG 10 Reduced Inequalities was perceived as a social rather than an economic issue and aspects around refugees were the major concerns reported in this domain. Further research is needed on why these issues are or are not relevant for participants.

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