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The role of the human dimension in promoting education for sustainable development at the regional level

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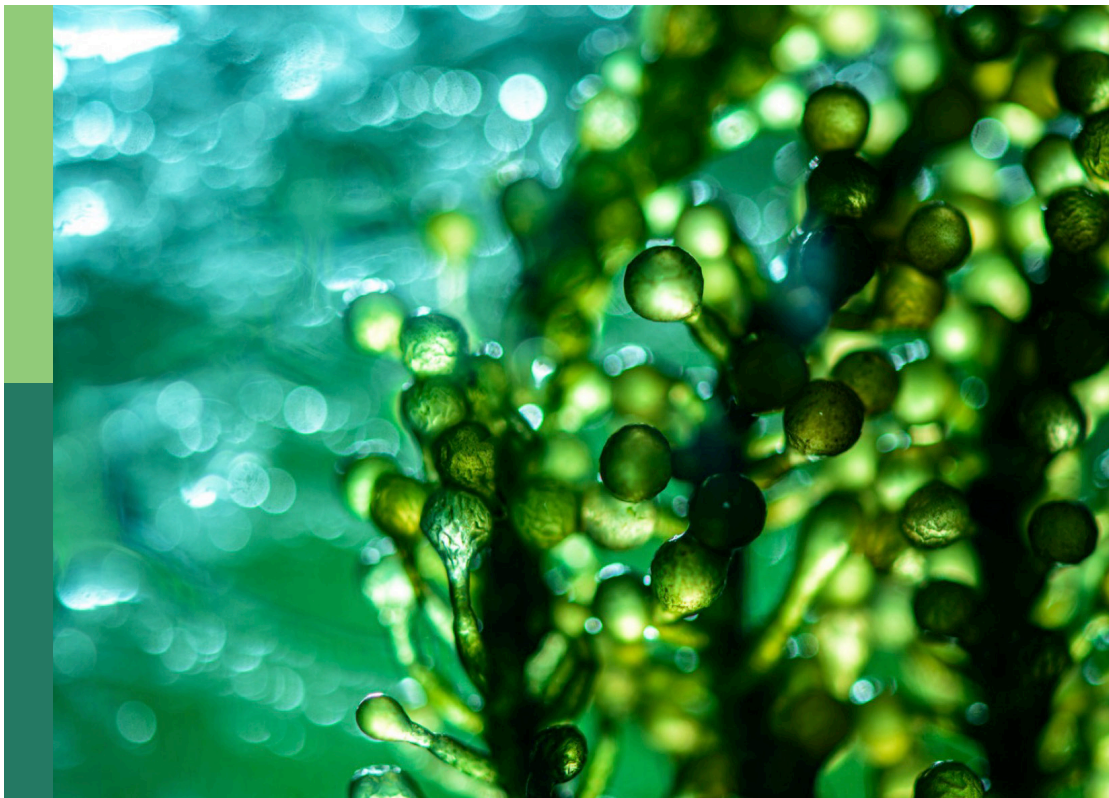

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The Role of the human dimension in promoting education for sustainable development at the regional level

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Editorial: The role of the human dimension in promoting education for sustainable development at the regional level

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Editorial on the Research Topic
The role of the human dimension in promoting education for sustainable development at the regional level

Introducing the Research Topic

The Frontiers in Sustainability Research Topic "*The role of the human dimension in promoting education for sustainable development at the regional level*" is comprised of nine articles. This theme was developed in collaboration with editors representing Regional Centres of Expertise (RCEs) on Education for Sustainable Development (ESD) from different regions of the world.

In general, RCEs provide a framework in which regional networks of higher education institutions (HEIs), public, private, and civil society organizations play the role of critical partners in the implementation of sustainable development appropriate to regional contexts. The RCE concept is internationally accepted and has been used since 2003. Currently there are 190 RCEs around the world that strive to bridge formal and non-formal education in their respective regions to create an integrated and contextualized agenda on how learning for sustainable development can be better implemented to achieve more sustainable societies and ecological integrity. The involvement of diverse regional actors within an RCE, and the nature of the learning processes that underpin their activities in practice, serve as a model for how to shape ESD in general. However, the growing network of these regional associations with its potential global impact raises many questions. Not only do RCEs offer a new approach to regional development, driven by the sustainability focus of the RCEs, but they also challenge the traditional role of HEIs in generating the knowledge necessary for development processes.

To answer some of these questions, the papers in this Research Topic discuss the processes of learning in different regional contexts and their transformative effects. These processes have the potential not only to influence the current environmental, social, and economic situation in different regions, but also to bring innovation to the education

system. The papers often focus on the agency of social actors (institutions, networks, and individuals), their shared visions, and their roles and activities carried out in a local/regional context to achieve desirable common goals—the social capital they collectively generate. The research in this Research Topic thus emphasizes the human dimension of these processes, where the exchange of ideas about the future and critical thinking are essential preconditions for change—as opposed to the (often overestimated) focus on technology. An important keyword is innovation: in a safe social environment with supportive relationships, new solutions to persistent problems can emerge, and new perspectives driven by creativity can provide space to ask fundamental questions.

Educational preconditions for change (at regional level)

Several articles (Kitamura and Ito; Gajparia et al.; van Herten and Perez; Kioupi and Voulvoulis) introduce Education for Sustainable Development (ESD) as an enabler of sustainable development across the environmental, social and economic spheres of human activity. However, it is even more evident that formal education systems operating at the national level struggle to contextualize local challenges relevant to sustainability—and thus the implementation of SD-oriented education programmes may be more appropriate at the regional or local level. These education initiatives are more successful as they often go beyond the classroom to engage with the knowledge and practices of regional or local actors and with regional geographies—and thus localize sustainable development issues within regional contexts.

The principles of this sustainability-engaged education are outlined in the article "Transformation through learning: Education about, for and as sustainability" by Gajparia et al.. With regard to sustainable development, it is not enough to learn about the problems (in *education about sustainability* the curriculum works with the content) or even to acquire the ability to solve these problems (*education for sustainability* emphasizes the role of the pedagogical approaches). The authors argue for the need to apply the concept of *education as sustainability*, which directly links intentions and values to practice and behavioral change. These considerations are based on Stephen Sterling's ecological view of education, which is contrasted with a more traditional mechanistic perspective (Sterling, 2001). In this hierarchy, however, even the concept of *education for sustainability* has only been documented in specific contexts; it has not yet broken through as a dominant paradigm in mainstream education. The authors discuss the possibility of making progress in regionally conceived education, with appropriate curriculum guidance to support student engagement; they provide several examples of programmes that apply this model. As the recent impact of ESD at a regional level remains limited (Sterling, 2021), these programmes should work with existing examples of good practice and involve individual teachers and school leaders in relatively deep innovation. The question is how to apply innovative ESD concepts systemically, which would necessarily require the transformation of the entire education system.

The changing role of universities—as they initiate ESD processes, and consequently enter into dialogue with other actors to provide expertise and motivation for sustainable action in practice—is reflected from different perspectives in this Research Topic. Kitamura and Ito in their article "*Facilitating personal transformation for sustainability: a learning program on the sustainable development goals, combining a card game and a self-reflective questionnaire*" see the personalization of the educational agenda—through adding a step between the development of initial awareness and the acquisition of competencies for subsequent action—as a necessary condition for adapting the education system to its role in sustainable development. This personalization would lead to an understanding of the relationship with a particular issue, in this case the SDGs—and once people have a personalized perception of the SDGs, they are more likely to actively seek information related to their own work or life, even without external help. At this stage, individuals would be able to plan their actions relatively easily. The authors focus on bridging the gap between simple awareness and active interest in practice: they design and implement the learning programme, which uses a combination of a game and a self-reflective questionnaire, applying a future perspective. This is one of the ways to localize the sustainability agenda—so that citizens (community members and local governments) see the SDGs as issues that directly affect them, and are able to translate the relevant policy goals into local contexts.

Education shaped to address regional challenges

The problems of contemporary society are often embedded in (and fuelled by) the education system—this is an assumption for changing the concept of education, which van Herten and Perez document in their article "*Ecocritical analysis of 'glocal' essays on Lived Experiences of Climate Change in higher education*." The authors see the ecological crisis as a crisis of Western thinking, which is dominated by the objective/subjective dichotomy. It is our education system that shapes this thinking and consequently practice. If climate change education is to be transformative—anticipating a resilient future society—a truly new educational design is needed, based on multidisciplinary and interdisciplinary knowledge.

In order to contribute to the desired change, the authors designed and implemented the university course that follows these considerations. The focus was on lived experiences of climate change, and students were asked to develop essays that linked their immediate, regional experiences to the broader contextual influences of climate change. The learning environment supported them to reflect on this relationship between global and local knowledge, and to be aware of the ontology, epistemology and ethics within the selected cases. The course was multidisciplinary in nature, with the humanities playing an important role—an ecocritical lens was applied. In analyzing these essays, the authors identify different forms of knowledge used by the students: situated knowledge and local knowledge about the residents' living environment, integrated with scientific knowledge about the consequences of climate change. With an ecocritical

perspective, students are more actively challenged to compare their lived experiences with the complex issue of climate change. This demonstrates that even when working with natural science phenomena, the humanities can increase levels of critique and promote multiple perspectives.

The personal dimension is embedded in ESD—it can shape the personalities and capacities of learners from early childhood to adulthood. This factor is discussed (at the community level) by Kioupi and Voulvoulis in their article "*Education for sustainable development as the catalyst for local transitions toward the sustainable development goals*." In order to achieve a common understanding of the SDGs that can be translated into practice, education communities need to localize themselves in relation to the goals that are meaningful to them and that will guide their vision. An analysis of three case studies, from a university, secondary and primary schools in the UK, led to the conclusion that participatory approaches are needed in education to enable ownership of the transformation process and commitment to action. The authors present a range of tools that enable people to connect with their local realities and link with their communities to discuss, (dis)agree and discover shared visions, values, ideas, and experiments. These tools (which include visioning, gap analysis, back-casting, and decision-making) allow all stakeholders to engage, share their views and act; they promote a socially critical orientation of education. Based on these considerations, the authors have developed a systemic but also practical framework for transitions toward the SDGs through ESD. They also conclude that the development of competences to envision sustainability (to decide what is aspirational and desirable), to make decisions and to set action plans for its realization requires a general rethinking of education and a shift from traditionally applied educational techniques.

Regional sustainable development resulting from the efforts of local actors

It is the diversity of interactions between actors and the openness to innovation that allows new ideas to be generated within communities. An important role in catalyzing these SD processes is played by the RCEs—the networks that bring together multiple local actors to implement local and regional sustainability policies. Often based in a university, RCEs see education as a prerequisite for the emergence of sustainability; one of their roles is to share good educational practices with other higher education institutions, schools and other formal, non-formal and informal education organizations. They also promote the engagement of committed individuals and social actors and see the social relations between them as an important driver for activities and joint projects. Social capital is thus a potential trigger for the transition to sustainable development, but this factor is less emphasized in the literature and in practice than technology.

In the European context, participatory processes are promoted at regional level through Local Action Groups (LAGs). These non-governmental organizations use the LEADER method to involve different local actors in the design and implementation of "community-led local development strategies" (SCLLD), which are specific to the region, its unique resources and opportunities, and can be framed by the "localized" SDGs. In a concrete example from the Czech Republic, where Local Action Groups cover rural areas across the country, the potential of this actor to initiate SDG-related changes at the regional, and therefore national level, has been explored by Vávra et al. In their article "*Local Action Groups and sustainable development agenda: Case study of regional perspectives from the Czech Republic*," the authors analyzed the perception of the SDGs by LAG representatives. The responses to the question: "Which SDGs do LAG representatives consider important at the local level, and which ones do they feel empowered to implement?" were quite unexpected. For example, while climate change does not seem to be often considered important and manageable by LAGs, the SDG most emphasized and addressed in practice is SDG 4—Education, which shows its perceived importance in a regional context and the willingness of LAGs to address it.

From this perspective, the landscape of LAGs is further explored by Dlouhá et al., who focus on the potential and impact of regional actors and their social relationships on regional sustainable development. Stakeholder mapping is therefore used to identify which actors can support sustainability processes and how, where they can have a real impact in practice, and what opportunities and constraints exist for their involvement. The article "*The role of actors in sustainable development processes at the local level—experience from the Czech Republic*" further illustrates how the SDGs are localized and addressed at the regional level, which actors are most important in this respect, and who is currently not involved in addressing sustainable development issues—but could be (under certain circumstances). The authors show the different roles of actors in the transformation toward a new concept of SDG-led regional development (OECD, 2020). The focus is on the expertise of regionally involved universities, and the role of education in these processes is highlighted—as a multiplier and facilitator of other SDGs. Through education, a desirable shift in the mindset of rural actors can take place; they can take responsibility not only for social wellbeing, but also for the environmental health of rural areas. As these areas are important providers of ecosystem services, they can play a prominent role in global resilience (although this factor is not perceived as a priority by citizens and local governments, at least in the Czech regions).

A "whole-region approach" to sustainable development requires changes in the policies and regulations governing different types of development. As Petry shows, RCE interventions can transform otherwise routine processes of policy implementation. RCEs have the technical expertise, independence and social legitimacy needed to halt or alter development proposals and, in turn, shape larger development policies. In a case study of the RCE of Saskatchewan (Canada), project approval processes are redirected into spaces for education and learning by all stakeholders, including, in particular, project proponents and government regulators. This is done through strategic letter writing since 2009 (including interventions in government approval processes for specific developments). This approach delivers messages to relevant institutions that fully highlight the unsustainable dimensions of proposed projects or those with high opportunity costs relative to more sustainable forms

of development in areas such as energy, forestry and mining. Successful RCE correspondence identified and framed key issues for decision-makers, offering constructive questions and criticism, further sustainability options and recommendations for action from a long-term citizen perspective. Through their deliberate inclusion in such correspondence, a wider range of regional, state and national governments and other stakeholders are informed about regional development issues evaluated through the lens of relevant SDGs and UN conventions. RCE Saskatchewan has thus been demonstrating its role as an independent, critical, organization with the expertise and credibility to influence regional and national policy.

Role of the RCEs—Localizing sustainable development

Regional development processes—those based on local resources, including human, social and natural capital—can be initiated and supported through education and lifelong learning. The RCE model puts this idea into practice—providing a mechanism for local actors to engage with the global Sustainable Development Goals in the context of their own communities and networks of cooperation, using education as a tool to implement sustainable development. During the United Nations Decade of Education for Sustainable Development (UN DESD), the concept of RCEs spread as the network grew and the innovations around multi-stakeholder partnership in ESD began to inspire university faculties, local school administrators and local government policy makers who wanted to accelerate action on sustainable development in their own cities and regions. The RCEs are therefore usually seen as a model for transforming higher education in general from hierarchical and competitive to interdependent and collaborative, in response to the challenges of sustainable development.

While research tends to focus on the organizational structure of RCEs—with much of the UN DESD focusing on *how* partners work together (for example, what governance and coordination structures enabled HEIs to work effectively with partners)—less attention is paid to the activities *on which* they work together. In contrast, Vaughter et al. examine the issues on which RCEs focus: the authors provide an overview and analysis of activities undertaken by RCEs around the world during the Global Action Programme (GAP) on ESD, which ran from 2015 to 2019. Most of the ESD projects reported by RCEs during the GAP are related to curriculum development, as educators often face a lack of resources for capacity building on sustainable development in their region. It is also noted that in the regional context, where the social environment is shaped by different actors involved in cooperation and mutual learning, the specific social relations of these actors consequently modify the characteristics of this learning. This gives rise to the concept of 'transformative education', with specific educational goals and pedagogical approaches. Here, education takes on a new role as an important factor in the transformation toward sustainability, and consequently undergoes profound changes itself.

Overall goal of this Research Topic

The RCE model represents a scientific movement in which the identity of the "scientist" has been deliberately expanded to include local and regional sustainability experts. These experts can facilitate the collaboration of traditional actors involved in teaching, research and community work (whether in schools, technical institutes, colleges, or universities) so that they, together with ordinary citizens, can turn their regions into living laboratories for sustainability actions. Within the global learning space opened by the UN University and the UN system in 2005 as a global network of RCEs, local actors can learn from each other and adapt successful learning experiences from one region to another.

To document these roles of RCE, White et al. explore what is meant by local context and the influences it can have on the way education is delivered. The authors show how historical, cultural and landscape factors can influence how people in a region envision and move toward a sustainable future. In Scotland, cultural aspects such as democratic intellect, universal access to education, connections with nature and place, and Patrick Geddes' concepts of "think globally, act locally," "place-work-people," and "heart-hand-head" have influenced the concept of education for sustainable development and how people are implementing it today. Contextual factors are modifying the strategy of the RCE and the way it implements ESD in the region; and the authors call for the introduction of an additional sustainability competency focusing on connections with nature and place.

The paper also reflects on a decade of activity in RCE Scotland. A Delphi survey and a dialogue-based, consultative approach led to broad buy-in and the adoption of a cross-sectoral approach to "learning for sustainability" across formal, informal and non-formal sectors; across early years, school, college, university, community, and private sectors; and across thematic areas such as climate change, biodiversity, land tenure, food, sharing economy, and more. Analysis of individual initiatives shows how a small secretariat, an elected steering group and chair, member-based working groups and project funding have enabled five ambitious strategic objectives to be implemented. Part of the success and longevity is attributed to attention to culture, context and collaboration.

RCEs are developing a new form of scholarship that is appropriately grounded in the local context. They translate a theoretically informed vision of regional sustainable development into practice, and see social capital as the main driver of this transformation. Throughout this Research Topic, authors have often reflected on the role of actors (institutions, networks, and individuals) in developing collaborative relationships to achieve desired progress in specific regional/local contexts. However, the authors also identify a number of challenges that remain in the localization of the sustainable development agenda. It is impossible to achieve transformation while working within the existing system, and it can seem paradoxical to balance transformative and traditional activities. Many host universities still do not see collaboration with local partners as an essential part of their research and teaching mission. As a result, it is still difficult to secure resources for individual RCEs and RCE networks, while the emerging model of sustainable, multi-stakeholder universities requires more than just financial support. An in-depth discussion

of this emerging institutional model (led by the authors in this Research Topic) may draw attention to its progressive, forward-looking nature.

Recommendations

The experience of the Regional Centres of Expertise network can make a significant contribution to transforming education. Looking for societal impact through transformative actions, RCEs can bring about desired changes in the following ways:

- Cross-sectoral and holistic dialogue—RCEs promote multi-stakeholder collaboration, dialogue 'across' academic boundaries, and debate between sectors and across regionally relevant activities, enabling systems thinking.
- RCEs can help promote a "sustainable university," supporting an emerging model of higher education institutions that are more responsive to real-world local and global problems, engage with the community, demonstrate leadership in operational sustainability, and innovate in ways of producing, sharing and applying knowledge.
- Involvement in the education of these actors—HEIs can act as an authority that can innovate pedagogical approaches to facilitate the development of sustainability competencies in staff, students and partners, exchange knowledge and build sustainability awareness in the region. For example, higher education institutions often bring innovative issues and approaches to local schools. In this respect, it is important that RCEs maintain the HEI tradition of critical thinking, but also support experiential learning, recognizing models of strong sustainability and the importance of individual self-awareness, wellbeing and connection with nature.
- RCEs can also identify and pursue new Research Topics due to their strong position in collaborating with local, regional and national academic and non-academic partners and their capacity for transdisciplinary research.
- RCEs can play a strong role in engaging different actors around the SDGs, promoting critical debate, translating these goals for different audiences, and facilitating support, evaluation and reflection on their implementation.
- RCEs can advocate for regional, national and international sustainable development policies and provide expert advice, drawing on the expertise within the RCE and the wider RCE network.
- RCEs can provide education and/or training to fill gaps in regional policies and practice in relation to sustainable development, such as specialized teacher training in ESD and continuing professional development in the private, public and third sectors, including higher education.
- The RCE network can facilitate theoretical discussions, sharing of experiences and practical suggestions across regions and nations, thereby facilitating efforts to deepen and strengthen ESD; to respect and integrate indigenous, local and scientific knowledge; to support new forms of intercultural education; and to decolonize the curriculum.

RCEs provide other actors in their regions—including educational organizations such as universities—with the ideas, community engagement strategies and collaborative opportunities to help their respective regions thrive. The Global RCE Network—coordinated by the United Nations University and operating worldwide (on all inhabited continents) to support education for sustainable development at the regional level—has recently applied this model in 190 RCEs worldwide. This network shares core principles and goals, is committed to regional and global wellbeing, and supports the 17 UN Sustainable Development Goals (SDGs). The individual RCEs also engage constructively and critically with the principles of the SDGs and the ways in which they manifest themselves in practice.

During 20 years of its existence, this concept has been tested in very different contexts around the world, and the experiences have been described in numerous case studies (cf. Vaughter and Pham, 2020; Vaughter et al., 2023). However, RCEs are still an experiment in applying globally generated sustainability principles and goals at the regional and local level. While the successes (in terms of SDG implementation) are well documented, the programmes and activities that face difficulties due to lack of national or local support and other reasons are less focused on by researchers. If these barriers are properly understood and addressed, it is likely that a transformation of higher education and lifelong learning institutions will follow, along with a change in the dominant model of knowledge exchange. The articles in this Research Topic seek a holistic understanding of paradigm shifts in education and regional development, and the role of actors with a common interest in the sustainable transformation of their region in these processes.

Author contributions

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Conflict of interest

RL is the director of Organisational Sustainability Ltd. (United Kingdom).

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Facilitating Personal Transformation for Sustainability: A Learning Program on the Sustainable Development Goals, Combining a Card Game and a Self-Reflective Questionnaire

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Sustainable Development Goals (SDGs) require transformations at all levels, from global to local, to be realized. Underlying all of these levels is the personal level, where any transformation begins. Before individual persons change their behavior for sustainability, they will need to not only understand the SDGs, but also regard them as a matter which directly concerns them. A process involving "personalizing the SDGs" needs to exist between initial awareness and subsequent action. However, identifying and instituting the means by which this can be realized is not easy. In this study, we designed a learning program that combined an existing SDGs game with an original self-reflective questionnaire, and implemented it in Ishikawa Prefecture, Japan. The program allowed participants (n = 289) to first play the game, which takes the form of a simulation of the world in the run up to 2030, and then carry out individual and/or group work to consider their individual, specific relationships with the global agenda. The questionnaire also provided each participant with a means to reflect on their initial perceptions and how they changed following this learning. The answers on the questionnaire indicated that the program aided the participants in raising their perceived levels of relationships with, and the personal significance of, the SDGs, while having fun at the same time. Personal relationships with the SDGs were expressed more concretely when local contexts and topics covered in other learning programs were tied in with the SDGs.

Keywords: sustainability, transformation, personalization, learning, game, reflection, facilitation, Noto

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INTRODUCTION

Sustainable Development Goals (SDGs) are a comprehensive set of global agendas requiring transformations at all levels to be realized (United Nations General Assembly, 2015, **Figure 1**, **Table 1**), including specific units of national and local government, as well as in civil society generally. For local-level transformations to occur, it is necessary for local governments and community members to translate their significance into local contexts, and then apply them for

FIGURE 1 | Sustainable Development Goals poster (Source: United Nations).

community development (Kioupi and Voulvoulis, 2019; Takagi, 2020). Scholars and practitioners of Education for Sustainable Development (ESD) have made practical attempts to localize the sustainability agenda (Pesanayi and Lupele, 2018).

Underlying all the aforementioned levels is the personal level, because all transformations begin at the level of individual human beings. Before an individual instigates changes in their behavior aimed at accommodating the SDGs, they will need to not only understand the SDGs, but additionally regard them as a matter which directly concerns them. As such, a process involving "personalizing the SDGs" needs to exist between initial awareness and subsequent action.

However, even while recognizing the necessity for this process, the issues of identifying and then instituting the means to realize the process must be addressed. Another issue is the difficulty of measuring learning outcomes. Development of methods to monitor and evaluate the outcomes of transformative learning for sustainability is an ongoing task of researchers and practitioners (Okitsu, 2019).

To tackle the above two issues, we set two research questions: (1) What is an effective learning program to support personalization of the SDGs? (2) What is a method of evaluation in terms of learning outcomes, that is, the degree to which SDGs are personalized?

We decided to implement this research on the ground, in light of the need and expectations regarding an introductory learning program at local schools, universities and community organizations. The participation of active learners is considered key to the process both of finding individual and collective meaning in pursuing the SDGs (Kioupi and Voulvoulis, 2019).

This paper reports on the learning program that we designed and implemented, making use of a game and self-reflective questionnaire combined. The program allows participants to first play the game in the form of a simulated world in the run up to 2030, followed by individual and/or group work to consider their individual, specific relationships with the global agenda. The following describes the conceptual framework, as well as the game and questionnaire as the concrete means used in the program. Later sections summarize the results of our implementation and discuss the findings, including the constraints and limitations.

PEDAGOGICAL FRAMEWORK

Conceptual Framework

Participatory learning incorporating experiences and reflection can influence learner perceptions, which may lead to behavioral change (Mezirow, 2008; Chiba et al., 2021). Problem-posing dialogue, as theorized by Paulo Freire, is an approach used in such types of learning (Nixon-Ponder, 1995), with this approach enhanced by instructional design theories including the ARCS (attention, relevance, confidence and satisfaction) model used

TABLE 1 | List of the 17 Sustainable Development Goals.

Goal 1	End poverty in all its forms everywhere
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure healthy lives and promote wellbeing for all at all ages
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10	Reduce inequality within and among countries
Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12	Ensure sustainable consumption and production patterns
Goal 13	Take urgent action to combat climate change and its impacts
Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

United Nations General Assembly (2015).

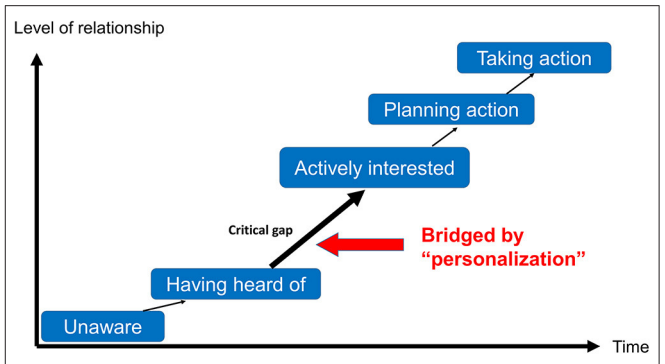

FIGURE 2 | Levels of personal relationship with the SDGs (Source: Own figure).

to specify the important steps (Keller, 1987). Likewise, the learner's commitment to the SDGs increases over a progression of steps (Takagi, 2020), and we placed particular emphasis on the processes of personalization aiming to bridge the critical divide between the levels of vague awareness of, and active interest in, the SDGs (**Figure 2**). By "personalization," we mean an individual's understanding of their relationship with a certain subject matter, in this case the SDGs.

It is worth explaining why we focused on the divide between vague awareness and active interest. On the one hand, a large number of people in Japan had never heard about the SDGs by early 2019, when we were designing this study (World Economic Forum, 2019). At the same time, however, there was very wide and frequent coverage of the SDGs in mass media, owing to which we were certain that awareness levels would rise soon and rapidly. On the other hand, we had the impression that those who had already been initiating their own SDGs-related actions were quick to realize what the SDGs meant to them. We reasoned that assisting this process of personalization for a wider range of people would be a next and important task. Our assumption was that once people gain personally-adapted perceptions of the SDGs, they would be more likely to start searching actively for information relevant to their own work or life, even without much assistance. People at this stage would be able to plan their action relatively easily. This assumption prompted us to focus on the gap between vague awareness and active interest.

We then specified four principles in our program design. First, it should be based on active learning, rather than one-way teaching. Second, our program should be able to function as both a relatively short and one-time event, as the demand exists for such an introductory program. Third, the program should include a process of self-evaluation, in which learners can reflect on their own perceptional change and write it down right away. This is assumed to enhance learning outcomes, and also provides evidence when assessing the effectiveness of the program. Lastly, but essentially, is the principle that the program be premised on being enjoyable, to allow learners to maintain their engagement and motivation throughout the program.

The above-mentioned principles assume that different modes of learning, i.e., engagement, imagination, and alignment, help learners identify their positions in relation to the issue in question (Wenger, 2010). In concrete terms, personalization of the SDGs is ideally prompted by engaging all three domains of: the head (cognitive domain), the hands (psychomotor domain), and the heart (affective domain), as suggested by Kioupi and Voulvoulis (2019). We also take into consideration the importance of facilitating the processes, whereby participants search for their own answers rather than the instructors suggesting or providing answers.

In designing our program, however, the limited time available for each session was a challenge. Requests from schools and local organizations tended to be for a one-time session of 1 or 2-h duration only. To allow us to satisfy the principles mentioned above and ensure that we could incorporate both experiential and reflective processes, we decided to design a program of a minimum 90-min length. A 90-min program, which might not ordinarily be deemed sufficient in terms of the time required to prompt significant changes in real-life behavior, seemed to be a realistic compromise. This is because a program of this length could nevertheless facilitate a small, though important, first step to exploring different decisions and potential behaviors.

In terms of the tools, we arrived at the idea of combining an interactive card game and a self-reflective questionnaire.

Games are increasingly used to learn about complex issues and ultimately transform behavior (Den Haan and van der Voort, 2018; Koivisto and Hamari, 2019). A rapidly increasing number of peer-reviewed academic papers have been published in the last several years on the use of games in sustainability learning, demonstrating their effectiveness (Stanitsas et al., 2019). One stream of such research defines its purpose as motivating participants to consider and possibly change their behaviors (Kumazawa, 2021). This purpose follows an assumption that the process of undergoing behavioral change in a simulated world can potentially bridge the divide between knowledge and action (Fernández Galeote et al., 2021), supporting changes in decisions and collaboration for sustainable development (Meinzen-Dick et al., 2018). Game playing also enables learners to anticipate diverse paths toward a sustainable future, a practice particularly important in times of complexity and uncertainty (van Der Leeuw, 2020; Vervoort et al., 2022).

Experiential learning can be deepened by incorporating a reflection process to allow participants to better understand the systems underlying the issues in practical terms (Craps and Brugnach, 2021), and interrogate the significance of their own learning experience by means of expressing it in words (Mezirow, 1990). Learner self-assessment can also be used to measure learning outcomes (Takahashi and Hoffmann, 2019). We therefore decided to use a one-page questionnaire that would function as a comparatively quick and easy tool for self-reflection and assessment.

Card Game

We used a card game called "2030 SDGs," developed in 2016 by an organization named Imacocollabo. The game was initially made in Japanese, which is the version we used in this study. It was later translated into other languages, including English. This is a game playable by between 5 to 20 teams, each of which consists of one or more persons. It requires a trained facilitator to design and oversee a program, which will typically involve an introduction, game playing, reflection, and in some cases a follow-up lecture. The facilitator first briefly introduces participants to key facts regarding the SDGs, followed by an overview of the rules of the game. During the game, players try to fulfill the respective personal goals assigned to them, i.e., wealth, a leisurely life, poverty alleviation, environmental protection, and social equity, in a simulated world leading toward 2030 (for details of the game, see Imacocollabo, n.d.).

Players use a finite amount of their resources, i.e., time and money, to carry out projects, such as constructing transportation infrastructure, promoting green consumption, and reforming medical systems. Each project has different impacts on the players' resources, as well as conditions in the simulated world, in the three domains of economy, environment, and society. A typical setting is for four participants to share a table, with several tables arranged like islands in a room. However, this will be dependent on the resources and constraints at each venue. During the playing time of the game, participants can move around. Just as in the real world, players can exchange information and negotiate with each other. They can also, by mutual agreement, relinquish or exchange any of the resource cards, such as those for time, money, or incomplete projects (**Figure 3**).

FIGURE 3 | Samples of the cards used in the game "2030 SDGs" (Source: Own photo, with permission by Imacocollabo).

At the end of the playing time, participants share the results regarding who and how many among them have achieved their personal goals, as well as those on the conditions in the simulated world of 2030. The essence of the game is to understand that any action taken by any person at any time has impacts, desirable or otherwise, on the entire world. Players must also consider the nature of desirable conditions in the simulated world in the process of pursuing their personal goals.

The game developer specifies that 2030 SDGs be played only under the guidance of a certified facilitator who has completed a paid, 3-day training course and passed an examination. The first author of this paper became a certified facilitator in March 2019, and has since used the game in our learning program on a not-for-profit basis.

The game 2030 SDGs has been used widely at schools and organizations (e.g., Mada et al., 2020), although its usefulness for improving learning outcomes has not been measured systematically. We found no published academic paper assessing its usefulness in peer-reviewed journals. We considered it meaningful to present this assessment as an example, which would be of some use to those planning or implementing similar learning programs using the same or a different game.

Self-Reflective Questionnaire

The questionnaire aims to provide each participant with a means to reflect on their initial perceptions and how they changed following this learning. We included four key questions in our original questionnaire (**Table 2**).

The first key question (Q1) is about the level of relationship between the participant themselves and the SDGs, to be answered before starting the program. The other three key questions are answered after the game experience. Q2 asks about the relationship between the participant and the SDGs in more detail

TABLE 2 | Key questions in the self-reflective questionnaire.

Q1 Which of the following describes most appropriately the degree of your relationship with the SDGs BEFORE today's program? (Select one) 1) The SDGs are of no concern to me. 2) I have heard about the SDGs (but no more than that). 3) I am searching actively for information on the SDGs (but have no specific ideas yet). 4) I have ideas for action on the SDGs (but have taken no action yet). 5) I am already taking action on the SDGs.
Q2 Which of the following describes most appropriately the relationship between your life/study/work and the SDGs? a) Highly related b) Possibly related c) Unlikely to be related d) Not related at all If a) or b), answer below, too. Describe the nature of your relationship. Please be specific. What are the possibly relevant goals among the 17 SDGs? Write all the Goal numbers that apply.
Q3 Which of the following describes most appropriately the degree of your relationship with the SDGs AFTER today's program? (Select one) 1) The SDGs are of no concern to me. 2) I have heard about the SDGs (but no more than that). 3) I am searching actively for information on the SDGs (but have no specific ideas yet). 4) I have ideas for action on the SDGs (but have taken no action yet). 5) I am already taking action on the SDGs. Note: "I have noticed that…" may precede all of the above e.g., "I have noticed that I am already talking action on the SDGs".
Q4 Rate your level of satisfaction with today's program, to a maximum of 5 points. Please provide any comments.

than Q1, while Q3 is fundamentally the same as Q1, but answered after they have gone through the learning program. The paired answers enable pre- and post-learning comparisons.

It is worth noting that we made minor adjustments to the wording in Q2, depending on the participant group on each occasion. For example, junior high school students, with an age range of between 12 and 15, were asked about the relationship between their "life" in general and the SDGs, while adult professionals were asked about their "activities," indicating their work and voluntary roles in the local community. Despite this adjustment, however, we intended to facilitate basically common processes, in which participants could explore their own attitudes, as well as any (potential) change in these attitudes, when considering from SDG perspectives.

LEARNING ENVIRONMENT

Our study site is Ishikawa Prefecture, Japan, focused largely in Suzu, a rural city located at the far end of Noto Peninsula. Noto is famous for its rich "satoyama and satoumi," which are the Japanese terms meaning social-ecological production landscapes and seascapes (Duraiappah et al., 2012).

Kanazawa University has collaborated with the municipal government of Suzu since the establishment of the Noto School in 2006. The school houses a small team of researchers to conduct community-based research and capacity development (Nakamura and Kitamura, 2018; Kitamura et al., 2020; Kikuchi et al., 2021). These activities led to the designation of Suzu by the Japanese Government as one of the first SDGs Future Cities in 2018, with the establishment of a new platform for multi-stakeholder collaboration, the Noto SDGs Laboratory (Kitamura et al., 2021).

TABLE 3 | Types and numbers of participants.

Date (YYYYMMDD)	Type of participants	Number of participants
20190209	Relatively young adult trainees in the capacity development program	12
20190412	Relatively young adults in community organizations	11
20190426	Senior high school students	49
20190510	University students	13
20190605	Relatively senior adult leaders of community organizations	21
20190607	Relatively young working adults	19
20190706	Relatively young adult trainees in the capacity development program	11
20190709	Junior high school students	16
20190920	Relatively young adult members and staff of local chamber of commerce	11
20190924	University students	5
20200928	University students	17
20201210	University students	35
20201217	Junior high school students	15
20210120	Junior high school students	54
Total		289

When undertaking this study, both authors of this paper were researchers based in the Noto School, affiliated with Kanazawa University and Noto SDGs Laboratory, with the mission of providing local people in Suzu, as well as students of Kanazawa University, with learning opportunities on the SDGs. During the 2 years from February 2019 through January 2021, we implemented our learning program on 14 occasions with various groups from civil society, comprised of high school students through to young professionals active in community development, as well as senior leaders in the local communities, and largely at the request of these host organizations (**Table 3**). Our program implementation was based on these requests from host organizations, resulting naturally in a diversity of participants.

RESULTS

Change of Perceived Relationships With the SDGs

A total of 289 participants completed the program with their questionnaire filled in over the 14 occasions we implemented the program. As mentioned earlier, our program implementation

TABLE 4 | Combination matrix of the scores in Q1 and Q3.

		After (Q3)					
	Score	**5**	**4**	**3**	**2**	**1**	**Total**
Before (Q1)	5	17	0	2	0	0	19
	4	2	10	0	0	0	12
	3	5	31	49	0	0	85
	2	2	9	125	12	0	148
	1	0	1	11	1	1	14
	Total	26	51	187	13	1	278

Shaded cells show the numbers of participants.

was based on the requests from the host schools and organizations. The participants were accordingly diverse, ranging from junior high school students to senior citizens in community organizations. The sample numbers were not large enough to represent any group of people in society. We present the following results as those in this preliminary study within this limited scope.

In terms of the comparison between the scores in Q1 and Q3, 278 participants answered both questions, providing usable data for the before/after comparison (**Table 4**). The average scores in Q1 and Q3 were 2.55 and 3.32, respectively, meaning an increase of 0.77 when comparing the before/after average scores. We also applied the Wilcoxon signed-rank text against the paired datasets, which revealed a significant difference ($p < 0.05$), suggesting an increase of the representative values when comparing the scores in Q3 with Q1.

One hundred and eighty-seven (187) participants (67.3%) showed an increase, i.e., a higher score in Q3 than Q1. Eighty-nine (89) participants (32.0%) had the same scores in the two questions, i.e., no change. Two (2) participants (0.7%) showed a decrease in their scores. Both of these latter scored 5 before, and 3 after the learning program.

The most representative answer (148 participants) in Q1 was the score of 2, accounting for 53.3% of all scores. Out of these 148 participants, 136 participants showed an increase in score when answering Q3, meaning they scored either 5, 4 or 3 in Q3. Among them, a majority ($n = 125$) scored 3 in Q3. This combination of the before/after scores (from 2 to 3) was the highest ratio (45.0%) of all the participants. Twelve (12) participants had no change in their before/after scores (from 2 to 2). No participant had a decrease from 2 to 1.

Description of the Relationships With the SDGs

As Q2 was an open-ended question, participants used it to express their specific relationships with the SDGs in various ways. Q2 also asked about the specific goal number(s) among the SDGs that would apply to their relationships. We added this optional sub-question from the second time we implemented the program.

The results showed several trends. SDG 14 (Life below Water) was mentioned by the highest number of participants ($n = 103$), followed by SDG 15 (Life on Land, $n = 89$). This trend was evident with groups studying satoyama and satoumi as their general theme. At the program implemented with the administrators of public halls, responsible mainly for senior citizens' activities in their communities, SDG 3 (Good Health and Wellbeing) attracted the highest number of votes, i.e., 10 out of 21 participants. At the program implemented with the Chamber of Commerce members and secretariat staff, SDG 8 (Decent Work and Economic Growth) had the highest number of votes, i.e., 5 out of 11 participants. As such, there was a relationship between the goal numbers and the missions of respective groups.

Participant comments added context to their answers, as shown in the below examples. An adult participant (Participant code: A-001) of the capacity development program in Noto commented: "Through my handicrafts using threads dyed with natural colors extracted from Noto's satoyama and satoumi, I am trying to make people more interested in, and appreciative of, the richness of nature in Noto. Therefore, my activities seem to connect best with SDGs 14 and 15." Other participants with livelihoods involving satoyama, such as a professional hunter (B-003), who was concerned with achieving a mutually beneficial balance between animals and humans, and a charcoal producer (B-002) involved in planting and cultivating forests, also pinpointed a deep connection with SDG 15.

A high school student (H-011) studying marine environmental issues mentioned her own action of joining a volunteer beach-cleaning group, with SDG 14 specified as her most relevant goal. A business owner (F-004) commented that: "Corporate activities are not just for 1 year but must develop perpetually, and therefore it is my priority goal to create an enterprise where employees feel motivated and convinced of the value of their work (SDG 8)." An adult participant also spoke up to comment during the post-game discussion that he had just learned that the activities he had been doing could feed in to the SDGs.

Level of Satisfaction With the Program

With respect to the level of satisfaction with the program (Q4), 279 participants provided scores, with 5 set as the maximum. The average score overall was 4.54. The average scores were >4 points on each of all 14 occasions the program was implemented. A total of 170 participants (60.9%) gave the maximum score of 5. Many participants commented that the program was an opportunity to learn in an enjoyable manner.

Other Observations

Other observations of the facilitator also merit mention and are noteworthy from the following perspectives. A first perspective is that of communication and cooperation. Results of the card game varied greatly, informed largely by the quantity and quality of communication and cooperation among the participants. We observed instances of active communication and cooperation that clearly contributed to achievements of personal goals within the game, as well as balanced conditions in the simulated world. We also observed instances of the opposite, whereby only a little more cooperation would likely have yielded considerably more desirable results.

Several participants expressed regrets that there could have been better communication and cooperation to better serve conditions in the simulated world, as well as the outcomes of individual goals. A high school student (P-002) expressed this matter precisely: "Through the card game experience, I understood that the global goals can only be achieved through the cooperation of everyone in the simulated world. I also understood that a change in one thing can influence the whole, prompting me to think that I wish to act in such a way as to bring about positive influences, however trivial." This is one example of the valuable lessons learned from participant experiences.

A second perspective is the physical set-up of the venues. On the first occasion of program implementation, the room was relatively packed, and the layout was not conducive to the free movement of participants. We learned after the game that the participants in one corner weren't exchanging information with those in the far corner, depriving them of opportunities to facilitate their goals through cooperation.

The influence of the layout on outcomes is a reminder that rural communities in real world locations distant from cities are disadvantaged by both their physical remoteness and their lack of access to technologies, limiting self-development opportunities. This in itself is a valuable lesson. On all the subsequent occasions of the program, however, we endeavored to ensure as few physical impediments to communication as possible in such a way that the will and action for participant communication alone would dictate the levels of communication and cooperation present.

A third perspective is the diversity in the ways in which self-reflection occurs. The following are just three remarkable examples. One participant, a high school student, weighed up his influence on the simulated world after the game, with no guidance from the facilitator. During the free discussion, he raised his hand and said: "My goal was wealth, which I achieved at an early stage. Then I tried to improve the environment of the world. I carried out nine projects in total. Unfortunately, the net score of these nine projects was zero for the environment. My projects did however contribute to improvements in the social conditions of the world equivalent to two points. Other than that, I helped other players, who were set on projects that would have positive impacts on the environment and society." This example, whereby the participant spontaneously reflected on his behavior in a simulated world in terms of its potential to lead to action in the real world, unprompted or guided by the facilitator, is distinctly impressive.

The second example was a university student who after the game said that his goal of seeking an inclusive society was not even near to achievement, which led him to consider stealing the cards (assets) of other participants. This situation can be characterized as paralleling real-world situations involving social unrest. While he didn't go through with this, his "lived" experience of inequality was a source of insightful learning. It was also meaningful that he shared his learning with his peers in the classroom, facilitating a collective learning.

The third example is a written comment by another university student (M-007): "I feel the philosophy of the SDGs is wonderful. At the same time, however, I feel a kind of fear that if everyone in our society regards this philosophy as beyond question, with no room for doubt, they will use this as a source of reproof toward persons with whom they are at variance over these issues."

While these three are isolated examples, they illustrate the potential for a wide variety of modes of self-reflection, and that excessive guidance may limit the freedom of participants to engage in processes of self-reflection which can lead to insightful learning and creativity.

DISCUSSION

While our main findings will conclude the paper, this section discusses constraints and limitations that we encountered in the course of our research. This was a somewhat preliminary study, with only small numbers of samples from different groups of people, limiting the extent to which its results can be generalized. We also acknowledge the limitations, in addition to the advantages, of subjective evaluation by the participants themselves. It should also be noted that, while this study was designed to facilitate before-and-after comparisons, other approaches, including with-and-without comparisons by setting control groups, have the potential to yield more robust evidence. There is potential merit in sequential studies on a much broader scale, as well as meta analyses in comparative manners, to allow testing or establishing generally applicable theories.

It is not realistic to expect momentous outcomes from short, one-time events. We were well-aware of this constraint before we implemented the program. After implementation, we confirmed that more in-depth learning should be realized only by combining other learning contents at host schools and organizations. It should be kept in mind that an introductory program like the one reported in this paper can only serve as a first, though important, step in sustainability learning.

Similarly, it is not easy to assess the extent to which subsequent action will be taken by participants. Such assessments will require long-term collaboration with the schools and organizations where the learning program is carried out. Arrangements could potentially be made to use the self-reflective questionnaire over a longer term to monitor participants' actual behaviors, particular at schools where such follow-up would be relatively easy.

There is no standard format that works in the context of all potential variations in setting. This study was able to establish one kind of basic format as a learning program on the SDGs. Learning programs invariably require flexibility, as well as customization, on a case-by-case basis dictated by particular preconditions.

All of the above feed in to the necessity for close collaboration between a person in charge at a school/organization and a facilitator/instructor of the program. We found from experience that quality of learning depends on the presence of key persons on both sides of the collaboration; as this cannot always be guaranteed, the outcomes and impacts of the learning program will vary. This may be one of the major constraints.

Last but not least, the issues raised by the COVID-19 pandemic should be touched upon. We designed and implemented the learning program as a face-to-face activity. As the pandemic went on, however, it became difficult to implement our program. Gatherings of large numbers of people in a

room, and interactions among them, including card exchanges, implicitly increase the risk of viral infection. Meanwhile, online communication is increasingly available at schools and organizations even in extremely rural locations. An important challenge in the near future will be to pursue methodologies surrounding learning programs on the SDGs, particularly the issue of effective ways of post-game reflection in online settings.

CONCLUSIONS

This study came to the following findings. Participatory learning programs like the one used in this study can contribute to personalization of the SDGs, by raising the perceived relevance of the SDGs to the participants. Two-thirds of those who took part in this study indicated an increase in the level of this perceived relevance.

Our learning program demonstrated particularly high compatibility to the early stages of learning on the SDGs. Nearly half of all the participants changed their perceived status from having merely heard about the SDGs (Level 2) to that of searching actively for information on the SDGs (Level 3). This indicates that participants successfully bridged the critical gap between the levels of vague awareness and active interest, as illustrated in **Figure 1**.

Personal relationships with the SDGs were expressed more concretely when specific themes, such as local sustainability of satoyama and satoumi, welfare for senior citizens, or continuity and growth in business guided the work/studies of participants. Their missions, as well as the local issues, were connected with their relevant goals among the SDGs.

There was a high satisfaction rate as assessed by participants in the learning program used in this study. The questionnaire asked the participants to fill in their names, which may have caused an upward bias. Even so, however, it seems safe to conclude that the objectives and principles of our study were fulfilled to a sufficient degree overall. The game-playing experience and self-assessment seem to have worked in synergy to guide participants to personalize the SDGs in their respective ways.

Overall, we are confident that the participants were able to take home a couple of lessons from this learning program. One is the understanding that the world we live in has inevitable trade-offs between economic and natural/social conditions. The other is the implication that, if they have effective mechanisms to collectively monitor these conditions available to them, people can collaborate to strive for sustainability. Such perspectives and a deeper understanding of society and principles for action will ideally be promoted through a wide variety of initiatives, a modest part of which is this study. As more and more individual actions are taken in society, these will hopefully have the potential to contribute to up-scaling of transformation for sustainability.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the original datasets have information identifying individual participants.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

KK designed and implemented this program as a principal investigator leading all stages of the study, as well assuming the role of on-site facilitator. KI provided comments and advice on the study at different stages from planning to manuscript writing, and on the data analysis more specifically. All authors contributed to the article and approved the submitted version.

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Role of Actors in the Processes of Sustainable Development at Local Level—Experiences From the Czech Republic

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In this text we are interested in the preconditions for, and opportunities provided by sustainable development at local level in non-metropolitan areas, i. e., in rural areas and villages. These areas are generally seen as having an important role in achieving sustainability. The literature review highlights the general principles of endogenous development with an emphasis on local resources including human potential and social capital, and the Czech context. In practice, the empowerment and cooperation of regional actors is crucial for the sustainable transition of rural areas; an analysis of the local situation was thus conducted from the perspective of social capital. Research primarily questioned the role of local actors in different areas related to sustainable development, their relationships and involvement in sustainability processes, as well as deficiencies in social conditions creating barriers to sustainable development. The research methods selected to answer these questions reflected the context-specific, scientifically-overlooked character of the theme of this research where emerging phenomena were at the center of our interest. A survey conducted with representatives of the National Network of Local Action Groups (LAGs) mapped the situation in 50 (out of 180) LAGs in the Czech Republic (28 % of the total number). Data were analyzed quantitatively (single and multiple-choice questions), in combination with qualitative methods which were used to transform and aggregate responses into conceptual categories which were monitored for frequency (to observe majority opinion). The diversity of local actors, their relationships and roles in the sustainable development processes was thus illustrated. A snapshot of actors' current involvement in specific areas of sustainable development was compared with their potential involvement in these areas illustrating the importance of social capital which is not always recognized in relevant policy documents. The engagement of these diverse actors in sustainability transition processes is less evident: in most of the categories of change, the role of public administration prevails. According to the respondents, these changes that would ensure a sustainable

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future of the regions are often not taking place. While some of these findings may be specific to geographically-defined regional conditions and the Czech historical context, the research raised theoretically relevant questions concerning the role of social capital in sustainability processes.

Keywords: sustainable development, local actors, Sustainable Development Goals (SDGs), social capital, regional development, Local Action Groups (LAGs)

INTRODUCTION

The Sustainable Development Goals (SDGs) were adopted by all UN member states in 2015 and in the following years they were elaborated into national development strategies at various levels [in the Czech Republic these are national and regional development strategies (Kárníková, 2017; Ministry of Regional Development, 2020)]. However, the general principles expressed in the SDGs cannot be applied universally. Sustainable development (SD) is context-specific and its implementation depends on the unique conditions in a given place or region, and the initiative of local people (Moallemi et al., 2019). Thus, while the general principles of the SDGs represent a common framework, regionally relevant strategies need to take into account local resources, unique opportunities and constraints, and be embedded in the specific local culture/s, etc. These local agendas are however still rather underexplored (Moallemi et al., 2020). In this text we will look at how the general objectives and principles of sustainable development are "translated" into concrete measures or activities that fit into a sustainability framework, using the regions of the Czech Republic as a case study. We are primarily interested in the social dimension of sustainability, which not only contributes in itself to the quality of the social environment and local life, but is often also a condition for success in achieving the objectives in other dimensions of sustainable development: economic and environmental. In search of local conditions that are favorable for the implementation of general SD strategies in this particular context, we thus concentrate on social aspects as one of the cross-cutting preconditions for sustainability. This perspective highlights the roles of different actors that are represented in this research by their associations—Local Action Groups (LAGs), a network of which covers most of the Czech Republic.

SDGs at Local Level—General Principles

Sustainable development is still embedded in the framework of globalized economy (cf. Blažek and Uhlíř, 2020) which is not always compatible for development at regional level, mainly because in practice this approach generates "winners" and "losers" (Smejkal, 2008). This often results in inequalities between regions—the comparative advantages sought by the economy usually favor the centers (large cities and agglomerations), while using the periphery (mostly rural areas) as a kind of hinterland, which entails dependency and its associated risks (Rodríguez-Pose and Fitjar, 2013; Ženka et al., 2017). These regions are thus vulnerable and often assume the role of (potential) "losers" with all the negative consequences for future development, either in terms of limited opportunities to exploit economic conditions (which centers can do better) or by attempts to match centers at any cost, regardless of local conditions and the sustainability of their resources (cf. Horlings and Padt, 2013).

The strategic objectives of regional development must therefore be based on different assumptions than the criteria for success in a globalized economy—rooted instead on the principles of endogenous development (that relies on internal resources and driving forces, in contrast to exogenous development or neo-endogenous development that combines the advantages of both) (Delín, 2013). The aim is then to mobilize the internal potential of the region and thus contribute to the most efficient, and at the same time, most sustainable use of local resources. As there is a great diversity of conditions among regions, geographically-sensitive policies must take into account specific conditions and limits of the local environment and its resources, and should be embedded in the particular local culture, etc. (Hansen and Coenen, 2015). On the other hand, in rural areas there are also unique opportunities to substantially contribute to sustainability locally and globally, and for some of the SDGs these areas can be considered to be the main "provider" of, for example ecosystem services, which is the context of implementation of SDGs such as climate change, life on land. The role of rural areas is emphasized, for example, by the OECD (2020) in a study showing that at least 100 of the 169 sub-goals (of the 17 SDGs) cannot be met without a significant contribution from cities and regions. They play an important role in achieving SD and quality of life with regards to water management, transport, infrastructure, land use, drinking water, achieving energy efficiency, among others; its main potential contribution is in climate change mitigation (Bachtler and Downes, 2020). Rural areas can be seen as a "provider" of ecosystem services (including aesthetic and recreational services) and the stewards of a resilient environment that is essential for quality of life—globally and in the long term; however, this role is not sufficiently recognized (Sitas et al., 2014) and important actors at local level are still not aware of the responsibility this entails.

Rural areas play a role in all three dimensions of sustainable development; however, sustainability processes at local level [often associated with transition, cf. (Harrington, 2016)] could not be initiated without the awareness and efforts of local people, thus the social capital of the region plays an important role here. The interrelationships between actors, their communication patterns and dynamics, and institutional settings to support collaboration, which vary considerably across regions (and is thus difficult to generalize), is a perspective that has started attracting scholarly attention (Truffer et al., 2015) and has been taken as the focus of this research.

Social Capital: A Prerequisite for Sustainable Regional Development

A major contribution of the 2030 Agenda and the concept of the 17 SDGs is the broad coverage of the social, economic and environmental aspects of development on a global scale, and at the same time the internal interconnectedness of the different SDGs in these areas (Elder and Olsen, 2019). On regional level the development goals and needs are usually set within all the three dimensions of sustainability—achieving economic prosperity, meeting social needs, improving the environment (Bagheri and Hjorth, 2007). Each of these dimensions encompasses not only the objectives but also the preconditions for development (the state of the economy, social relations and the state of the environment determine further development). The three dimensions of sustainable development (economic, social, environmental) should thus be mutually supportive (cf. Craps and Brugnach, 2021); according to Hosseini and Kaneko (2012), this principle can be fulfilled mainly at the national scale. In practice, none of these dimensions is usually emphasized above the others, because their importance is linked to different time scales: some are more important in the long term, others in the short term (cf. Purvis et al., 2019). However, the social dimension is highly valued in achieving sustainability as it is addressed by nine out of the seventeen SDGs.

An important factor in development is thus the social environment. In this context Putnam et al. (1993) defined social capital as "characteristics of social organization, such as trust, norms, and networks, that can improve the effectiveness of a society by facilitating coordinated action" (in Smejkal, 2008, p. 40). Social capital is especially important *at local level:* here it is embedded in the community, encompasses the relationships and communication patterns of actors, and is manifested in the way the community works together in practical activities and projects. As a specific factor influencing the development of rural communities, it is considered to be "soft infrastructure" necessary for local development (Demartini and Del Baldo, 2015). The results of long-term research show that "...aspects of socio-cultural nature are important for the success/failure of peripheries, for their stabilization and for the activation of endogenous resources for their further development" (Jančák et al., 2010, p. 208). According to these authors, social capital can be assessed on the basis of its three basic principles: commitment, trust and satisfaction with community life (ibid., p. 217).

In this regard, social capital is considered as one of the preconditions for development in two other areas—environmental and economic. For the achievement of *environmental sustainability* in a particular place or community, social relationships between actors and their commitment are beneficial or even essential: the state of the environment is influenced by the everyday activities of individuals and groups, and care for the environment is part of the culture in a given community (Chang, 2013). In terms of *economic prosperity*, social capital is necessary for building trust and, in certain circumstances, for increasing economic efficiency (Dasgupta and Serageldin, 2001). This is important mainly when the economy depends to a greater extent on local ties and collaboration. Social relations, communication patterns and institutional settings, which vary considerably from region to region, are then considered one of the most important aspects of sustainability in local contexts (Thierstein and Walser, 1999).

Although the different SDGs are interrelated in many ways (cf. Bautista-Puig et al., 2021), the *social dimension of sustainability* is the most neglected in practice (Cuthill, 2010). Social issues tend to be conceived in development strategies as a problem or an end in itself, to be addressed by measures "from above", rather than as a means to achieve other goals (Chang, 2013). Also from a regional development point of view, social capital is usually undervalued compared to economic conditions (Boström, 2012). However, this is slowly changing and a new policy framework is starting to redefine the appropriate conditions and environment for sustainable processes at local level: OECD (2006), for example, challenges the basic assumptions and objectives of regional development and describes the need to shift toward endogenous principles. This led to the formulation of a new development framework harnessing the internal potential of rural areas (OECD, 2019), further complemented by a direct link to the Sustainable Development Goals, thereby leading to the formulation of a "new SDG paradigm" (OECD, 2020). In this concept, development goals are defined as the achievement of well-being and quality of life in terms of the SDGs, i.e., based on the 5 Ps: people, prosperity, planet, peace, partnerships. The tools for achieving this type of development include targeted investments in human and social capital, highlighting opportunities to involve all concerned actors, with civil society being a key actor in achieving sustainability (such as active citizens organizations) (OECD, 2020).

Local Actors and Social Relations as Drivers of Sustainable Development

At local level, the "emancipation of regions" is thus based on using all their internal resources and potential, including the mobilization of actors, which is considered a change of perspective or even a new concept of rural space (OECD, 2006; Ward and Brown, 2009). These regions deal with many problems of a local nature and must also build capacity for resilience and sustainable care of environmental resources. To deal with these challenges, they need a great deal of autonomy to allow local actors to function as development drivers. This is determined by the social environment: Perlín (1999, p. 3) defines a rural settlement from a social perspective as one "where there are close social contacts between the individual inhabitants of the settlement, and there is long-term informal social control and participation".

On the other hand, the role of technology is frequently discussed in the context of development: the OECD (2018) identified the driving forces of change in rural areas as being mainly technological in nature. Also the concept of Smart Cities for municipalities and regions is being criticized for its over-reliance on technology (Suartika and Cuthbert, 2020). This technological perspective is still applied in Czech strategies (Ministry of Regional Development, 2018), in spite of the evidence that systemic solutions of a technological nature

may not have the expected impact if conditions for their implementation—in terms of human and social capital—are not favorable (Ženka et al., 2017). In rural areas and small villages in particular, the involvement of local people and their willingness to engage in the development processes is a key factor of success.

Actors and Their Roles

Increasing attention to endogenous development processes based on internal resources and regional potential (Ward and Brown, 2009) highlights the role of diverse locally-specific actors as one of its most important assumptions and drivers (cf. Zahradník and Dlouhá, 2016). In this context, OECD (2006) emphasized the role of all levels of government, local actors: public, private, non-governmental non-profit organizations (NGOs) and civil society associations, and also their cooperation across sectors. This development concept contrasts to the older model of top-down policy where, in general, the main driving forces are national governments and large farmers which supposedly ensure the region competitiveness (Horlings and Marsden, 2014).

The necessity to involve actors such as businesses and NGOs in the processes of change toward sustainability is widely discussed also by the academic community (Avelino and Wittmayer, 2016). In this regard, processes based on sustainable leadership (Horlings and Padt, 2013), and communication/coordination of joint planning and activities, where attention is given to the role of mediator between actors, are gaining importance and recognition. As a shift of perspective from government to governance is happening, Sedlacek and Gaube (2010, p. 121–122) stress the need for a more comprehensive transition where sustainability principles are increasingly embedded in all relevant institutions, while collaboration with internal/external actors is ongoing. According to these authors, a new type of rural development actor—the Local Action Group (LAG)—has taken on the role of coordinating and supporting this collaboration. The LAG, as a community of citizens, non-profit organizations, private business and public administration (municipalities, associations of municipalities and public authorities), is a regionally-based organization which is independent of political decision-making. One of the important roles of LAGs is to develop a balanced partnership between the main interest groups (municipalities, entrepreneurs, including farmers and the non-profit sector) with a clear set of rules for co-operation (so the LAGs are not a lobby or pressure structure for any rural interest group); on regional level, LAGs cooperate within a network (Binek et al., 2020). LAGs (and their partners) work together to develop rural areas, and administer financial support from EU and national programmes for their region. In the EU, the LAGS opened up opportunities for the strengthening of local and rural governance which is conditioned by the existence of informal networks, multi-level decision-making, and professionalization of bottom-up initiatives, among others. Logically, LAGs are seen as a catalyst for a transformation toward a new paradigm of rural development (Boukalova et al., 2016).

The Czech Context

While the OECD (2020) has elaborated on the general territorial principles of SDG implementation from a social perspective, in this article we strive to document and analyse how these principles manifest in the specific context of rural development, using the example of the Czech Republic (CR). We concentrate on regions defined as areas with municipalities of up to 25,000 inhabitants where LAGs are active (NS MAS, 2021). The development of these areas is influenced by public administration institutions (state administration of municipalities, democratically elected councils), and their associations (for example the Union of Towns and Municipalities); there are also professional institutions (responsible for water, nature management, etc.) whose activities are subject to the relevant ministries. To initiate bottom-up processes at the level of municipalities and their rural hinterlands, a new actor in regional development—the Local Action Groups (LAGs)—has been assigned responsibility and provided with the LEADER method as a policy instrument. This method aims to involve partners at local level, including civil society and local economic actors, in the design and implementation of local integrated strategies that support development processes and potentially create conditions for transition to a more sustainable future in the territory and community (Lošťák and Hudečková, 2010; Svobodová, 2015). On this basis, territory-specific Strategies of Community-Led Local Development (SCLLDs) are developed, in the formulation and implementation of which the local actors, coordinated by the LAGs, play a role (Konečný et al., 2020). The concept of LAGs representing local partnerships between public, private and civic sector, and whose activities are based on the LEADER approach, is not unique for the Czech Republic—it is widely applied at EU level (Konečný, 2019). However, the specifics of individual countries shape development processes and in the Czech Republic, bottom-up initiatives are greatly influenced by national strategies that provide external stimuli for exogenous development processes (Konečný et al., 2021).

Development Strategies for Rural Areas in CR

In general, it is primarily the policy of the EU that influences national development priorities in the Czech Republic. However, paradigmatic policy changes are introduced with a delay: the concept of *territorial dimension* was included in the Regional Development Strategy (RDS) for 2014–2021 (Ministry of Regional Development, 2013), but not fully recognized even by the more recently published Regional Development Strategy 21+ (Ministry of Regional Development, 2020). These strategies lack an emphasis on awareness of local conditions, including human and social capital, as a basis for regional development. What is still emphasized is instead the provision of social services and, above all, the elimination of disparities in territorial cohesion—which is assessed by demographic, economic, or infrastructure indicators (e.g., completed housing), without taking into account community aspects.

The Regional Development Strategy of the Czech Republic 21+ (Ministry of Regional Development, 2020) defines spatially differentiated economic, social and environmental objectives

for the different categories of regions: metropolitan areas, agglomerations and regional centers, and it pays special attention to restructured regions and economically and socially vulnerable areas. Its narrative of development has, compared with the previous RDS 2014–2020, shifted toward endogenous development opportunities, local specifics and bottom-up activities. In some areas, for example landscape, this is more visible, in others it is less evident, e.g., in the field of local culture and education. The great potential of local communities with their unique social environment, and also local knowledge and experiences as a resource for learning, remain completely untapped (cf. Dlouhá et al., 2021a). When these strategies deal with bottom-up development processes, they do not take into account its main driving forces—the local actors.

Social Relations as an Opportunity and Challenge for Sustainability

Social capital on local and regional level in the Czech Republic has been explored by Sýkora (2017): the results of a large-scale questionnaire survey show that community activities and the existence of associations are an asset and development potential of all settlements irrespective of size, but are particularly significant for smallest settlements of up to 500 inhabitants. The importance of these community aspects (the relationships between local residents and their willingness to participate in the life of the town or village) for local development decreases as the population size of the settlement increases. In general, anonymity and lack of community life are problems typically attributed mainly to cities (Sýkora, 2017).

In this regard, the vast majority of 89 % of Czech towns and villages consider cooperation with neighboring towns and villages as a suitable tool to facilitate solving development goals and problems. The most important (from the perspective of the respondents of this research) themes of inter-municipal cooperation include maintaining good neighborly relations. There is a clear preference among municipalities for bottom-up, voluntary cooperation, using existing relationships and experience and emphasizing geographical proximity and similarity in size, rather than top-down cooperation. Municipalities associate this top-down cooperation with negative perceptions of state measures, the threat of increased administrative, time and financial burdens, as well as unfriendly relationships and mutual distrust. A certain skepticism toward cities is particularly evident in small municipalities which prefer to work with municipalities of a similar size rather than cities (Sýkora, 2017).

Identified future trends and challenges that will influence the development of settlements with a population of <15,000 in the next 20–30 years include, among others: strengthening local identity (the need for people to identify with their native regions, to belong somewhere); increasing public engagement of local people (dependent on the social capital of the settlement in question); and development of self-help and community initiatives and their support (Studnička, 2018). On the other hand, also supra-local (inter-municipal, micro-regional) cooperation should be considered as an increasingly important tool to address the problems of small municipalities and towns (Studnička, 2018). All these factors are very important for empowering people to contribute to local as well as global sustainability processes (Ober, 2015).

Actors in CR

The categorization of regional development actors in the Czech context traditionally comprises three main groups: enterprises, households (individuals) and the public sector (state) (Ježek, 2014) while neglecting non-profit and civil society organizations. From this point of view, the main tools for territorial development are at the disposal of public administration and local government actors (Smejkal, 2008, p. 25) while educational institutions also play an essential role in the regional context. On the other hand, Perlín et al. (2010) emphasize relevant associations, mostly non-profit organizations and civic associations, and their activities in the local environment; Sýkora (2017) then show that community activities and the existence of associations are important especially for local development. The importance of these bottom-up initiatives has been documented in the context of environment and nature protection (Dlouhá and Zahradník, 2015).

In the Czech Republic, the role of supporting social capital (cooperation between actors within the region and beyond) as a necessary pre-requisite for joint envisioning, planning and realization of innovative projects, is unique for LAGs. It makes them one of the most important potential actors in a transformation that may (or may not) lead to a sustainable future. LAGs have only been operating since 2004, when the country joined an international network based on the LEADER method after the Czech Republic entered the EU. In 2020, LAGs were already operating across the Czech countryside (Binek et al., 2020); in 2021 they covered 93 % of the territory of CR with 60 % of its population (NS MAS, 2021). To fulfill their regional role, LAGs provide two main activities: (1) animation of local actors and (2) administrative tasks related to the management of the LAGs and implementation of CLLD strategies into operational programmes (Binek et al., 2020). The first of these roles is based on working with local actors to provide positive motivation, guidance and support in practical activities (projects); the second one sometimes implies the formal fulfillment of the requirements "from above". The latter is prevalent in less proactive LAGs, which is partly explained by the historical legacy of socialist regimes of there being very little space for taking initiative at grassroots level (Svobodová, 2015; Boukalova et al., 2016). The freedom of local actors to choose their own development objectives is also limited due to the targeted support for the regional policy implementation (formulated at national level), which leads to the selection of applicants who are eligible for this support (Konečný et al., 2021). In the questionnaire responses, LAG managers, for example, spoke of the needs of NGOs, which can be difficult to support, although they are often an essential part of the local community. The inability to support associations and NGOs has led some LAGs to fear the loss of members from this "third" sector. As a result, some of the problems and needs identified in the SCLLD are not addressed in the territory, and the support for community life in rural areas is relatively low (Konečný et al., 2020).

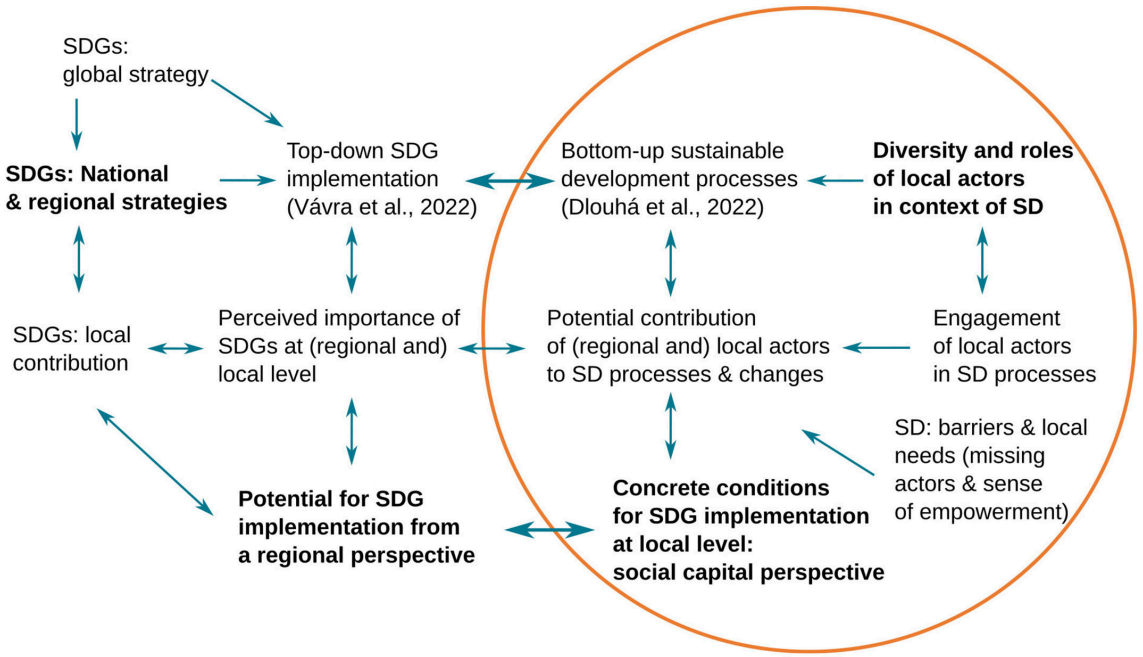

FIGURE 1 | Complementarity of research objectives in the two articles of this special collection: this one (in a circle) and Vávra et al. (2022).

METHODS

This study was developed in the framework of a 3-year project of cooperation between universities and Local Action Groups; academics had the opportunity to cooperate with LAG representatives during the preparation and implementation of 4 semesters of training on various sustainable development themes. The research team received feedback from training participants (mostly LAG managers) regarding the relevance of the sustainable development themes for practice in local context. This relatively close collaboration is reflected in the nature of the presented action research and its results: important questions emerged during the collaboration. The training was disrupted by the COVID-19 pandemic—most of the lectures were delivered online and interaction was also online. In the final phase of the second cycle of the training, a comprehensive survey was designed that reflected experiences from the interaction between lecturers (researchers) and LAG representatives, especially feedback concerning bottom-up processes and local actors as their main driving forces. Research questions included the following:

- What role do LAG representatives attribute to actors from different levels and sectors (individual, local or regional government, non-profit and private sectors) in different areas related to SD?
- How are these actors involved in the processes of sustainability transition/SDG implementation, i.e., in planning for the future and implementation of the changes needed?
- Which actors are currently missing but needed to achieve the SD goals at local level?

The research analyzed the contribution of the identified actors in the 3 dimensions of sustainable development (economic, social, environmental) which was complemented by the topics of education (from the perspective of lifelong learning) and citizen engagement (democratic dialogue). Based on the general research questions, a questionnaire was developed which focused on the following thematic areas:

- Possibilities and tools for sustainable development within the LAG,
- Role of actors in sustainable development of the region,
- Preconditions for the implementation of sustainable development objectives in the region, and
- Specific experiences from the LAG.

The sustainable development aspects of these themes were examined in terms of the actors' current involvement (who plays/does not play a role in the observed area) and with regard to the future outlook (who formulates new sustainable development goals in the region and who implements them, who initiates change and innovation—and who is missing in this respect). These thematic areas correspond to the objectives of the research—to map the possibilities/constraints of sustainable development at local level and its driving forces in terms of actors' engagement (and bottom-up processes initiated by them). As the full questionnaire was quite detailed, its full version and some of the results (relevant for different research questions) were published elsewhere (Dlouhá et al., 2021a; Vávra et al., 2022).

This online questionnaire was disseminated via email among all LAGs in the CR (the chairman of the National Network of LAGs used the database of contacts to disseminate the link).

TABLE 1 | Definition of actor categories (theoretically based coding) and the summary of responses from open-ended questions.

Code	Actor category	Includes
1	Local Actions Groups	LAG; LAG partners; LAG members; LAG staff/employees; LAG management; some forward-thinking/innovative people on different positions in LAG; LAG decision-making body; working groups within the LAG those involved in, cooperation between LAGs; Local Action Plans for Education
2	Local people and community	Community; active citizens; volunteers
3	Cultural institutions	Library; museums; cultural houses; cultural services of the city; cultural associations
4	Educational organizations	Schools (involved in Local Action Plans); schools and educational institutions; kindergartens; primary schools; secondary schools; universities; actors providing extracurricular and non-formal education; active teachers; lifelong learning institutions; local universities; vocationally-oriented secondary schools; lifelong and vocational education; representatives of primary schools
5	Small local businesses	Small local firms; smaller innovative firms; small entrepreneurs; socially responsible and environmentally-friendly firms
6	Small-scale farmers	Farmers; local eco-farmers; organic farmers
7	Large corporations	Entrepreneurs; some firms; firms and businesses; large employers and entrepreneurs; automobile and engineering firms; large agricultural enterprises; large farms; large farmers
8	Non-profit organizations	NGOs; Non-profit organizations providing non-formal education; ecological center DOTEK; non-profit organizations mainly focused on environmental issues; associations; leisure center; clubs and associations (firefighters, sports clubs, etc.); interest groups creating conditions for sport, history, etc.; arts organizations and associations
9	Public administration	Region; municipalities; mayors; municipal councilors; towns; municipalities with extended powers; microregions
10	Nature conservation authorities	Nature protection agency; Administration of national parks or protected areas; Department of Environment-Municipality of Jičín; nature conservationists; organizations and bodies dealing with the environment; Czech Union for Nature Conservation
11	Social facilities and businesses	Actors of community planning of social and accompanying services
12	Other (professional institutions)	Umbrella organizations, or their district structures (e.g., Chamber of Commerce); research and scientific institutions outside the region; state organizations e.g., Forests of the Czech Republic, Odra River Basin; foresters; food inspection
12	Other (churches)	Churches; parish; charity
13—this category was not used in analysis	All actors	Applicants in LAG calls; actors of community planning of social and accompanying services; interested subjects from the territory; those involved in the dialogue that will be launched in the context of the preparation of the new SCLLD strategy and with growing awareness of the need for sustainable development in society

Verbal responses to open-ended questions (posed throughout the questionnaire) were coded into categories using the respondents' own words, and analyzed with an emphasis on the variety of responses, not their frequency. In this table, blue fields describe actors with a role in the social domain of sustainability, yellow in the economic domain, green in the environmental domain, pink fields were not used in further analysis. The white fields fall into all 3 dimensions of sustainability; most of the others are also applicable in a dimension other than the one assigned. The exception is category Nature conservation authorities, which is purely environmental.

The respondents were mostly chairs or directors of Local Action Groups (12 persons), CLLD managers or project managers (51), administrative staff (6), and in one case a professional consultant. The questionnaire combined closed questions (analyzed with quantitative methods) and open questions (that allowed for a qualitative approach and interpretations). All 180 local action groups were invited to complete this online questionnaire, and full responses were obtained from 50 LAGs (28 % of LAGs). In this set, LAGs of different sizes from all regions of the Czech Republic were represented, including those participating in the project training. Given that the answers of the respondents are based on detailed knowledge of the local situation (LAGs' unique know-how), we can consider the answers to provide a solid basis for mapping the surveyed issue.

The perception of different actors by LAG representatives was analyzed, focusing on their roles that are relevant to the local conditions, and how they can be supported in this unique context. The perceived roles and relationships of both top-down actors and (mainly) local actors responsible for bottom-up processes was highlighted. The quantitative part of the research (single and multiple choice questions) focused on mapping sustainable development at local level: the obtained results illustrate changes toward sustainability, and roles/relationships of local/regional actors. To map their (fulfilled or unfulfilled) potential to contribute to development in different areas of sustainability, a multiple choice matrix was developed (the respondents ticked the box relevant for the actor and the area of contribution). Open ended questions were used to capture spontaneous responses and to catch the views of respondents in their own words. They provide rich information about experiences on the ground and uncover the conditions for sustainable development and SDG implementation from a local (bottom-up) perspective. With open ended questions we analyzed the variety of actors and their influence on pre-determined categories of transition processes. Open ended questions were also used to provide space for comments and

reflection of unique experiences which then served as a context for interpretation of results.

Due to the complexity of the questionnaire, all questions were optional; the number of responses to individual questions thus varied. The multiple-choice questions were analyzed quantitatively in absolute numbers of responses rather than percent (those that were completed were considered) with attention to variability and diversity of responses. To increase reliability, consistency between quantitative and qualitative, open-ended, questions was ascertained (concretely in case of mentioned actors with specific roles in different sustainability areas). The research proved to be consistent with respect to similar content and frequency of categories in both types of questions.

Responses to the open-ended questions were usually analyzed with respect to unique insights and experiences. Some of these responses were however transformed and aggregated into conceptual categories for which frequency was monitored (to observe majority opinion). The categories were "data-driven", they were constructed based on the words and text analyzed. The process of coding was constantly adapted to research objectives and the theoretical background of the research. The data from open questions were used for triangulation and validation of quantitative data.

In general, this research explored the conditions for sustainable development at the local level from the bottom-up perspective, paying special attention to local actors. There is complementary research (Vávra et al., 2022), which looks at top-down strategies and their impact at local level where the SDGs are the main focus. This work used the same questionnaire, and also same respondents—employees of the Local Action Groups that were assigned to represent their LAG—answered the questions. For comparison of research objectives in the articles (see **Figure 1**).

RESULTS

Data analysis showed the relationships of the various local actors and their roles as a driving force for sustainable development at local level, and illustrated the social environment in which these actors operate. To provide a comprehensive picture of how the sustainability processes are shaped by the social capital within this regional and local context, we cite other parts of the research (Vávra et al., 2022) while the specific role of education in actors' empowerment that is a pre-requisite of changes toward sustainability has been discussed in the national context (Dlouhá et al., 2021a).

Actors at the Local Level

Analysis of verbal responses to open-ended questions confirmed that all mentioned actors fall into the categories established through theoretically-based coding (see **Table 1**).

Changes Toward Sustainability—The Local Context

The LAGs' representatives feel that most of the changes toward sustainability needed at the local level are NOT taking place to a sufficient extent—illustrated by **Figure 2**.

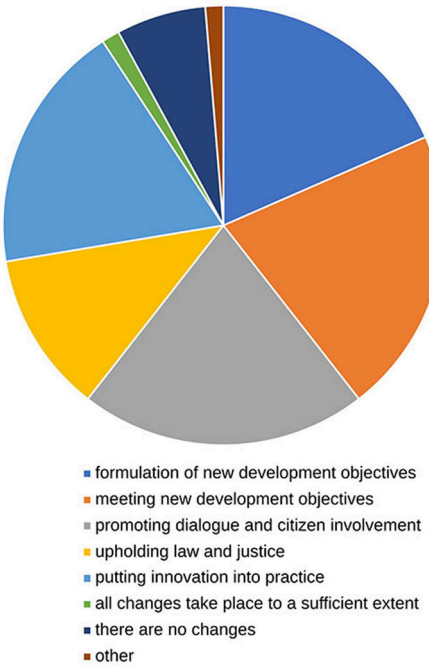

FIGURE 2 | Categories of changes that are NOT taking place in the field of sustainability, $n = 46$. Answers to the multiple-choice question *"Tick which changes to sustainability in your LAG are NOT happening on a sufficient scale, and list the actors that YOU would need to help kick-start them"*.

In respondents' opinions, several categories of changes are not taking place (only 1 of the respondents thinks that all changes are taking place and 5 of the respondents think that no changes are taking place at all). The reasons why these changes are difficult to initiate include lack of funding (too narrowly-defined support through the LAGs), insufficient human resources, and the low authority of LAGs in decision-making (due to shortcomings in legislation). The barriers that prevent LAGs from being leaders in sustainable development are discussed in detail by Vávra et al. (2022).

Cooperation With National Actors

Supporting cooperation with actors at local, regional and national levels is an important part of the LAGs' activities. **Figure 3** illustrates how the quality of cooperation with various actors was perceived by the LAGs' representatives.

The top group of most intensely cooperating actors consists of neighboring LAGs, the National Network of LAGs, and local municipalities—more than 80 % of respondents evaluated this cooperation as excellent or good. On the other hand, cooperation with supra-regional entities is significantly lower; bad cooperation is rare but no cooperation is often mentioned in relation to the Ministry of Finance (this institution was included in the survey as a hypothetically important actor). From this perspective, it is worth noting the weak or absent cooperation with universities and research organizations which in general are an important driving force for sustainable development (cf. Dlouhá and Zahradník, 2015).

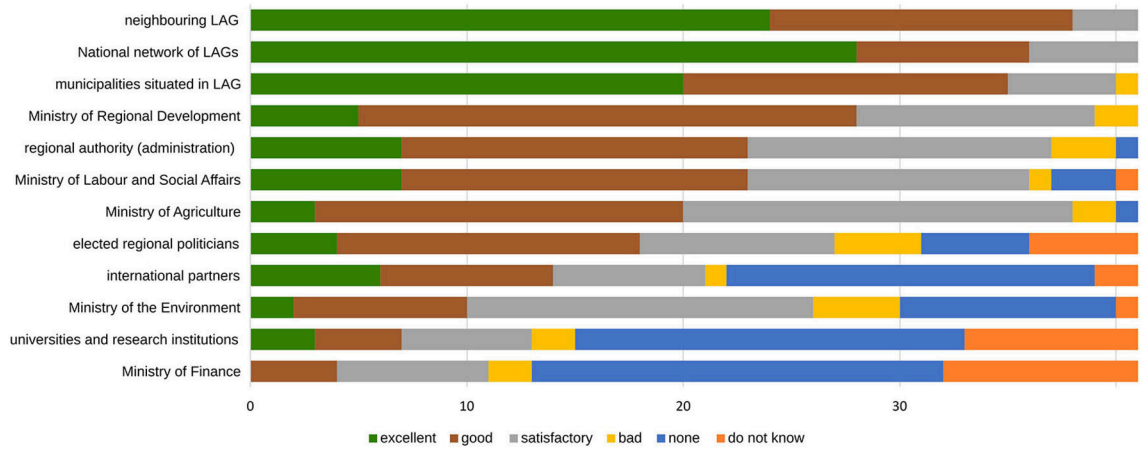

FIGURE 3 | Extent of the LAGs' cooperation with other actors, $n = 41$. Answers to the multiple-choice question *"How do you evaluate cooperation of your LAG with various actors of public administration and external institutions?"*.

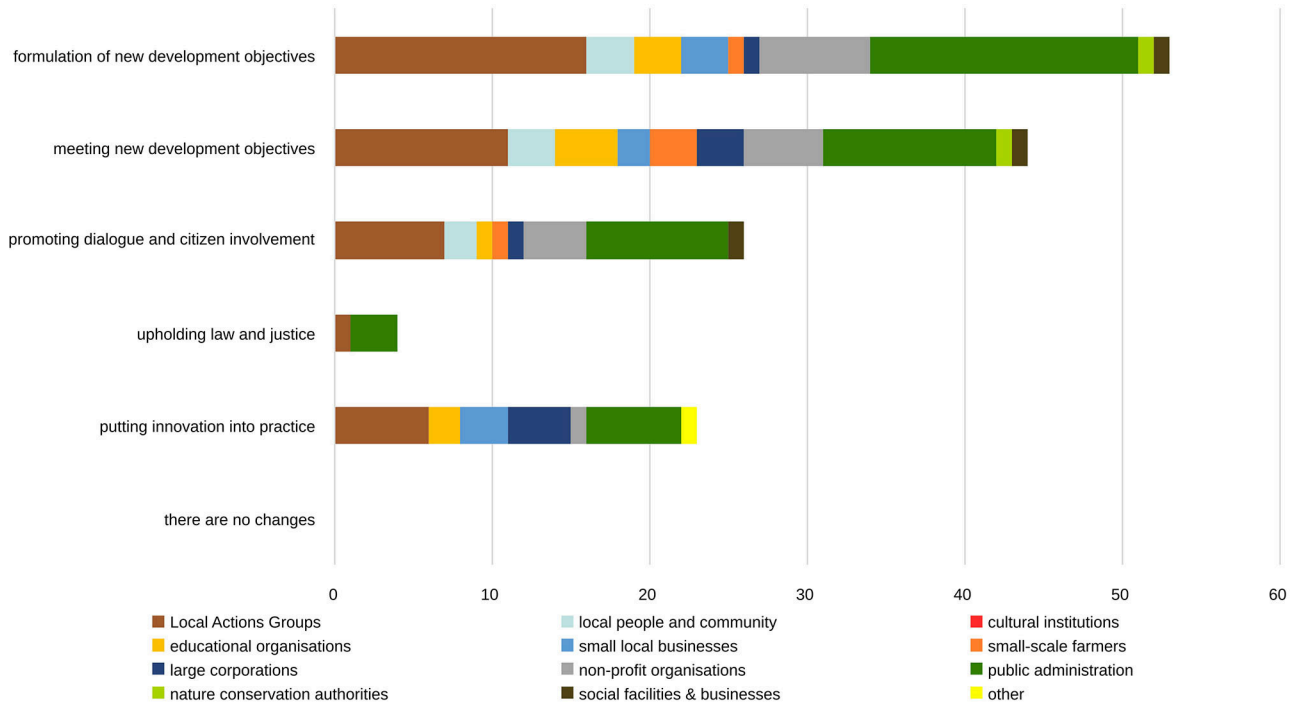

FIGURE 4 | Which actors are involved in changes toward sustainability, $n = 45$. Answers to the open-ended question: *Which actors are at the PRESENT TIME helping to START a discussion on sustainability in your LAG on the following topics?* Actors mentioned by the respondents in open ended responses were consequently assigned into the categories of actors developed through theoretically-based coding.

Diversity of Local Actors in the Process of Transformation

The previous conclusion (that LAGs cooperate mainly with local actors) is related to the following observation about the diversity of local actors (**Figure 4**).

This question aimed to identify local actors and their role in the processes of change toward sustainability. It is evident that there is a diverse range of actors involved in LAGs around changes toward sustainability; a number of actors are involved especially in the formulation of development goals and their implementation.

Relationships Between Actors at Local Level

The social capital of a given region can be assessed according to the relationships between actors (**Figure 5**).

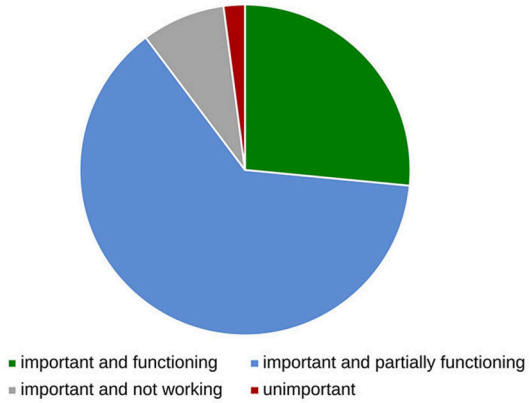

FIGURE 5 | Relationships between actors and their importance, $n = 41$. Answers to the multiple-choice question: *How do you perceive the RELATIONSHIPS between the different actors in your LAG and their IMPORTANCE for sustainable development*.

As responses to this question show, LAG representatives mention excellent or good cooperation between all actors in almost 90 % of cases; actors that are lacking in terms of cooperation include the education sector (especially universities) and scientific and research institutions. The most frequently mentioned missing actor in terms of cooperation is entrepreneurs, both small (3 respondents out of 41) and especially large (6 respondents). Powerful employers and large companies may even influence relationships adversely (3 respondents).

Engagement of Local Actors in the Areas of Sustainability

Which actors do, and which do not, play a role in the areas of sustainability is illustrated in **Figure 6**. Here, the answers to the two questions are compared so that for each actor both the actual perceived contribution to change in the region, and their absence, can be seen. The level of current involvement of the actors, and the unfulfilled potential in this area (from the respondents' perspective) can be ascertained from this comparison.

The Local Action Groups feel competent to address the challenges of sustainable development; only a very limited number of their representatives feel that they are not sufficiently involved in addressing these challenges. On the other hand (according to these responses) the commercial sector does not contribute much to sustainability (beyond its economic objectives) but the large commercial companies *should* make a significant contribution in all areas of SD. The (perceived) importance of the civic sector (local people and community, NGOs), as well as cultural institutions and schools is evident.

Engagement of Local Actors in the Processes of Transformation

The future perspective of sustainable development—who formulates new sustainable development goals in the region and who implements them, who initiates change and innovation, and who is missing in this respect—is illustrated in **Figure 7**.

The most proactive actor in formulating and implementing new sustainable objectives in the region is reported to be public administration even though this actor still has great potential to be involved in sustainability (the negative part of the graph—below zero). This is the case also for the LAGs themselves (but with a considerably smaller potential of further involvement). The democratic actors may be influential if cooperating together: non-profit organizations plus local people and community, who can be supported by educational institutions. Large commercial companies are perceived as an actor with power which is however not sufficiently used in the public interest despite having relatively large potential in this regard. The role of cultural institutions is perceived as politically passive, not providing new impulses for development.

Empowerment of LAGs to Resolve the Local Sustainability Challenges

In terms of how the SDGs can be promoted at local level, LAGs generally understand the importance of the SDG concept; however, there are only a few goals to which they can make a meaningful contribution (cf. Vávra et al., 2022). In general, LAGs can contribute most in the social area, including the economy, where immediate results can be expected. By contrast, their action in the environmental field, especially as regards climate change, has yet to be seen. At the same time, LAG representatives are fully aware of their current and potential role in their local context (see **Figures 6**, **7**) but the opportunities to make substantial impacts on different areas of sustainability are not always straightforward (the obstacles to fulfilling this role were mentioned in the open-ended questions). To fulfill their role in the local context—improving the well-being of individuals within the community, and to support, inspire and coordinate its members—LAGs deliver necessary know-how through education: in this field, their perceived contribution is most significant, as illustrated also by Dlouhá et al. (2021a).

DISCUSSION

The paper presented a reflection on the preconditions for the implementation of the SDGs at local level, focusing on the nature and roles of the different actors as one of the starting points of sustainability processes from the perspective of LAG representatives. The social conditions of sustainable development mentioned in the relevant documents (OECD, 2019, 2020) have been somewhat neglected in the literature (Cuthill, 2010; Chang, 2013) and are only recently starting to gain attention (Binek et al., 2020)—often following the implementation of the LEADER method in practice and LAGs' subsequent activities.

The analysis showed that a broad range of actors play a role at local level in the different areas of sustainable development. Some of the actors that are usually emphasized from an economic perspective of development (Binek et al., 2009; Ježek, 2014) are of marginal importance in terms of sustainable development at local

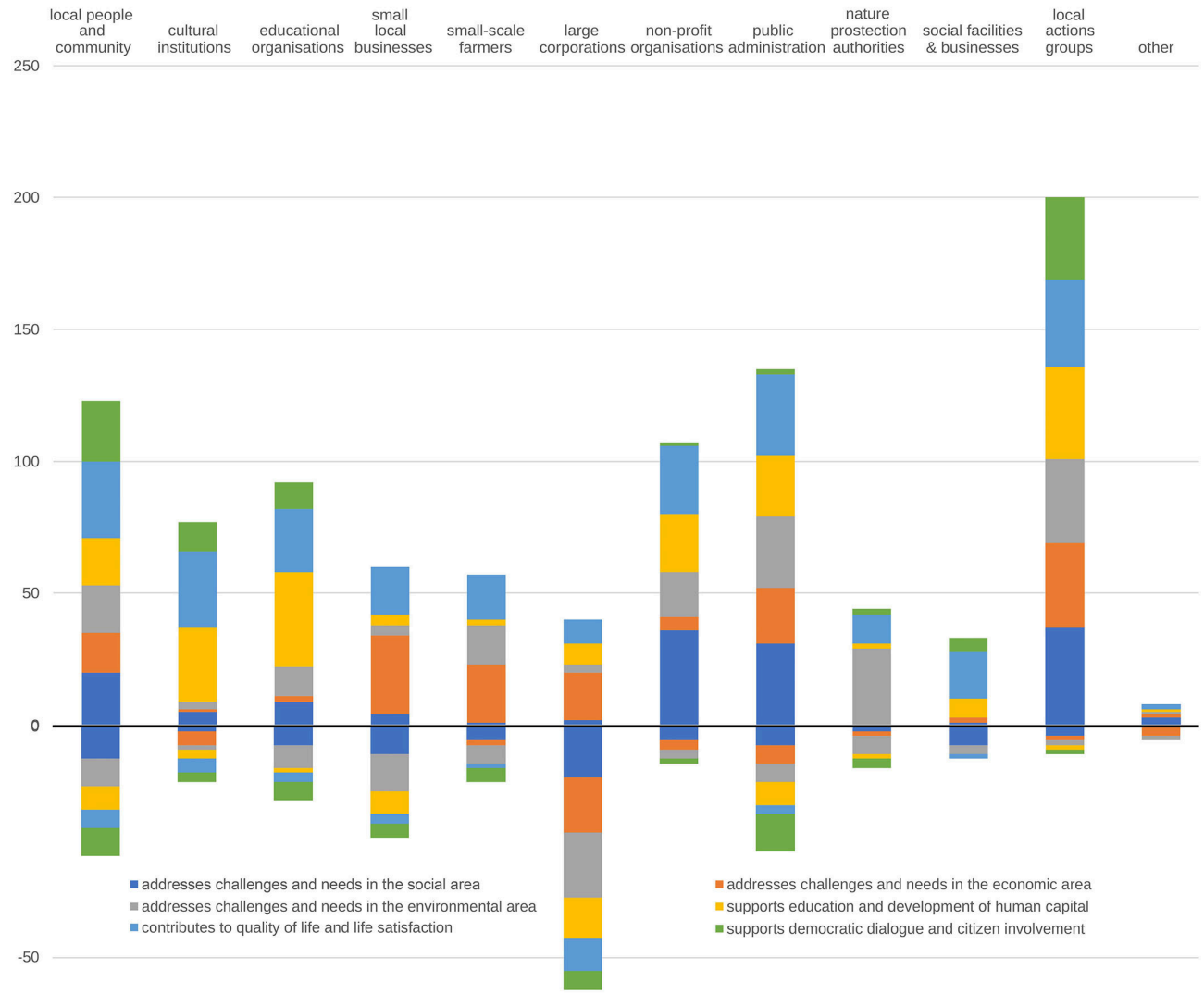

FIGURE 6 | The extent to which LAG representatives consider that selected actors are currently involved in addressing challenges and needs in the areas of sustainable development (in positive values)—compared to the extent to which LAG representatives consider that the same actors are NOT—but should be—currently involved in addressing the same challenges (in negative values). Here the answers to the two related multiple-choice questions were compared: *Who IS CURRENTLY involved in your region in the following...* and the next: *Who is NOT—BUT SHOULD BE—involved in your region in the following...* These questions were answered by ticking a box within the matrix—relevant for the actor and the category of engagement.

level. The actors influencing top-down decision-making were considered by the respondents of the survey as less important than those entering processes from below; collaboration with the latter is more intense, as **Figure 3** shows. From the bottom-up development point of view, the LAGs were considered to be the most important actors—their role is to empower other local actors and create a supportive environment for their activities. This role is relevant for the strategies of regional emancipation expressed in the "new SDG paradigm" of regional development (OECD, 2020).

The specificities of the endogenous development in the regions that emancipate themselves from the demands of the global economy (OECD, 2006; Ward and Brown, 2009) are illustrated by the perception of large corporations, which, according to the respondents, do not contribute significantly to any of the sustainability domains (and are rated the lowest with regards to contribution to quality of life and democratic dialogue). Even in the economic area, their contribution is average, with other economic players (small local firms and small farmers), and public administration (including the LAGs) making a greater contribution (**Figure 6**). As the answers to open ended questions also documented, the integration of large corporations into the local context may be highly problematic. On the other hand, large corporations (as perceived by respondents) are the first among those who currently do not but *should* participate in local development in all areas

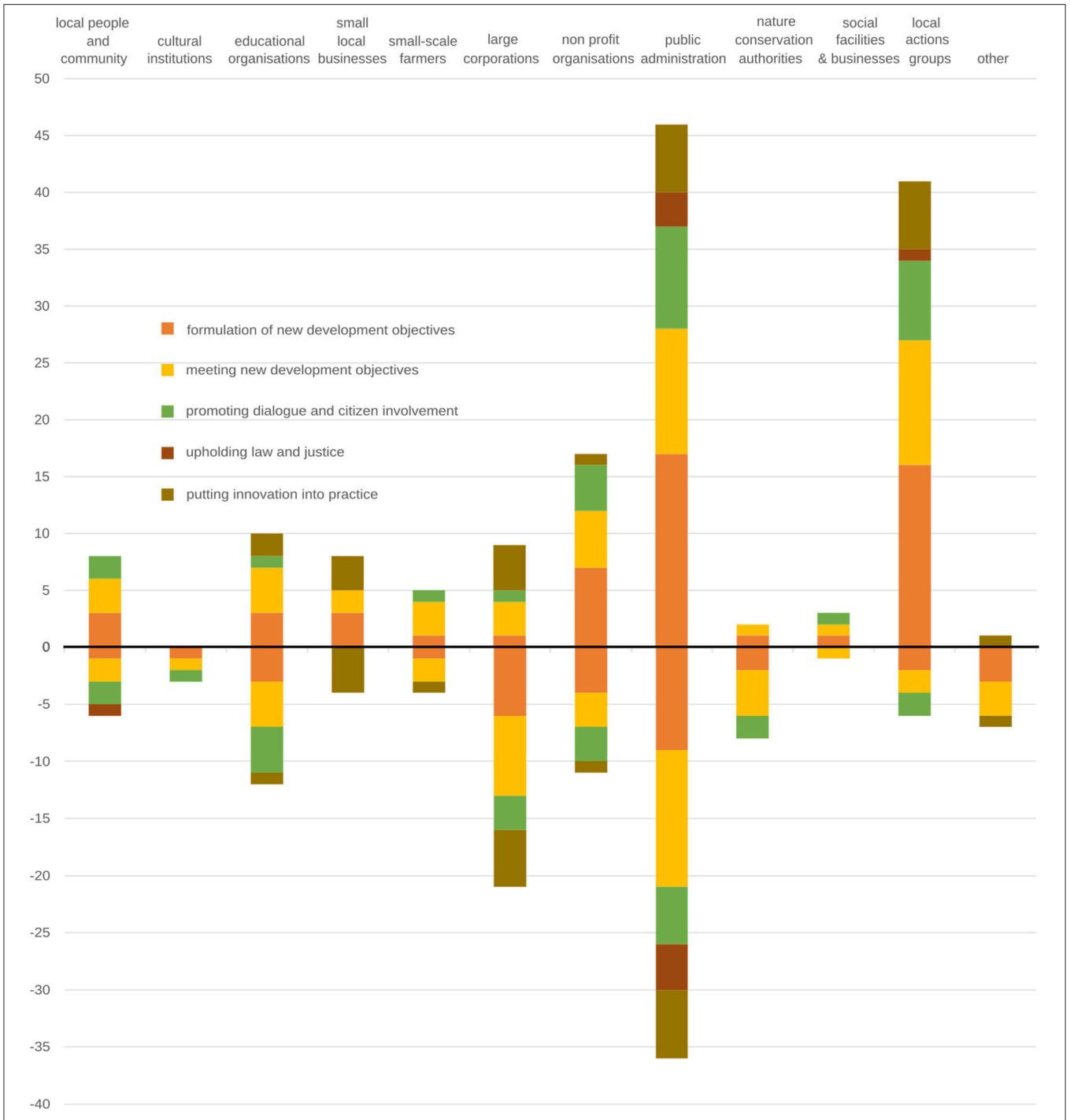

FIGURE 7 | To what extent do LAG representatives believe that selected actors are currently helping to initiate the sustainability changes in the following fields (the part of the graph with positive values), and for which changes toward sustainability that are not taking place to a sufficient extent would they need actors to help initiate them (the part of the graph with negative values). Here the answers to the following questions were compared: *Which actors are CURRENTLY helping to START a discussion on sustainability in your LAG on the following topics? Which changes toward sustainability are NOT happening in your LAG to a sufficient extent, and list the actors you WOULD need to get them started.* The questions were multiple choice (topics) with an open ended component (description of actors).

of SD and initiate necessary changes (**Figure 7**). This suggests that in the new SDG paradigm, the roles of actors need to be redefined with respect to their influence on sustainability issues (Elder and Olsen, 2019). As sustainability issues are interconnected [as are SDGs in similar ways, see Bagheri and Hjorth (2007)], inter-sectoral approaches (resulting from

transdiciplinarity) will require institutional changes at different levels (Sedlacek and Gaube, 2010) within the framework of more substantial policy change at regional level (Bachtler and Downes, 2020).

In line with the integrative approach to sustainability (Bautista-Puig et al., 2021), the disadvantages of over-specialization of actors to only one area of sustainability are obvious; in the specific conditions of the Czech Republic, this can be illustrated by the role of nature conservation organizations, who are rarely involved in sustainability processes and their contribution almost exclusively in the area of nature protection is associated with low impact in other areas (**Figure 7**). As a result, there is a low level of dialogue on environmental problem-solving across society (cf. Brugnach and Ingram, 2012) and a generally poor awareness of how environmental objectives may be implemented across different dimensions of sustainability. The low perceived importance of environmental SDGs such as climate change by LAG representatives as documented by Vávra et al. (2022) is obvious, alongside the low empowerment of this actor in the environmental field (**Figure 6**). This is particularly alarming because rural areas are important actors in achieving the environmentally focused SDGs globally, being the major providers of ecosystem services. Without this awareness and empowerment, rural areas cannot play their crucial role in SDG implementation—delivering ecosystem services to the rest of the globe. Besides this role in the environmental dimension of sustainability, social capital is also necessary for building trust and thus increasing economic efficiency locally (Dasgupta and Serageldin, 2001).

What are the characteristics of the diverse actors' roles in the implementation of SDGs at local level? In the sustainability framework established by OECD (2020), the role of civil society received greater emphasis, as opposed to the commercial sphere. This may be characteristic of the Czech context, where businesses have not yet embraced the concept of social responsibility, but possibly also connected to the relatively low potential to promote change, including innovation (comparable to the potential of schools in this respect). As is apparent from the open-ended questions in the survey, when it comes to innovations supporting the green economy, local actors seem to be helpless. According to the respondents, there is not only a lack of active experts, research and development institutions, and consulting firms in the regions; the relevant education is also missing, with several respondents stating that "almost everything" is absent. Insufficient cooperation with universities and research institutions is confirmed by **Figure 3**. Thus, in terms of shaping the future, the most important actor seems to be currently the public administration (**Figure 7**). This finding could indicate deficient know-how and low empowerment of other local actors, resulting in their weak influence on decision-making and sustainability processes as such.

The role of local communities and NGOs in addressing current challenges in the CR is comparable to the influence of public administrations. This could suggest strong democratic participation in the regions, but also can be interpreted as a deficiency: numerous problems do not have systemic solutions and are left to the initiative of local citizens which sometimes leads to partial failures and wasted energy. The need to invest in a lot of voluntary work is also mentioned by the respondents as a negative experience of their involvement in LAG activities. In this regard, the representatives of the LAGs complain about the lack of financial and informational support, limited powers and burdensome administration. In the CR, spontaneous bottom-up processes are also often hampered by measures from above, evidence of which is provided by several authors (Svobodová, 2015; Konečný et al., 2021).

Given the perceived importance of the education sector (Dlouhá et al., 2021a), it should be analyzed in more detail (see **Figure 6**). Almost all actors play a role here, with less importance given to those from the commercial sector and, surprisingly, to nature protection authorities. Small, and particularly large enterprises are most frequently mentioned among those who *should* be more involved in delivering education to address the needs of the region, while local governments and cultural institutions should also promote "place-based" learning. The open-ended answers concerning the missing actors or systemic measures often indicate that among those significantly missing are "local universities, colleges, vocationally-oriented secondary schools; lifelong and vocational education...". In some regions there is also "...a lack of support for environmental educational centers and other institutions and NGOs interested in education" or "...active NGOs that would focus on sustainable development issues". It was mentioned here that local schools sometimes neglect or actually oppose the concept of sustainable development. LAGs have significant competence in the educational field (Smejkal, 2008; Lošťák and Hudečková, 2010) and feel that they can contribute here most (**Figures 6**, **7**), but they need a strong actor responsible for education to cooperate with. In reality, not only important actors in education for the needs of the region are missing, but also the legal environment is systemically undervalued—which results in a deficient system of lifelong learning, and the absence of a valid strategy to create it (cf. Dlouhá et al., 2021b).

Not all desirable changes to sustainable development are ongoing to a sufficient degree (**Figure 2**). There is still some potential to mobilize the social capital of different regions (the negative values in **Figures 6**, **7**), in terms of encouraging local actors and supporting their cooperation and relationships. Even if these relationships are already good or satisfactory (**Figure 5**), the open-ended questions uncovered some deficiencies. These are seen mainly in insufficient cooperation with local businesses, especially big agricultural companies and other large corporations. Some of the actors and local inhabitants have low commitment to contribute to the community; in this regard, it is the role of Local Action Groups to work with local actors, to empower and support these actors to achieve long term goals, including sustainability. The LAGs already have (from their point of view) the biggest role in addressing sustainable development challenges which might however be a subjective and biased assessment. The areas of sustainable development to which they feel they contribute the most are described by Vávra et al. (2022) and in **Figure 7**. However, even if the feeling that they can significantly contribute

is subjective, it can lead to actions that make their intention a reality.

Limits of the Research

Prior to the research, close relationships were established with LAG representatives during the design and implementation phase of the training on SD which facilitated direct experience with the context of local development. The research was then conceived as action research and based on qualitative methods—analyzing responses by LAG representatives in the questionnaire, with a quantitative component serving to illustrate the conclusions. This approach facilitated the gradual materialization of a picture of the studied environment.

The sample of respondents included representatives of LAGs from only 28 % of these associations. The composition of the sample and willingness to answer was adversely affected by the situation of COVID-19. Respondents who completed the questionnaire worked carefully and provided much additional information even in open-ended questions; however, their views might be influenced by the way they cooperate with the actors in the region. LAGs usually deliver (a small amount of) financial support to small actors such as local enterprises and have little or no impact on big companies so their perception of this actor may be biased. Moreover, the individual actors and their roles are very diverse, and activities of LAGs in different regions also differ according to the local circumstances, so it is relatively difficult to generalize. However, as the research attempted to identify emergent phenomena (focusing on the diversity and regional specifics of sustainable development), and as the interpretation of the results was triangulated from the theoretical and practical point of view (comments obtained from LAG representatives), it can be said that the results give a fairly good indication of the overall situation in different regions of the country.

To increase data reliability, some questions were asked twice (in a modified form), and the results compared. Verification of the roles of actors in the areas of sustainable development (outcome from the analysis of data from multiple choice questions) was carried out with open ended questions concerning the role of actors in similar sustainability areas (theoretical based coding was used to identify categories of actors for quantitative analysis). The numbers of involved actors (a) ticked and (b) described by the respondents were relatively comparable in the case of positive involvement of the major actors; questions concerning the deficiency of actors had a slightly different focus and were not taken into account. This exercise resulted in the conclusion that the roles of actors and their involvement in sustainable development processes were assessed consistently by the respondents across the whole survey.

CONCLUSIONS

The factors of development on local and regional level can be seen as external (incentives, e.g., external subsidies, provided on the basis of top-down decisions) and internal (mobilization of internal resources and potential). These can be appropriately combined; in this article we have dealt mainly with internal (endogenous) factors of development. Top-down measures to promote SD include not only financial incentives and policy frameworks (targets and strategies), but also knowledge, innovation and technology transfer. However, if SD at local level is to take place with sustainable use of the resources and opportunities offered by the region, then these incentives must be appropriately applied in the local context where actors with different views and experiences defend their interests. The drivers of the necessary bottom-up processes are thus related to the social capital in a given place—the interrelationships between local actors and the ways in which they collaborate.

Research conducted through a survey with representatives of Local Action Groups as respondents explored social capital in the small towns and rural areas of the Czech Republic, focusing on the nature and roles of actors in sustainable development processes at local level. The views of LAG representatives were mapped, analyzed and interpreted in the context of a territorial approach to development (OECD, 2020). It became obvious that in the countryside (where LAGs operate), a wide range of actors and diverse contributions to SD (or, on the contrary, a noticeable lack of involvement) have to be taken into account. The actors acting "from above", i.e., ministries and other governmental bodies, are often seen as an extraneous element, their actions often associated with a lack of understanding of the local situation and increased administrative burden, leading local actors to prefer cooperation with those working from a bottom-up approach. On the other hand, the local actors are the main driving force of sustainable development at the regional level. These actors to different extent address (or fail to address) challenges in social, economic, and environmental areas, contribute to quality of life, education and development of human capital, and promote democratic dialogue with citizen involvement. Their contribution to these sustainable development processes is far from being intuitively obvious: for example, almost all of the actors are perceived to be active in the field of education while only few of them support democratic dialogue. All of them also contribute to well-being while economic challenges are addressed less evenly (with the relatively limited contribution of large corporations). Even more surprising is their involvement in SD processes that shape the future—these actors formulate and meet new development objectives, promote citizens' involvement, uphold law and justice, and put innovation into practice to very different degrees. Most of these processes are initiated by public administration, including LAGs—and this actor is the only one who "uphold law and justice" to a certain extent (according to responses to one of the questions).

At regional level, it is difficult to promote a one-size-fits-all path to sustainability; instead, unique ways of meeting (broadly defined) goals need to be sought that are appropriate to specific local conditions. Too much reliance on uniform, pre-packaged solutions could lead to resignation of local initiatives, blind compliance with policies from above and adoption of ready-made e.g., technological solutions. Without the authentic participation of all local actors, substantial and long-term changes toward sustainability cannot happen. Conversely,

development processes that are sensitive to the geographical and historical context may contribute to the formation of a unique local culture. Creating the conditions for cooperation and networking between actors must therefore take into account their diversity and anticipate their different (potential) contribution to the SDGs (which is often dependent on the recent history of the country/region as well as regionally specific current conditions, e.g., funding). The role of education that responds to local needs should be also reflected as it brings relevant expertise and awareness among local inhabitants in the field of sustainability. Here, the role of an actor who is dedicated to mapping local conditions, especially other actors, their interests and networks of cooperation, and who can translate general principles of sustainability into the local context, is indispensable. In the Czech Republic, this role is played by the National Network of Local Action Groups—the most important actor applying the LEADER method to stimulate desirable development processes from below. This actor is active, and the method is used in many other EU countries.

The SDGs undoubtedly changed the paradigm of development on regional and local levels, and this also concerns actors' roles and involvement. The perspective of actors and their social capital consistently promoted in this text may in turn transform understanding of sustainable development as such. On this level, social driving forces—an interplay of processes that are initiated by a variety of actors, with emphasis on social capital and character of social environment—are not only outcomes of development, but also its main preconditions. Accenting the social driving forces of development would shape local culture and support the well-being of local inhabitants, and deepen the commitment of the local actors to contribute on a larger scale. Attention paid to these social aspects of sustainable development thus may have a potential impact on practice; and as an emerging theme in research it is also relevant from theoretical point of view.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article are available upon request.

AUTHOR CONTRIBUTIONS

JD: conceptualization of the research, literature review, design of methodology and formal analysis, and writing—original draft. JV: co-design of the methodology and the survey, analysis of data related to the top-down processes of sustainable development, and the role of SDGs. MP: co-design of methodology and the survey, qualitative and quantitative analysis of the data, and interpretation of the results. ZD: contribution to the literature review, comments to the methodology, testing of the survey in the pilot phase, and interpretation of the results. All authors have read and agreed to the published version of the manuscript.

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Education for Sustainable Development as the Catalyst for Local Transitions Toward the Sustainable Development Goals

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Education for Sustainable Development (ESD) is hypothesized to enable the transition to a sustainable future as envisioned by the UN Sustainable Development Goals (SDGs). To demonstrate the potential of ESD to facilitate such a transition, research was carried out between 2018 and 2020, using a systems thinking approach to enable educational communities develop their own visions around the SDGs through a participatory process of localization of sustainability goals and targets and an alignment with formal educational outcomes. Three case studies implemented in a university and two schools in the UK were evaluated as to their capacity to facilitate these transitions through the development of sustainability competences in their learners. Findings from the application of the systemic framework for transitions toward the SDGs through ESD and assessment tools for sustainability competence attainment in learners are discussed in depth. Important barriers and enablers of the process are identified, as well as leverage points to increase the effectiveness of interventions. This work aims to inform education practitioners and community stakeholders about the potential of ESD and practices they can adapt to their own needs and circumstances.

Keywords: ESD, sustainability competence, SDGs, pedagogy, curriculum, assessment, sustainability transition, constructive alignment

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INTRODUCTION

Education has a major role to play in dealing with the sustainability crisis, however its capacity to achieve positive outcomes has been criticized (Jickling and Wals, 2008). "It is the highly educated people who are causing the environmental destruction" (Orr, 1991), a statement that is often used to capture how unsuccessful education efforts have been so far in challenging the status quo, the values and perspectives that permeate the unsustainability of our times. Education for Sustainable Development (ESD) fits within the socially critical orientation of education, which assumes that it can challenge existing power structures and enable democratic and equal participation of all in society, with the other two being the vocational/neo-classical, which focuses on career goals and skills that are important for the labor market and the liberal/progressive, which focuses on personal development through experiential learning and integration of theory and practice, as the three main attitudes toward the educational curriculum, according to Wade (2008). The latter two have been

linked to ESD, as skills for sustainability are becoming increasingly important as well as experiential learning shows promise on changing mindsets. The former view however is transformational because it enables critical analysis of existing worldviews, values and structures and empowers learners to transform society. This critical view should be coupled with a systems or relational approach that recognizes that society operates within environmental boundaries as well as is built on social foundations of justice, equity and inclusion and examines the relationships among ESD, education, society and the biophysical environment through multiple spheres of interaction. Such approach can liberate people, make them question how things are done and experiment with different ways of doing them, to ultimate end up with doing better things (achieving visions) (Blake et al., 2013).

To harness education for a common future vision of the world that enables the planet and people to thrive, participatory approaches that allow all stakeholders to become involved, share their views and act, are also necessary (Bullock and Hitzhusen, 2015). Such approaches to education can focus local efforts and lead to regional and global actions. They enable people to connect to their local realities and link them with their communities to discuss, (dis)agree and discover common visions, values, ideas and experiments to try, complementing the socially critical orientation of education. Through a pragmatic lens, sustainability competence (or agency) is the ability to participate in collective decision-making, embrace the plurality of perspectives and engage in active experimentation and deliberation to reveal what works in specific problematic situations and contexts (Rojas, 2019). Education's role in this context is therefore to develop citizen's knowledge and skills in SD and cultivate an interest in participation in community.

The socioeconomic and environmental challenges our society faces today are complex and urgent (Rockström et al., 2009; Raworth, 2012; Griggs et al., 2013; Voulvoulis and Burgman, 2019). Thus, transformative pedagogy is a promising tool for ESD because it emphasizes learning that promotes action (Rose and Cachelin, 2013), enables learners to develop their own views, assess different perspectives, values and interests and develop their own observations, arguments and competences to deal with sustainability issues (Blake et al., 2013). This principle also supports active participation of students in community-driven decision-making to solve local problems (Medrick, 2013; Barnum and Illari, 2016). Within transformative pedagogies, project and problem-based pedagogies that encourage collaboration and active learning in ESD have been shown as effective for developing sustainability competences in learners. They expose students to real-world and authentic situations that require them to manage complexity, work closely with others and make decisions based on trade-offs (Brundiers et al., 2010; Segalàs et al., 2010; Wiek et al., 2011a; Aditomo et al., 2013). Lozano et al. (2017), using hermeneutics and grounded theory, showed project and problem-based learning to have the greatest potential in empowering learners with multiple sustainability competences.

Competence as a term in educational practice has been evolving. First, it related to professional standards and those that prepare students for the labor market, often narrowing the perspective of education to merely the accumulation of skills that matter for the economy, such as the skills for the fourth industrial revolution (World Economic Forum, 2016). This view emerged as an opportunity to combat wide unemployment in Europe and overcome the obsolescence of lower order skills promoted by the widespread automation of work (Anderson-Levitt, 2017), and is apparent in early OECD (2005) documents. It evolved to cover whole personality development, one that aligns with personal fulfillment, freedom, active citizenship and participation in shaping all aspects of society, which increasingly aligns with the principles of ESD (Carm, 2013). The transformative view of competence requires active learning and transformative pedagogy; and requires students to develop cognitive, affective and behavioral competences, allowing them to construct their own knowledge, skills, values and emotions by active participation in learning, enabling in turn lasting transformation and commitment to action (Sipos et al., 2008). Learning increases through the interaction with others as well as self-reflection. Action increases by questioning accepted practices, values and norms and identifying areas that contradict people's experiences of the socio-economic and cultural context, ultimately altering them (Gokool-ramdoo and Rumjaun, 2016) and aligns with the socially critically view of ESD.

This view on competence in primary and secondary education, although widespread, is not global (Anderson-Levitt, 2017). Regions of the world that have implemented a competence-based approach to school education include most notably Europe, some countries in Africa, Latin America and regions in North America. There have been countries such as South Africa that implemented the model and abandoned it altogether due to resistance from local governments and some countries such as Japan and UK who are swinging between content-based and competence-based education. Using a broader interpretation of the concept, policy documents provide examples of some countries in Asia and America that are using the terms skills, capabilities, targets, goals and educational objectives interchangeably with the term competences (Wu and Shen, 2016).

The concept of competence is gaining a lot more ground in Higher Education (HE), with many universities worldwide shifting to a competence-based approach (Blanco-Portela et al., 2017). GreenComp, the European Sustainability Competence Framework was published recently, with a view to promoting learning for environmental sustainability in the European Union though a flexible set of competences that include empathy, responsibility, and care for our planet and for public health (Bianchi et al., 2022). The new ESD guidance for the UK HE sector (QAA, 2020) advocates for designing ESD into curricula, to transform students' ways of thinking and acting so that they become sustainability change makers. It also advises in favor of linking learning outcomes with ESD competences and designing learning environments that are interdisciplinary or transdisciplinary, learning approaches that are inclusive and accessible for all, policies that support holistic assessment and providing extra and co-curricular activities. All these require highly trained and motivated educators in all levels, educators

with the competences to achieve the transformation needed (UNESCO, 2020).

Another important ingredient to maximizing the effectiveness of ESD in enabling sustainability, is the need of for seeing things through a holistic lens, and the need for a systems approach in ESD programmes. Systems thinking as a promising approach for transforming ESD has been advocated for many times especially considering that sustainability is a complex concept with dynamically interactive dimensions, i.e., the natural, social and economic (UNESCO, 2014; Gokool-ramdoo and Rumjaun, 2016; Iyer-Raniga and Andamon, 2016; Pipere, 2016; Wilson, 2017; Schuler et al., 2018). It has further become particularly relevant, as the Sustainable Development Goals (SDGs) require an integrated approach to their implementation that avoids the fragmented approach of addressing them as separate priorities, which may be conflicting and undermine efforts to achieve them. Considering that sustainable development is a contested concept but is rooted in normativity, equity, integration and dynamism (Waas et al., 2011) and that the SDGs offer a blueprint for achieving a sustainable society by 2030, we developed a set of attributes for a society that would have achieved the SDGs in the future. These attributes are based on a systemic grouping of the SDGs and are: living well within planetary boundaries, maintaining inter and intra-generational equity and justice, engaging in resilient sustainable behaviors that dynamically adapt to context, safeguarding planetary and human health and wellbeing through alternative economic models, investing in collaboration based on empathy, tolerance and transdisciplinarity, promoting diversity and inclusion and transparent governance (Kioupi and Voulvoulis, 2019). They can offer education communities some clarity on what ESD is aiming to achieve through its efforts. Through this view, the SDGs offer the opportunity to view sustainability as strong, one that aligns with the environmental, living within earth's limits; social, the just operating space for humanity to thrive; economic, human activity that enhances nature and society; and institutional dimensions, transparent governance and public participation in decision-making needed for collaboratively achieving a sustainable, prosperous and peaceful future for the planet and its people.

Here we present research that focuses on formal education settings. This is the model of education that has the potential to generate systemic change as it can shape the personalities and capacities of learners from early on in their lives through well into adulthood (Besson et al., 2014). Although the assessment of effectiveness of ESD can be conceptualized as teacher effectiveness, educational climate effectiveness and learning effectiveness from an education perspective (Stumbo and McWalters, 2010), when seen though a systemic lens for achieving sustainability it relates to the development of sustainability competences as educational outcomes. It is considered in terms of increasing student learning gain, i.e., capacity-building, that empowers learners with knowledge, skills, attitudes and behaviors to pursue sustainability (Pauw et al., 2015). Sustainability competences can be developed though primary, secondary and tertiary education, and through case studies at these levels, here, we present the findings from the application of a systemic framework for assessing their development.

MATERIALS AND METHODS

The Systemic Framework for Sustainability Transition Guided by the SDGs

Using a published systemic framework (**Figure 1**) for linking educational outcomes to the SDGs (Kioupi and Voulvoulis, 2019) as the conceptual framework, this study examines sustainability competence development in three case studies of formal education (Higher Education, primary and secondary school education). The power of the systems thinking approach is leveraged through this conceptual framework as it can be used as an overarching methodology to answer research questions around the complexity of SD, educational transformation toward sustainability, and in particular to set the research investigation. In addition, it can be used to provide the context and interconnections between sustainability, the role of education and measuring its effectiveness. Lastly and importantly, through its various tools, such as visioning, gap analysis, back casting and decision-making, it can enable the participatory approach necessary for including the perspectives of the education stakeholders involved in the transformation, actively engaging them in rethinking education, envisioning sustainability, making decisions and setting action plans for its realization (Blake et al., 2013; Palmberg et al., 2017). Two other approaches have already been used in ESD with limited success toward sustainability transformation. An instrumental approach has seen ESD as a tool for achieving sustainable development through education, criticized for being prescriptive and associated with the vocational/neoclassical view of education that puts the emphasis on skills for the market economy (Jickling and Wals, 2008). This is the same approach that has resulted in the sustainability challenges we face today that continues to fail to address current economic models as root causes of unsustainability. The other approach has been based on an emancipatory view and is more open-ended. It aligns with the liberal/progressive view of education that aims to transform the learner to an empowered individual capable of making their own choices through experiential pedagogy (Wals et al., 2008), but its success has also been limited due to its failure to account for the multiple societal influences on learner development and the importance of power relationships in enabling sustainability action.

The main steps of the systemic framework, applied in the case studies, include:

- Step 1 - brining the education stakeholders together in participatory visioning of what a sustainable future would look like for them if the SDGs had been fulfilled;
- Step 2 - identifying the enabling conditions that will allow the participatory vision to emerge;
- Step 3 - selecting the competences that target those enabling conditions and facilitate the sustainability transition;
- Step 4 – selecting pedagogies and assessments for enabling the required competence development and;

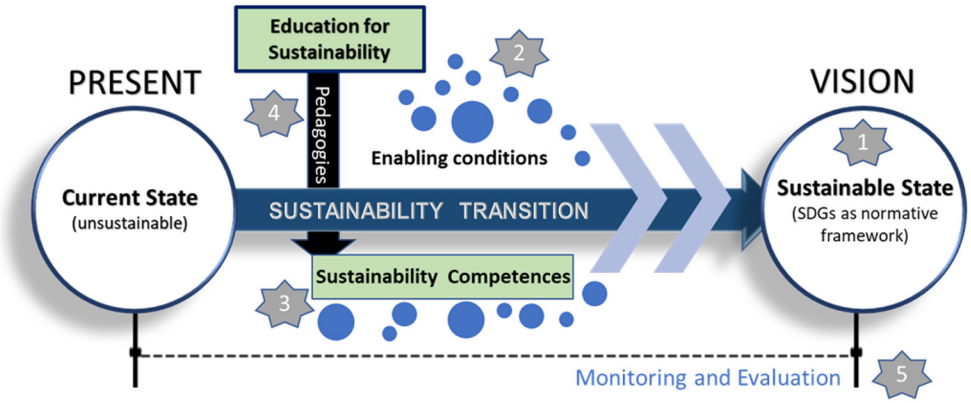

FIGURE 1 | The systemic framework for linking educational outcomes to the SDGs (Kioupi and Voulvoulis, 2019) that forms the theoretical approach applied in this study.

- Step 5 - monitoring and evaluation of progress toward the sustainable state.

The framework was intended to be used as guidance and inspiration by educational communities that seek to enable transformation toward sustainability and not seen as a prescriptive set of actions that they need to adapt to. Educational communities need to localize its steps in terms of the SDGs that are meaningful for them and will guide their vision as well as include the internal (educators, students, leadership of education communities) and external stakeholders (public and private organizations, citizens) to become involved in its realization. These stakeholders then through back-acting will devise a plan on how to achieve their vision. With regards to the enabling conditions for this vision to emerge, we have published a previous paper (Kioupi and Voulvoulis, 2020) on a generalized set of attributes of a sustainable society to emerge that can be used by Higher Education communities in particular and which we discussed in introduction and bring later into this paper as part of the application of the framework.

The selection of competences for sustainability by the educational community require transparent communications, participatory decision-making and inclusion of all stakeholders involved being mindful of the power imbalances that may skew the intended outcomes toward specific views. To formulate the competences needed the educational community should think about how the individual can lead a meaningful life not only for themselves but for their communities as well, and how they can take initiative, be adaptable and do the right things in the each complex situation (Lambrechts et al., 2018). To achieve that, educational communities should be mindful of how they enable all voices to be heard and to decide on values and ways of working that are inclusive and democratic prior to applying the steps of the framework. This view of competence is transformational and different to the traditional instrumental view of skills related with problem-solving of sustainability issues (Wiek et al., 2011a).

For step 4 the stakeholders should make sure that the pedagogies and assessments are constructively aligned to the competences selected (Casey and Sturgis, 2018) so they enable the lived experience of competence in their members and account for wider systemic factors that may influence it such as training of educators and whole institution approaches (Fischer et al., 2015). For the final step, which is monitoring and evaluation, they should keep in mind that change is unpredictable and thus an agile management approach of building capacity to tackle emerging challenges and seize opportunities as well as iteration of previous steps and adaptation of plans, practices as well as experimentation on new ways of being and doing would be beneficial (López-Alcarria et al., 2019). The flexibility of the framework presented is showcased in its adaptation for application in the different educational levels of the case studies examined in the next sections.

The framework applied in this study has some similarities with sustainability assessment frameworks that suggest ways by which integration of the SDGs into existing social and environmental impact assessments can help local communities make decisions about the effective management of resources, tackling inequalities and developing partnerships found in the literature (Morrison-Saunders et al., 2020), but should not be confused with these as it is a systemic framework for the transformation of the educational offer of communities with a view to achieving systemic change. For example, it shares similarities with the conceptual framework for sustainability assessment by Pope et al. (2017) in that it accounts for development goals, such as the SDGs, inclusion of multiple stakeholders and aims to generate a transition through targets for collaborative action but while the former outlines what is theoretically sound and practically possible, our framework includes a visioning part in which what is aspirational and desirable is decided to enable ownership of the transformation process and the commitment to action is built as capability in all stakeholders through engagement in back-casting. Lastly, regarding the view of sustainability assessment as decision making (Waas et al., 2014) process with structured approaches that enable the definition of sustainability based on the local context for the stakeholders, it being a learning process that transforms the stakeholders involved through the

operationalisation of sustainability and giving opportunity for measurable change based on the use of indicators and providing a systematic and stepwise approach to deal with its complexity, our framework has strong alignment. It is based on the same systems theory principles that to achieve transformation in a complex system, the current state needs to be known as well as the future stated should be envisioned and its attributes need to be identified for the selection of appropriate indicators to monitor progress to achieve it. In our case the indicators are the competences developed by the educational community and the process is guided by the proper pedagogies, assessments and whole systems approaches that enable competence development in learners.

The Case Study Approach as a Method for Applying the Systemic Framework

A case study approach was selected as the means to gain insights from applying the framework for each educational level (Moore et al., 2012), particularly through engaging with the stakeholders involved (mainly lecturers, curriculum coordinators, headmasters, teachers and students). Understanding the characteristics and needs of the different stakeholders as well as the barriers and opportunities they are faced with, is a crucial part of the case study approach that helped us strengthen the framework though its practical application. The three case studies of educational programmes already had some link with sustainability. Firstly, the university case study applied at a master's level programme in a London university had focus on environmental technology. Secondly, the secondary school case study applied at a London middle school in a programme related to the SDGs and thirdly the primary school case study took place in the outskirts of London in a school that implemented an innovative curriculum design with links among all subjects and sustainability.

The case study approach was selected as an opportunity for exploratory research in this emerging field of study as empirical evidence is missing (Rowley, 2002). It offered an opportunity to both demonstrate the application of the framework developed as well as the means for collecting evidence to support it. It also allowed its application to three different educational levels to evaluate its applicability as well as to enable a comparison between these levels. Such an approach compensates for the lack of rigor associated with case studies (Rowley, 2002) as it has a clear function and a positivist view by means of deciding the aim and research questions in advance of designing the data collection and analysis tools. The aim of this research was to assess the effectiveness of education in enabling the transition to a sustainable future guided by the SDGs through the application of a systemic framework for the development of sustainability competences in learners. The investigation was aided by the formulation of the following research questions:

1. Does the application of the developed framework in Higher Education (HE) provide evidence for its effectiveness in empowering learners with sustainability competences?
2. What are the important conditions/factors that influence its effectiveness when applied in a HE setting?
3. Does the application of the developed framework in School Education (SE) provide evidence for its effectiveness in empowering learners with sustainability competences?
4. What are the important conditions/factors that influence its effectiveness when applied in school settings?
5. Does the framework assist educational communities (HE, SE) to formalize their contributions to the SDGs/sustainability transformations?

The assumptions for this research were clarified early on as well and included:

1. The SDGs can provide a useful normative framework for educational communities to decide in a participatory way the sustainability competences they should develop in order to achieve their localized vision of sustainability
2. Learners can develop sustainability competences through educational programmes provided appropriate learning outcomes are defined and appropriate pedagogies and assessments are in place.
3. The evidence collected through the assessment of learner sustainability competences can aid decision making in curriculum, teaching methodology and pedagogy development and general transformation of education toward sustainability

The case study approach offered flexibility over the investigation (Rowley, 2002), which is considered a strength in accordance with the systemic framework produced, as a participatory approach in designing the data collection and analysis methods was desirable to fit the context of each educational community. A mix of methods for data collection that include both qualitative and quantitative tools was used and the participation of education stakeholders in shaping the research through discussions provided deep insights into the realities faced. Observations in classrooms, minutes from university and school meetings, official educational programme documents, websites, interviews and surveys were used to collect the data needed to fulfill the aim of this research. As for the methods of analysis, statistical analyses of quantitative data from surveys and questionnaires as well as qualitative text analyses to identify themes and generate insights were conducted using appropriate software (such as MS excel, SPSS, NVIVO). As generalization was not the aim of this research but instead evidence of the framework applicability and identification of factors/conditions that may influence the effectiveness of education in developing sustainability competences in the specific contexts, the findings can be of value to education practitioners when taking the framework forward in their institutions. In applying the framework, it was assumed that Step 1 "envisioning a sustainable future" had already taken place independently before the start of the research, as all three educational institutions had formulated their visions engaging their specific stakeholders involved in the three programmes of study. This was verified during discussions with educational institution representatives. Step 2 "identifying enabling conditions for sustainability to emerge" was only applied in the university case study referring to

important enabling conditions identified by the systemic grouping of the SDGs. These were based on a previous study around the attributes of a sustainable society elaborated earlier in the introduction and included, the Safe Operating Space (SOS), the Just Operating Space (JOS), Alternative Economic Models (AEM), Resilient Sustainable Behaviors (RSB), Health and Wellbeing (HW), Collaboration (COL), Diversity and Inclusion (DI) and Transparency and Governance (TG) (Kioupi and Voulvoulis, 2020). Those enabling conditions were used to assess the alignment of the master's programme's learning outcomes to sustainability. For the primary and secondary school programmes the learning outcomes where checked for alignment directly to the sustainability vision both had formulated.

For the selection of competences in the university case study (step 3), the competences were translated from the aligned learning outcomes to the enabling conditions for sustainability to emerge and complemented with more knowledge specific competences. Whereas, for the primary and secondary school case studies, the stakeholders according to their stated visions for sustainability and the specific curricular knowledge guidelines they were following, selected the intended competences. As far as the pedagogies selected are concerned (step 4), in the university and secondary school case studies the application of project and problem based pedagogies was deemed appropriate for the level of knowledge and skill the students already had and according to the transformative pedagogy principles of ESD (Seatter and Ceulemans, 2017; Tejedor et al., 2019). For the primary school case study, active learning approaches were followed that engaged the students in learning about the water, food and energy nexus such as interactive teaching sessions, field work, essays and opportunities to use their schools as test bed of sustainable practices (Burns et al., 2016).

Lastly and importantly, for the assessment of sustainability competences as indicators of achieving the sustainability vision (step 5) intended by the education stakeholders in the three case studies, a mix of existing assessments already used by the educators to cover their subject specific learning outcomes as well as additional self and team assessments and educator rubrics were used. This was done to enable the students and educators to receive and provide rich feedback and information about the performance of students. Competence models with criteria and levels of performance were also constructed for measurement purposes based on the cognitive, affective and behavioral dimensions of the selected competences for sustainability (Leutner et al., 2017).

RESULTS

University Case Study

The university case study was at a master's course at a major UK university, focusing on two cohorts of students studying *water management, pollution management* and *environmental analysis and assessment,* as part of a programme in *Environmental Technology*. The course's sustainability vision was clarified in discussions with the director, teaching and research staff, curriculum developers, students and alumni as stakeholders. The vision included "the desire to prepare the next generation of sustainability professionals who can solve wicked problems, having a systemic and interdisciplinary understanding of their causes and effects as well as work collaboratively to provide solutions" (Centre for Environmental Policy, 2018). The analysis of the programme's learning outcomes (LOs) found problem solving for sustainability challenges to be of primary importance and related to analytical, research and critical thinking skills. Much attention overall was given to collaboration and communication in interdisciplinary contexts and the ability to understand and deal with complex socio-environmental systems. Decision-making and strategic thinking were deemed crucial for assessing different options and deciding on a course of action. Self-awareness and regulation were thought as important abilities related to understanding the role one can play when engaging in sustainability issues and coping with the challenges faced. Future thinking and value thinking around alternative scenarios and perspectives were targeted through the course's learning modules on energy policy and urban sustainable environments. LOs around understanding of water management and environmental analysis and assessment concepts were also considered.

The LOs were assessed against the sustainability attributes for enabling a sustainability vision guided by the SDGs to materialize through a word-code comparison (Kioupi and Voulvoulis, 2020). The outcome was that the master's programme while doing a good job in terms of specific enabling conditions for sustainability (SOS, AEM, COL, and RSB) related to its environmental, economic and institutional aspects, could benefit by increasing focus on others (JOS, HW. TG and DI) more related with its social aspects (**Figure 2**). The process informed the curriculum review that followed this study.

For conducting this research the students of the Water Management (WM), Environmental Analysis and Assessment (EAA) and Pollution Management (PM) options of the master's programme participated. Course pedagogies were also discussed with the academic staff, to understand the reasons behind the course's project/problem based approach; the students worked in projects simulating authentic consultancy work, helping water and waste management companies address complex sustainability challenges (Centre for Environmental Policy, 2020a,b). Assessments of competence were based on models with descriptors of behaviors the students would need to demonstrate, evaluated using educator rubrics (ER) as well as student self-assessments (SA) (Kioupi, 2021). The course's own assessment methods were explored to assess competence development in students. These included the project reports, project oral presentations and written exams to collect data on all the intended competences. The assessment found students to have developed the intended competences with combined scores ranging between 60 and 79% [intermediate (60–69%) to advanced (70–79%) performance] in all intended competences (**Figure 3**). The combined scores were derived

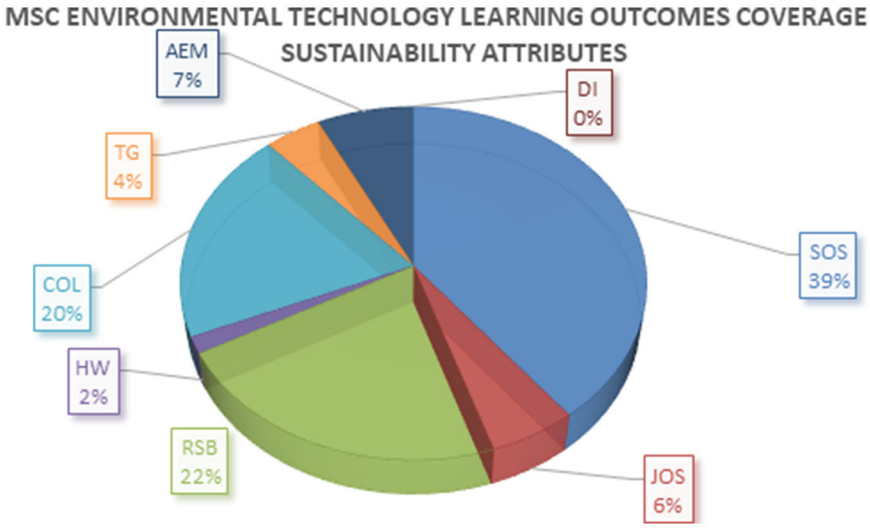

FIGURE 2 | Coverage of the eight sustainability attributes by the learning outcomes of the master's programme in Environmental Technology.

after integrating the ER and SA scores. A notable difference was that students perceived systems thinking, collaboration and research skills more challenging to attain according to their self-assessments scores.

It is evident from **Figure 3** that the students of WM performed better than the students of the EAA and PM options and achieved advanced performance in eight out of nine assessed competences. For the EAA and PM students, who achieved intermediate level in all nine competences, the combined scores were similar, but the PM students performed somewhat better that the EAA students in knowledge and understanding, systems thinking, future thinking and research skills.

Secondary School Case Study

The secondary school's vision was formulated by the school leadership, board of trustees, educators, students and parents. The vision was to "provide young people from all backgrounds with a life-changing education that equips and inspires them to make a positive impact on society and to excel in the wider world with sustainability being central to the kind of impact the students will have" (personal communication with head teacher). To apply the framework we collaborated with the coordinator, educators and Year 9 students of the Global Goals course. For this course, the coordinating educator and supporting teachers selected the following sustainability competences for their students to achieve the vision of becoming sustainability change agents:

1. Systems thinking to allow students to understand the root causes of problems,
2. Reflective thinking to allow them to be independent learners,
3. Critical thinking to allow them to conduct valid research around the SDGs,
4. Self-regulation to allow them to cope with failure,
5. Collaboration to help them become team players and
6. Problem-solving and action to enable them develop creative and practical solutions and materialize them.

The pedagogies used as part of the application of the framework in the secondary school were project and problem-based learning. The students were practically asked to form teams and select the SDGs they felt they wanted to contribute toward and then identify a problem related to those and work to present a solution. The Global Goals programme was new and innovative, and did not have any established assessments. Self and team assessments were selected as they key instruments to collect data on the performance of the project teams and to help students understand their progress in discussions with the teaching staff (Kioupi, 2021). A final peer assessment for the projects the students submitted at the end of the school year with clear success criteria, was also developed to assess the quality of the project deliverables. The results demonstrated advanced competence (3.9–4.2 on a scale from 1 to 5) for the students of Year 9 who participated but highlighted some weaknesses in terms of coping with failure, self-regulation and working in teams based on the students' self and team assessments (**Figure 4**). The teachers considered these important findings, and ways to help those students have a positive impact in their societal roles.

Primary School Case Study

The primary school's vision for sustainability was "to promote sustainable living and learning and develop energy and environmentally conscious individuals who care about the world around them and understand what is required to sustain individual, team and global well-being". The vision was formulated by the leadership of the school together with the teachers. The school was quite innovative in having developed a sustainability-linked curriculum that enabled students to

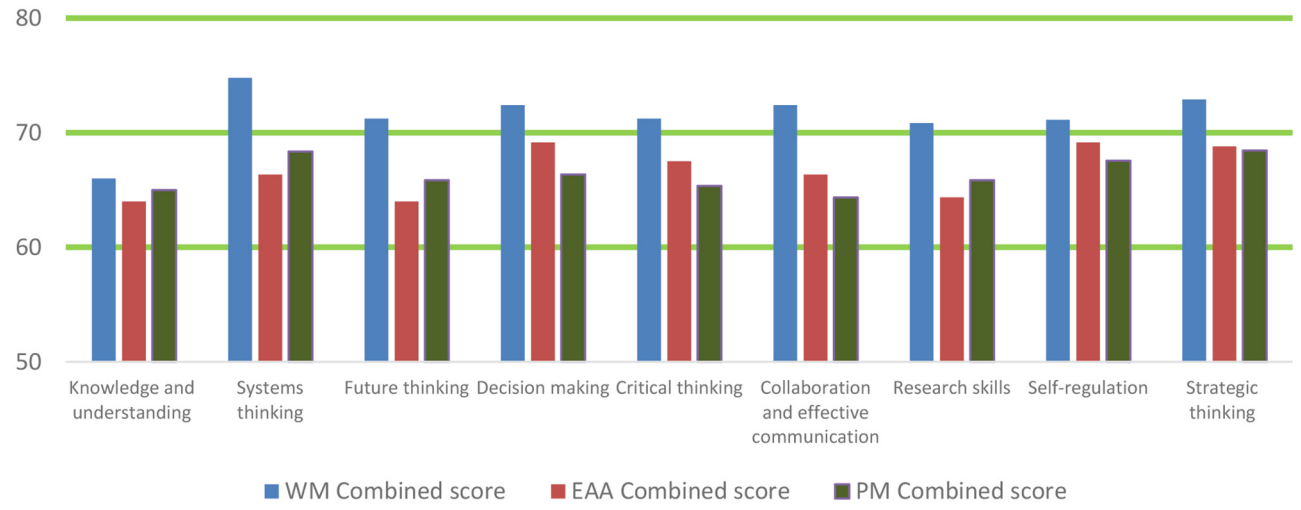

FIGURE 3 | Combined competence scores for the nine competences assessed in the students of the WM, EAA and PM options, after integrating ER and SA percentage scores.

FIGURE 4 | Average competence results for the Year 9 secondary school students who participated in the Global Goals programme in each of the six competences assessed on a scale from 1 (minimum competence) to 5 (very high competence).

experience sustainability values through enquiries of learning that linked all the subjects taught. The research was done with students of Years 4, 5 and 6 and their learning related to the water, energy and food nexus (Kioupi, 2021). Thus, the competences selected by the teachers to enable the school's vision were cognitive around knowledge and understanding of scientific problems related with food, energy and water, affective around values and emotions toward production and consumption of food, energy and water and behavioral in terms of making sustainable energy, water and food choices.

The pedagogies were based on active learning and included the whole school as a lab for practicing sustainability, supported by the nature of the school (an advanced eco-school). A questionnaire that checked the knowledge, skills and attitudes of students in topics around food, energy and water, observations of student work and informal interviews with them were used for assessment. The results demonstrated that the students although advanced in skills, values and behaviors for sustainability, lacked somewhat in scientific knowledge in environmental problems and were susceptible to framing issues around equating certain behaviors as good/sustainable and others as bad/unsustainable, such as conventional food and non-renewable energy always equates to unsustainable and thus "bad choice", while organic food and renewable energy always equates to sustainable and thus "good choice" (**Figures 5**, **6**). A more critical and holistic approach in dealing with sustainability issues would render them more capable to become conscious decision makers which is better aligned with the vision of the school (Starke, 2019; Kioupi, 2021). This was discussed with the teachers and headmaster of the school so that ways could be identified to remediate it.

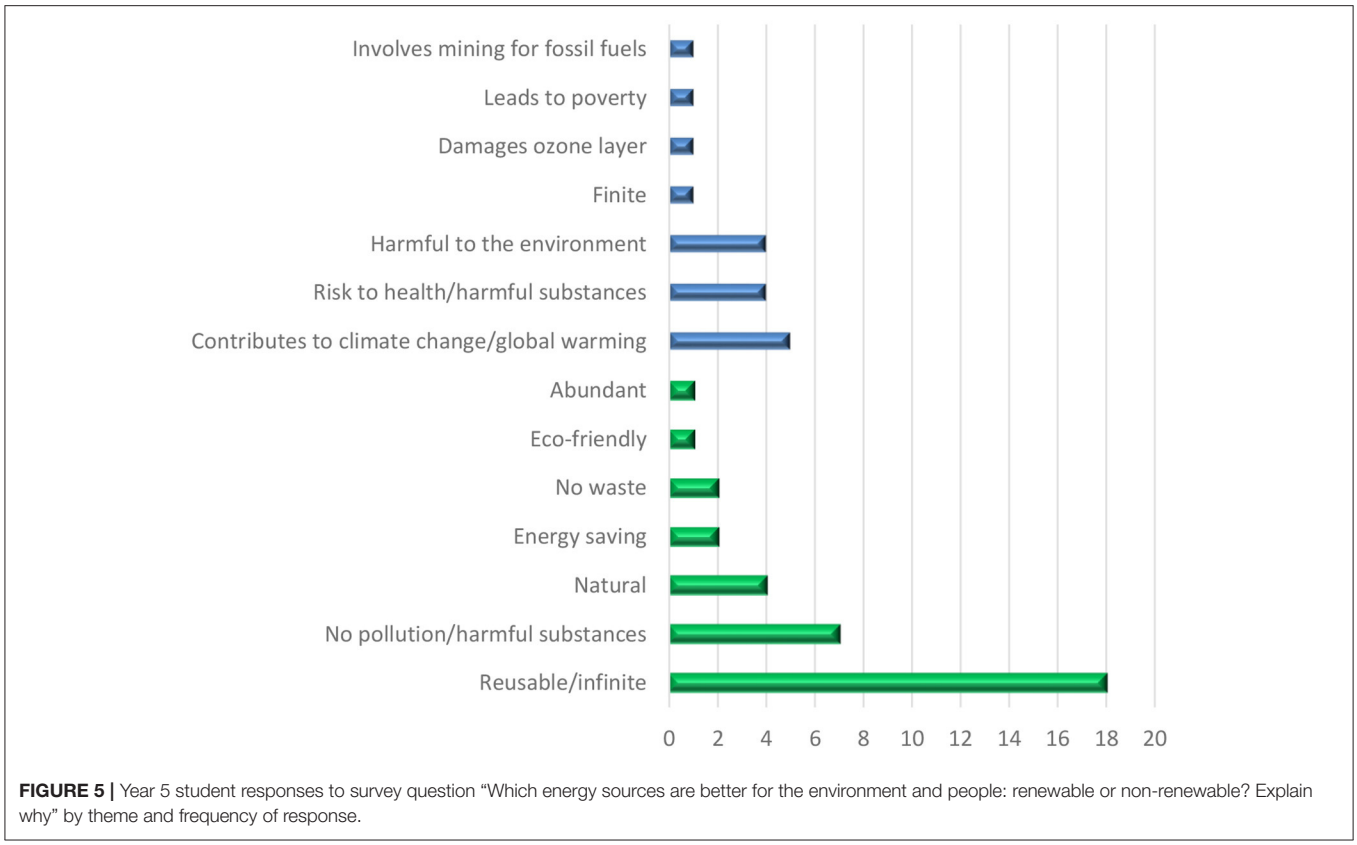

FIGURE 5 | Year 5 student responses to survey question "Which energy sources are better for the environment and people: renewable or non-renewable? Explain why" by theme and frequency of response.

Results Across Educational Levels

The findings demonstrate the potential of all the approaches being successful in enabling students develop their intended sustainability competences but to different extent (Research questions 1 and 3). Starting early in primary school, students showed their capacity for basic systems thinking as they were able to link concepts such as food energy and water that do not have obvious connections in mainstream education approaches. This was further supported by the number of topics they could introduce to explain sustainability concepts and by being able in some cases to suggest pros and cons for some controversial issues. They were also found to uphold sustainability values, attitudes and behaviors around water, energy and food use/practices and preventing waste. These hold promise that ESD pedagogies can enable the development of complex competences in students from an early age (8–11 years old). This is in accordance with published studies (Assaraf and Orion, 2010; Ampuero et al., 2015) that support the proposition that transformative pedagogies have high potential to empower students with sustainability competences. The school students positively influenced their peers and families in favor of sustainability through discussions during and after the activities, as reported by their teachers. This could generate a ripple effect of transformation in the community on condition that the school employs a holistic and pluralistic approach to sustainability and avoids framing behaviors as "good/desirable" and "bad/undesirable".

Secondary school students, on the other hand, were found to be better able to integrate the environmental, social and economic dimensions of sustainability, and work independently to research and provide solutions to local sustainability problems during their engagement in the project-based learning activities. As they were adolescents, research supports the idea that they were more likely to develop sustainable behaviors through engaging in challenging active learning activities in the school and then transferring this to out of school settings (Uitto et al., 2015). They were also able to work collaboratively to develop their projects to a much higher capacity than primary school students were, but they needed support by their teachers in doing so. They showed high capacity for systems thinking, critical thinking, problem solving and reflective thinking, all of which are important for their personal learning growth and for addressing sustainability challenges. Such an assessment of sustainability competence in secondary school education addresses an important gap as there is limited research at this specific education level (Pauw et al., 2015). However, their ability to cope with failure and deal with feedback from peers and educators is something that requires attention and further development as it will define their future engagement with sustainability action.

Higher education students' ability to think systemically, strategically and critically empowers them to identify the root causes of problems, prioritize and implement targeted action as demonstrated in the study. Their capacity for future, normative

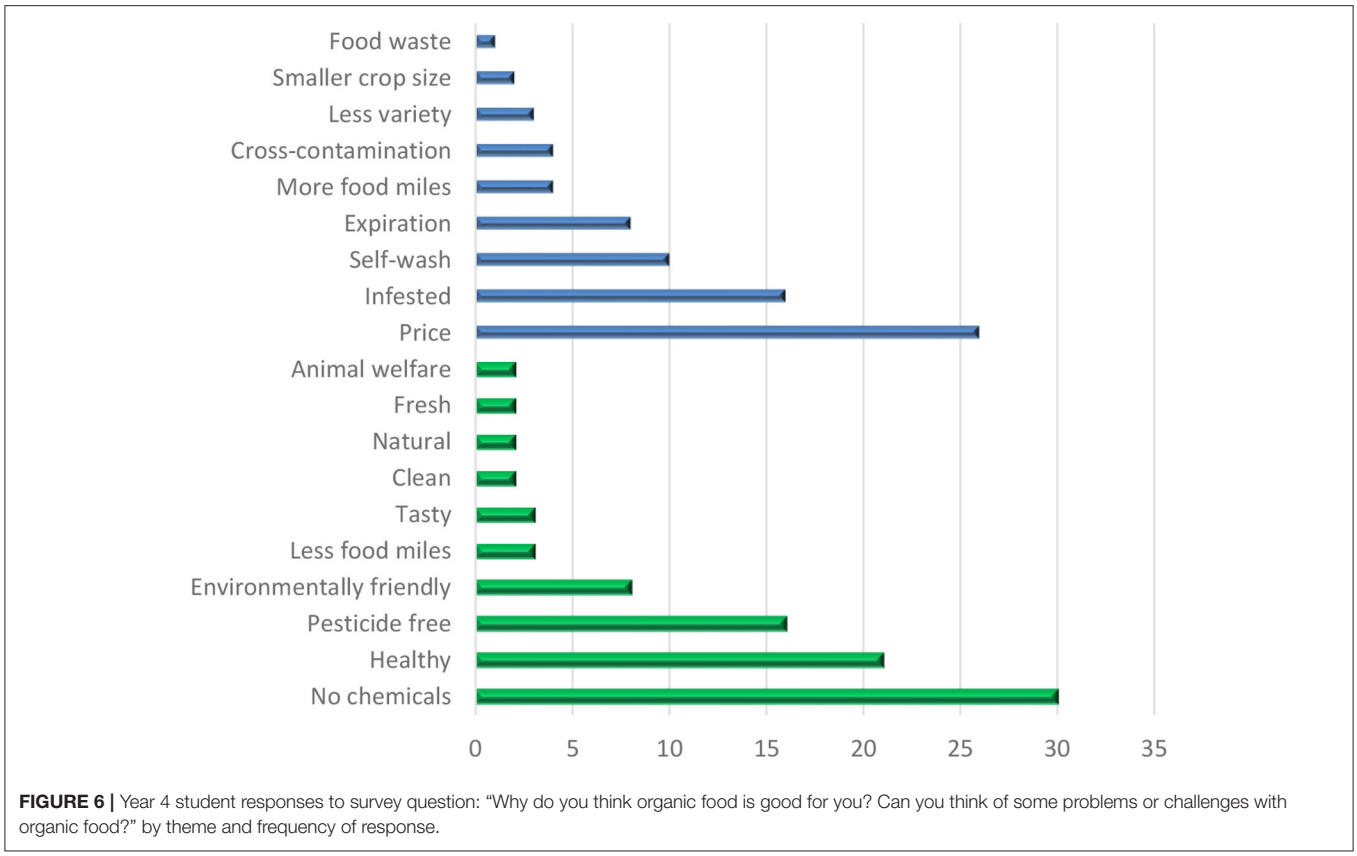

FIGURE 6 | Year 4 student responses to survey question: "Why do you think organic food is good for you? Can you think of some problems or challenges with organic food?" by theme and frequency of response.

thinking and self-regulation is something the universities must invest in as it will assist them in developing long-term solutions, balancing current and future needs and impacts and engaging in ethical inquiry with communities to prioritize ethical frameworks appropriate for enabling visions of sustainability to become reality (Minteer, 2012). Higher education learners are an important target of ESD efforts as they will be the leaders of tomorrow and have the capacity to apply their sustainability competences in various professional and societal roles (Weiss et al., 2021). University students are a great force for transformation as through their communities and networks they have the potential to mobilize local action and develop local sustainability solutions. Youth stakeholders are regarded as an important actor of the ESD for 2030 initiative for achieving the SDGs and their empowerment and mobilization is one of the five priority areas of this action plan (UNESCO, 2020). The focus of ESD at this level should be to enable university students to work collaboratively in transdisciplinary groups and show empathy and understanding toward diverse perspectives. This can happen if sustainability becomes part and parcel of teaching, research, community engagement and operations and appropriate sustainability competences are selected and integrated by the education institution stakeholders (Molderez and Ceulemans, 2018).

Regarding research questions 2 and 4 around the factors that influence the effectiveness of developing sustainability competences in learners, sustainability, as a concept is quite complex and somehow vague across all the case studies, down to the interpretation of the local education stakeholders to clarify, define and pursue. Specifically in the HE case study the use of the tool to check the alignment of learning outcomes to the attributes of the sustainable society based on the systemic grouping of the SDGs helped the HE stakeholders articulate the contribution of the master's programme to sustainability by overcoming some of the confusion. Moreover, no programme was effectively compliant with constructive alignment principles among learning outcomes, pedagogies and assessments. Constructive alignment purports that to enable competence attainment in learners all the components of the curriculum and leaning and teaching process should be aligned (Casey and Sturgis, 2018) and is an influencing factor. Discussions with academic staff and school teachers on the importance of constructive alignment for enabling the students to develop the intended competences, aimed to facilitate changes to the curricula to support its principles. Improvements in the assessments of all programmes were made in terms of aligning pedagogies to selected competences and their evaluation.

An important research question of this project (research question 5) was around the capacity of the framework to enable educational communities initiate sustainability transformation. An important principle of effectiveness that resulted from this research is that education efforts around ESD should be pursued and implemented at all levels of education as they can provide unique benefits for the learners and increase their potential

for transformational change. The different levels of education, however, pursued different approaches in implementing ESD, with the primary school integrating sustainability as the connecting thread of all subjects taught, the secondary school including a unique course in its curriculum around the SDGs and the university offering a master's programme of study oriented toward sustainability. In secondary schools, the curriculum is much more fragmented than the primary school one, as the students are offered opportunities to develop their knowledge and skills in many different subjects. This may have some benefits in terms of improving subject-specific literacy but fails to develop the whole-personality of the student in a way aligned with ESD principles. ESD requires integration of different subjects, concepts and skills and should not be treated as an add-on to the curriculum. Rather, it should be integrated holistically giving the opportunity to students to be part of it throughout their secondary school studies so they can develop their critical thinking and action competence capacities. This is applicable to HE as well, opportunities to engage with sustainability should extend beyond a master's programme to all aspects of university life, campus operations, research, governance and community engagement to enable transformation.

DISCUSSION

Considering the systemic framework applied that provides the conceptual framework for this study and its steps, here we discuss our findings in terms of how the sustainability vision is defined, how competence is conceptualized and how pedagogy and assessment are enabling competence development in learners (research questions 1 and 3). Sustainable Development is not a well-defined concept and as a result Education for Sustainable Development has been criticized for vagueness and lack of tangible outcomes, often leading to disengagement of educators and learners (Kioupi and Voulvoulis, 2019). The SDGs have offered the opportunity for a new conceptualization of Sustainable Development as a systems state that our society is trying to achieve, and in this work, we looked at sustainability competences as the enabling conditions for transitioning to such a state. In other words, the aim of sustainability education is to empower learners with the competences needed to become the citizens of a sustainable world. This makes education crucial in driving sustainability transformation and the realization of the SDGs. Moreover, the sustainable state is not predefined, but one that needs to be envisioned by learners and the wider educational community inspired by the SDGs. All levels of education focused on the ideal learner as part of their sustainability vision, articulated its attributes or competences and were successful in developing them in their learners.

The concept of sustainability competence is also contested. It ranges from a narrow definition of knowledge for sustainability to problem-solving and generic lists of knowledge and skills prescribed for achieving sustainability integration in education (Wiek et al., 2011b; Brundiers et al., 2020).

According to our work, the selection of competences or LOs should not be based on generic lists that promise vague sustainability outcomes, but on the priorities of the educational institution and its sustainability vision. Similarly, the assessment of effectiveness in competence development by learners should be locally relevant, tailor made to their needs and their vision. Recent studies (Salovaara et al., 2020) support the uniform inclusion of a list of five suggested sustainability competences (systems thinking, anticipatory, strategic, interpersonal, and normative competencies) by Wiek et al. (2016) in all master's programmes for sustainability. However, master's programmes (and in general, university programmes) LOs need to reflect the diversity of perspectives of stakeholders that formulated them and the values they prioritize, and not prescribed lists of competences to achieve sustainability. Such competence lists should be viewed with caution, discussed by the HE community and aligned with a programme's specific aims about the type of graduates they want to develop based on their visions of sustainability.

Competences are enabled by pedagogies as per our framework. A study on the impact of ESD on student learning in 18 countries found that pedagogy is a better predictor of sustainability competence development than the introduction of sustainability content (Laurie et al., 2016). ESD pedagogies have some specific characteristics. These are active engagement of the learner (student-centered), enabling multiple voices to be heard and worldviews to be elaborated (pluralism), collaboration among peers and the educator to solve problems and tasks (collaborative problem solving), critical reflection on values, beliefs and actions (critical pedagogy) and planning and implementing action on real world cases (project based learning). All these require a shift from traditional teaching techniques in education such as lecturing or direct teaching (UNESCO, 2018). Authors (Wade, 2012) further suggest the importance of transdisciplinary communities of practice that generate new knowledge and transformative ESD practice, use physical and virtual learning environments and adapt their operations to the context. The teaching methods applied in the case studies followed some the principles of effective ESD pedagogies, however the framework can be enhanced by explicit reference to these to avoid the framing issues observed in primary education.

As competence-based education is fast pervading university education, it requires methods to describe, model and assess competences. Competences are complex constructs and require special assessment as they reflect the multidimensional, integrated and action based nature of learner agency to enact sustainability and their assessment goes beyond testing knowledge and understanding, which is what traditional assessments do. Competence assessment in the case studies offered opportunities to educators to establish criteria and indicators of performance that include cognitive, affective and behavioral dimensions and examine holistically the areas that can be included in the LOs of their educational programmes. The students gained a more dynamic view of assessment as they were not only assessed by educators but could assess themselves and their peers in what can be a very educational experience that can sharpen their judgement (Ohland et al., 2012; Boud et al., 2015). In addition, a major importance of competence assessment is that it focuses not only on the outcomes of learning, but also on the

process and experiences that led to those outcomes (Hutchings et al., 2012) demonstrated by the fact that the learning and assessment activities used in the case studies prioritized the lived experience of competence. It further provides specific, targeted and actionable feedback to the educator and student on which they can work and improve (Casey and Sturgis, 2018).

Considering the factors that influence the effectiveness of education efforts to enable competence development in learners of universities and schools using the framework (research questions 2 and 4), it is absolutely crucial for educators to be trained. For all educators and especially those of HE institutions, this process poses difficulties as it requires them to develop skills in using new ways of teaching, which can be challenging and may generate resistance toward implementing ESD altogether (Lambrechts et al., 2010). Educator professional training that builds the capacities of educators to initiate education for the SDGs (UNESCO, 2020) is therefore needed to translate curricular guidelines into usable pedagogies. The need for educator training in social and environmental matters has been highlighted as a gap in the provision of skills for the fourth industrial revolution to learners in a study of public and private Technical Education Institutions (Srivastava et al., 2022). It would make sense to train the educators of every educational sector on how to use the framework we developed to define sustainability visions around the SDGs and select competences. Furthermore, the adaptation of the assessment tools for the alignment of LOs to the SDGs for use by educators and the development of relevant training material can empower them. The provision of training on the use of the assessment tool for the competences so that they can assess the attainment of sustainability competence in their learners can help educators align with QAA guidance on ESD (QAA, 2020).

Essential in implementing educator training is the why and how to do it. The main reason behind training educators in ESD is to enable them to start the process of sustainability transformation, but there are other desired outcomes as well. One very important outcome is to render teachers autonomous agents for sustainability education in schools (Kumaravadivelu, 2001). This way they will be able to challenge their own assumptions about teaching and learning, be critical about their practices, identify opportunities for transformation and know when to apply what and why. In addition, they will be better positioned to empathize with their learners, understand their background and perspectives and use it as material to enable constructive learning development for both the learner and the teacher.

Another important factor that influences the effectiveness of the framework in developing learner competences is the consideration of the educational environment and its interaction with the learner. Learners come to the educational setting having not only their own knowledge, skillset, worldviews, values and life experiences but also their own socio-political consciousness and educational history. This is alternatively called cultural capital and may enhance or inhibit learning especially if the learning environment is biased or not inclusive of the differences among learners (Cobern, 1996). The learner is influenced, according to Bronfenbrenner's ecological systems theory, by various spheres with which they interact (Crawford, 2020). Immediate is the family, peers, educators, community members and the interactions among them. At an intermediate level, the learner is indirectly influenced by social, economic and governance structures, ideologies and attitudes of the culture. Lastly, at the outmost level, the learner is influenced by the environmental changes and transitions in larger time scales that influence the life events of a learner (Guy-Evans, 2020). It would be useful if educators were encouraged to develop holistic thinking, tolerance and acceptance with critical ability to use pedagogy that enables their students to explore their life experiences, accepted worldviews and values, spheres of influence and the very practice of sustainability and education and challenge them to come up with new conceptualisations (Kumaravadivelu, 2001). This would be particularly useful in avoiding framing as well as tackling uncertainty and complexity though developing self-regulation as highlighted in the problem and project based case study scenarios.

A useful way to enable effectiveness of the learning environment is to employ a constructivist view (McLeod, n.d.) in pedagogy design. As the implemented case studies show the learning environment should become dynamic and allow learners to express their own views, explain their thinking and in return, offer them opportunities to challenge those views and ways of thinking or reinforce them. This was obvious in the university case study, where students were challenged to understand an open-ended management problem with highly uncertain data and future implications, combine their views and navigate the complexities they faced to deliver a strategy for their clients. In the secondary school case study, the students selected the sustainability problem on which to focus on their own, but were given guidance and previous training in identifying and linking sustainability problems to the SDGs. They faced a lot of complexity and challenges with project realization, but at the same time managed to persevere either due to having selected the topic themselves and thus were committed or because the teachers/team mates encouraged them to do so. The primary school case study endeavored to challenge the students through linking concepts (such as water, food and energy) and exposing the connections between seemingly unrelated processes (e.g., growing food in other countries and consuming it in the UK results in virtual water transport) to offer them a holistic view of the food, energy, water nexus.

Constructivism also gives attention to students' emotions and attitudes as they condition, prepare or inhibit student learning (Huber and Seidel, 2018). This was more obvious in the design of the primary school case study as the questionnaire analysis showed the students had positive attitudes toward sustainability both prior to and after the learning activities. In the university case study, emotions were mainly related with how the students worked in teams and regulated conflict, while a similar approach was found in the secondary school with the students also focusing on recovering from failure. Because of the link between emotions, attitudes and behaviors that can lead to sustainability action (Sleurs, 2011), the learning environment should offer rich opportunities for learners to experience emotions and develop or change their attitudes toward learning and sustainability if appropriate, including through interacting with peers and

educators. The affective domain of learning should be considered by education practitioners and policy-makers in the field of school and university ESD as it can enable development of sustainability competences for the longer-term, and be given equal attention to the cognitive and behavioral domains.

The case studies helped identify some barriers that hinder the effectiveness of ESD. The concept of competence had not previously been used in primary school education in the integrated form used in the case study. In most cases competence is assessed as environmental knowledge gain or environmental attitudes' change (Legault and Pelletier, 2000; Kioupi and Arianoutsou, 2016) in students participating in environmental education programmes. The primary school decided to select cognitive, affective and behavioral learning outcomes around the environmental dimensions of the water, food and energy nexus because of its simpler form and due to time limitations. Thus, the environmental knowledge dimension of sustainability competence was more prominent in the primary school than holism and pluralism, which are integral parts of ESD. This lack of holism and pluralism could be related to the opinion of teachers that the developmental stage in which the primary school pupils were in their learning was premature and would pose difficulties for the students to grasp sustainability's interconnected nature.

School education practitioners are encouraged to focus on knowledge, emotional and behavioral gains around all three pillars of sustainability for school students participating in ESD programmes, engaging many perspectives on what can be sustainable and what not (Pauw et al., 2015). By contrast, the secondary school case study aimed to look at sustainability competences holistically and bring in multiple perspectives (environmental, social, economic, and psychological). This was apparent in the projects the students developed around the SDGs and in their self and team assessments. However, the ability of students to cope with failure and conflict was low, which shows that although secondary school students can engage in challenging sustainability projects as such, they need to be provided with tools on how to self-regulate and collaborate.

In the primary school, the lack of holism and pluralism was considered a barrier to truly empowering students with critical thinking in making informed decisions. In the secondary school, the lack of programme integration and continuity within the curriculum resulted in reduced student and teacher engagement with sustainability. These barriers have been identified by other authors who stress that the integration of sustainability across the programme of study is more difficult in secondary education than primary (Taylor et al., 2019). This is because of the rigid structure of the curriculum, but it is nevertheless worth investing in ESD being the central part of a school's work due to its benefits for student learning (Fredriksson et al., 2020). Policy-makers should therefore consider implementing changes at the secondary school level, as a siloed approach to different topics, whereby ESD is just another add-on in the curriculum, does not enhance learning. There is a strong movement in the UK specifically that advocates the need for a whole institution approach (WIA) that ensures all students engage in sustainability action (British Educational Research Association, 2021).

In the university case study, improving focus on sustainability attributes such as health and wellbeing, diversity and inclusion and the social dimensions of sustainability can result in wider approaches to teaching and learning that can support the holistic development of students as competent sustainability practitioners. Nevertheless, having a programme of study about sustainability is considered to be an isolated initiative especially if sustainability in other areas of the institution is rather low (operations, research, governance, outreach) and there is a lack of an integrative framework for guiding, supporting and linking activities at the institutional level (Weiss et al., 2021). Similarly to school education, at the university level, a WIA could lead to the ideal collaborative paradigm change toward sustainability that merges bottom-up and top-down approaches in all its dimensions (Weiss et al., 2021).

Linking effectiveness in developing sustainability competences in learners with enabling sustainability transformation through educational programmes (research question 5), it would be of interest to education practitioners, curriculum developers and policy makers to use the framework as strategizing tool when planning curriculum reviews, especially in the university sector. It would be beneficial for the aforementioned stakeholders to set clear targets for transformation based on data collected in advance of the review, such as how their programmes' LOs are aligning with sustainability attributes. However, it is crucial to start a curriculum review with envisioning alternative sustainable futures (through a participatory process) (Amsler, 2019), thinking on how these can be achieved and then reformulating LOs in order to align with them. Checking the completeness of LOs with respect to the sustainability visions generated can be done by applying the assessment tool provided to achieve holistic representation of sustainability attributes. This can inform the entire process of the review and become an opportunity to integrate sustainability holistically, as the education stakeholders can problematize on the eight sustainability attributes by discussions on, for example: What does living well within planetary boundaries mean? How can we achieve inter and intra generational equity and justice? How can we develop resilience as a community? What is transparent governance for us? How can we achieve inclusion and diversity? What are the important factors that contribute to our health and wellbeing? How can we achieve transdisciplinary collaboration? How can we change the current economic model of ecological destruction and injustice? This way the curriculum will have a solid foundation of visions, principles, and aligned LOs to which to link the teaching and assessment activities.

Research findings also demonstrated the importance of participation, experimentation and flexibility in achieving sustainability transformation. All educational institutions in our case studies (university, primary and secondary school) engaged various stakeholders, to a greater or lesser extent, in decisions regarding their visions, educational curricula, learning outcomes, activities and assessments. They were open to collaborating with the researchers to experiment during the research interventions with new ways of looking into their educational programmes. For example, the secondary school

teachers were open to implementing assessment of competences, although their programme was not formally marked, and experimenting with different types of assessments although they had no prior experience with these. They generated insights and knowledge around why they did things the way they did, such as the primary school teachers who wanted to instill a sustainability ethos in the students of the school that sometimes resulted in positive or negative framing of the concepts used. They also wanted to try other ways of teaching them, such as through inquiry that enables the students to investigate the concepts in focus. The university stakeholders saw the benefits of a competence-based approach in formulating LOs and the assessment of competence through the use of rubrics to evaluate the different performance levels, but at the same time recognized that the process can pose challenges for academic staff (unfamiliarity, inconsistency, time consuming assessment) as well as for the students (working toward performance levels and not marks, needing more support).

Overall, there is good evidence that a systems approach to the integration of the SDGs into education as shown by the application of our framework has the potential to transform education toward sustainability (research question 5). It can enable learners to develop sustainability competences through reorienting LOs toward sustainability, aligning curricula, learning and assessments. The SDGs as an element of intentional design in education can offer normative goals that can motivate intentions to act and bring about change (Caniglia et al., 2021). This can happen by explicitly selecting LOs aligned to the SDGs (such as those though our framework); leaving no one behind by tackling power asymmetries (such as those between the educator and the student, the head teacher and the teachers, the programme director, academic staff and students) and through providing equal participation opportunities for all groups (educators, students, directors etc.) to develop and exercise their agency.

Starting by integrating the SDGs through their translation into sustainability competences in educational offerings of all levels can incentivise and condition other internal and external stakeholders to do the same, as these are broad areas that can be used to transform all aspects of the educational institution. Having achieved that first stage, the transformation toward sustainability initiated in the educational communities would potentially diffuse into the local or regional communities through synergies among educational institutions and local stakeholders and by the graduates of those institutions working actively for and with those communities. The expected outcome would be progress toward achieving the UN 2030 SDGs and this can be quantified in the indicators selected by the global community (Costanza et al., 2016; Muff et al., 2018).

Sustainability transformations need to take place all around the world, and education can provide the ecosystem to foster them (Scoones et al., 2018). Higher system parameters such as cultural shifts and societal changes will need to help align such efforts toward sustainability to achieve natural and human wellbeing (Boyer et al., 2016). Such shifts will nurture diverse communities of practice, creating a mosaic of various ideas, perspectives and approaches. Education institutions can be the hubs that generate the appropriate conditions for these shifts and enable the interactions among various stakeholders to reach a state that they all thrive. It is crucial that all educators and stakeholders who have been trained in the dominant paradigm of education get the support they need to open to new ideas (Wade, 2008). It is in the diversity of those interactions and openness to innovation that new ideas can be generated within communities. The ideas can be turned into actions and thus communities can provide sustainability services to society and an antidote to homogeneity. Regional Centres of Expertise (RCEs) on ESD, which are networks that are often organized around a university and bring multiple local stakeholders together to implement local and regional sustainability efforts coordinated by the United Nations University, can catalyze this effort. They can share best practices with other HE institutions, schools and other formal, non-formal and informal educational organizations and plan the transformation of education needed for sustainability to emerge (Wade, 2013; United Nations University Institute for the Advanced Study of Sustainability, 2021).

CONCLUDING THOUGHTS AND FUTURE RESEARCH OPPORTUNITIES

The application of the systemic framework for integrating the SDGs into educational outcomes and aforementioned assessment showed evidence of its effectiveness and the benefit various education levels can reap from engaging with these approaches. Based on the case study findings the steps of the framework can be enhanced and below is revised set of steps that could be implemented by educational communities:

- Step 1 - brining the education stakeholders together in participatory visioning of what a sustainable future would look like for them if the SDGs had been fulfilled; including the attributes of a sustainable society that has achieved the SDGs as an open framework on which the stakeholders can discuss their views so they have a base to develop their shared understanding of sustainability as well as the ideal learner. Discussions on including diverse voices as well as tackling power asymmetries are essential in this step.
- Step 2 - selecting the competences that target the sustainability attributes and facilitate the sustainability transition; checking the alignment of the selected competences to the attributes using the assessment tool developed to identify gaps and make adjustments if needed.
- Step 3 - identifying the enabling conditions that will allow competence development in learners such as constructive alignment among competences, pedagogies and assessments, educational environment design, educator professional development, implementation of curriculum reviews for sustainability integration and WIA approaches for enabling sustainability transformation.
- Step 4 – selecting pedagogies and assessments for enabling the required competence development based on the principles of ESD (holism, pluralism, critical analysis, collaboration, authenticity, real world application, lived experience, targeting cognitive, affective and behavioral aspects of competences).

- Step 5 - monitoring and evaluation of progress toward the sustainable state, collection of data through the assessment tools on learner competence to inform decision-making in an iterative process; crucial for its success is the participation of all stakeholders with interest and power; flexibility in adapting to new circumstances, experimenting with new ways of doing things (including teaching and assessing) and enhancing the contribution to the SDGs through forming partnerships with local, regional and international communities.

Future research could apply this framework to universities and schools from other geographies and orientations and comparisons could be made among diverse programmes of study on how they applied it in their communities and what were the benefits they experienced. It could also focus on the continuity of competence development through the different educational levels to identify developmental indicators of how knowledge, skill and behavior are actually evolving through the learner's educational journey. What is more, longitudinal studies that follow the graduates of ESD aligned programmes into their educational and societal roles and assess their application of sustainability competences in the service of community would verify the lasting effect those approaches can have on learners.

Other opportunities to take this research forward could focus on assessing the effectiveness of teacher empowerment with capacities for SDGs integration with the systemic framework and tools in teacher training sessions, how this reflects in their teaching practice, curriculum, pedagogy and assessment design and implementation, and how it affects student development of competence. Assessing the effectiveness of WIAs in terms of integrating SDGs vision in governance, operations, education, research and community engagement and outreach would show the added benefit of the assessment methods and allow for comparisons and lessons to be shared among educational institutions.

Finally, yet importantly, educational communities should engage in in depth discussions (or interviews and focus groups) about how by enabling their educators and learners develop sustainability competences and implementing a WIA, they are influencing the achievement of the SDGs at a local level. It would be helpful if the educational institutions would report on how they are impacting the realization of the SDGs locally through the use of the indicators of specific SDGs (United Nations, 2018) that are important for their communities. They could also use various existing tools such as the gap frame for monitoring and evaluation of their contributions (Muff et al., 2018).

This research took place in three educational settings that had the "institutional freedom" to develop their own curricula, LOs, teaching and learning and assessments following some official guidance. In cases where there are strict rules and curricula to be followed based on national guidelines for example the framework needs to be adapted. However, as further policy recommendation, granting freedom to education institutions to manage their vision, mission, curricula, learning outcomes, pedagogies and assessments using participatory and systems approaches could help increase the flexibility and effectiveness of education. This can happen as a mix of a bottom-up (community-led approaches) and top-down method (formal education agencies' enabling policy). Another way to do this, would be to encourage diversity in learning outcomes as well as in practices used so that learners can be empowered to make critical and informed decisions around challenging sustainability issues and have the capacity for working in inter and transdisciplinary teams. The five-step framework and derived assessment tools can support educator and policy-maker training, with the main concepts covered in policy documents related to increasing the effectiveness of ESD. Sustainability needs to be an integral part of all education, incorporated in institutional agendas and practices of all countries as an enabling factor for achieving the SDGs. These changes will allow education to play a critical role for enabling the sustainability transformation our society urgently needs.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Imperial College London Research Ethics Committee. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

VK conceived the research, developed the framework and applied it to the case studies, analyzed the results, and discussed the findings. NV supervised the research project, contributed to the framework development and the writing of the paper and reviewed the results, analysis, and discussion of findings. All authors contributed to the article and approved the submitted version.

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Local Action Groups and Sustainable Development Agenda: Case Study of Regional Perspectives From Czechia

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The United Nations' 2030 Agenda for Sustainable Development is generally accepted as an overarching framework to cope with various global challenges. Many of them are manifested locally and need to be solved at the regional or local level. National strategies of regional development and top-down funding are important drivers of the activities of various regional actors. However, the integration of the regional development strategies and the sustainable development agenda is not straightforward and may fail to acknowledge the local context and potential for bottom-up activities. In the European Union's (EU) context, the local action groups (LAGs) are an important driving force of regional development, but little is known about their perception of the sustainable development agenda. The article presents a research case study of Czech LAGs realized in 2021. LAGs were approached with questionnaires focusing on their understanding of the sustainable development agenda and their own role in the process of its implementation. In this paper, we show that the LAGs' representatives are aware of the sustainable development concept and work with relevant governmental strategies, but they feel that they cannot contribute to the fulfillment of many particular sustainable development goals (SDGs), especially those related to the environment. This contrasts with their reflection of the goals with an economic and social focus in which they feel relatively more empowered, especially in education. Our findings reveal that there is a high risk of mismatch between the bottom-up potential of LAGs for regional sustainable development and top-down conditions of national strategies. The results of the research contribute to the contemporary discussions about the SDGs and regional development and thus could be used by both academics and practitioners. Notably, national policymakers and regional authorities could benefit from our insights into LAGs' perspective of SDGs' implementation.

Keywords: Czechia, local action groups, regional development, regional policy, environment, sustainable development goals

INTRODUCTION

Contemporary societies are facing several environmental, social, economic, technological, and political challenges, often labeled as "megatrends", which could be defined as "long-term transformation processes, which [...] influence peoples' thinking, activities, social organization, and future reality" (Havránek and Pokorný, 2016 p. 5). The drivers of the transformations include changes in population and migration, urbanization, climate change, biodiversity loss, and other environmental issues, competition for resources, shifts in economic and political power, and growing diversity in lifestyles and governance (European Environmental Agency, 2019). To cope with the current challenges and to provide a framework for future development, the United Nations' 2030 Agenda for Sustainable Development was agreed upon as a "plan of action for people, planet, and prosperity" to help to end poverty, improve health and education, and deal with the pressing challenges of climate change and nature protection (United Nations, 2015). The particular aims are presented in the form of the 17 sustainable development goals (SDGs), which are implemented by all United Nations member states and include various topics of social, economic, and environmental dimensions of human development. Contrary to the previous development agendas, like the Millenium Development Goals (MDGs), the SDGs are transformative, universally aspiring, oriented toward all countries, and integrative in terms of the three dimensions of sustainable development—social, economic, and environmental (Elder and Olsen, 2019; Fukuda-Parr and McNeill, 2019).

The sustainable development goals agenda is a general framework for national development policies, and, through them, the regional or local development strategies are addressed[1]. The main gap in both research and practice lies in the process of translating this very general, normative, and ambitious SDGs framework into a local context. The regional stakeholders should understand and respond to the SDGs so that transformative processes at different levels are initiated. While the linking of global and regional perspectives is crucial, there are different viewpoints and interests of global, national, and regional actors and their limited capacities for development (Messias et al., 2018). The importance of citizens and regions depends mainly on their ability to manage natural resources at the local level, while still being influenced by global processes and megatrends (Organization for Economic Co-operation and Development, 2020). The resulting incomprehension of strategies at different levels (global, national, and regional) may undermine the sustainable development process. Even in the rich global north countries, most of the regions are still far from achieving the SDGs as defined for the 2030 time frame (Organization for Economic Co-operation and Development, 2020).

Therefore, we present a study of how the global and national agendas are reflected by the actors of local and regional development, and how they see their own roles within these processes. In our case study, we have chosen the members of the National Network of Local Action Groups in the Czech Republic[2] (NN LAGs). Local action groups (LAGs) are important actors of regional development in the European Union's rural areas, as independent associations of local actors that are based on public-private partnerships and empowered to develop local strategies and allocate resources according to the LEADER method (European Commission, 2005; see also below). They consist of the representatives of local municipalities, businesses, NGOs, and other stakeholders, which are operating all over the EU, covering more than half of its rural population (European Network for Rural Development, 2017). The embeddedness of LAGs in local conditions theoretically provides an opportunity for the successful transfer of global policies into regions. Yet this can be problematic if top-down agendas do not meet local needs and perspectives, especially if the settings of financial and legal frameworks for the policy implementation are questionable (Konečný et al., 2021). Despite the fact that rural areas are often seen as important mainly in the local and regional context, their ability to provide ecosystem services and contribute to climate change mitigation and adaptation makes them important actors with large sustainability potential even at the global level (Bezák et al., 2020). Therefore, our main research objective is to identify how LAGs perceive various strategies related to sustainable development, how they reflect the importance of the SDGs for their region, and how they anticipate their own contribution to the SDGs' fulfillment in the local circumstances.

Our paper contributes to the recent academic and practical discussions about the implementation of the global policies of sustainable development at the regional level. Given the fact that LAGs are key actors in the multilevel governance of rural areas, this case study fits well into the recent academic discussions about the relations of the internal and external driving forces of regional development [stressed in the neo-endogenous development paradigm (cf. Shucksmith et al., 2021)] and the imperative of SDGs in the re-focusing of regional development goals [i.e., New SDGs Development Paradigm (cf. Organization for Economic Co-operation and Development, 2020)]. Specifically, this paper links together the global SDGs agenda and LAGs as a case study. According to the best of our knowledge, LAGs were already studied in the context of sustainable rural development (e.g., Sedlacek and Gaube, 2010; Palmisano et al., 2016; European Network for Rural Development, 2018a; Koštálová and Vávra, 2021) but not particularly connected to the SDGs themselves. We support this claim with our December 2021 search in the Scopus database, using the combination of topics "Local Action Group" (or "LAG"/"LAGs") and "Sustainable Development Goals" (or "SDGs"/"SDGs") in the titles, abstracts, or keywords of the

[1]Terms "local" and "regional" are important concepts used in this paper. "Regional" usually refers to the scale of countries' regions often at the NUTS2 or NUTS3 level in EU territorial nomenclature (see, e.g., Eurostat, n.d.). "Local" is used for more detailed levels, including the microregional level of LAGs or municipalities. Generally speaking (see below for details), several LAGs can be found in one region and fulfill the niche between the individual municipalities and regions. In specific cases, the terms "local" and "regional" also refer to the particular policies, strategies, and concepts and are thus used in the sense of the original referenced document.

[2]National Network of Local Action Groups in the Czech Republic. (n.d.). *Kde působí MAS*. Available online at: https://www.nsmascr.cz/o-spolku/kde-pusobi-mas/.

articles. This search did not provide any relevant publication with a focus on both LAGs and SDGs. This does not mean that any previous research has not covered these two topics together but suggests that there are no research articles in English in the global Scopus database with a primary focus on the LAGs' perception of the SDGs. Due to the fact that there is hardly any relevant research on LAGs' understanding of SDGs, we often refer to the perspectives of local and regional governments in the literature review as these have been researched more often.

This article is structured as follows. The Literature Review briefly presents the concept of SDGs, sketches shifts in regional development paradigms, presents LAGs in general, and then outlines the links between SDGs and regional development. The section concludes with the main research questions of this paper. The following Case Study Section describes the specifics of LAGs in Czechia and their position in Czech regional development strategies. The Materials and Methods Section outlines the conducted survey to gain evidence from practice: the sampling and data collection method, main items of the questionnaire, characteristics of respondents, and methods of data analysis, including limitations of the methods. The Results are then structured according to the research questions, similarly to the Discussion in which the details of the results are discussed in comparison to other research among LAGs and regional governments and with respect to discussions about SDGs and regional development. The paper ends with Conclusions, including suggestions for possible future research.

LITERATURE REVIEW

Sustainable Development Goals

As presented in the Section Introduction, the SDGs are praised as an important step toward sustainable development by providing 17 universal, integrative, and indivisible goals, which aim to initiate various transformations (United Nations, 2015). These 17 SDGs' goals consist of 169 particular targets with assigned indicators. From the point of view of goals' interdependency, the terminological shift from the three "pillars" to the "dimensions" of sustainable development (social, economic, environmental) occurred after Rio+20 (Elder and Olsen, 2019) to reflect the intersectionality of the three aspects of sustainability better. Elder and Olsen argue that, despite their integrative nature, three groups of SDGs can be differentiated due to their predominant dimensions: social goals, 1–5 (the end of poverty; food security and sustainable agriculture; health and wellbeing; education; and gender equality); mixed goals, 6, 7, and 11 (water and sanitation; clean energy; sustainable cities); economic goals, 8–10 (economic growth and employment; sustainable industrialization; and inequality reduction); and environmental goals, 12–15 (sustainable consumption and production; climate change; oceans; terrestrial ecosystems). SDGs 16 (peace) and 17 (partnership) have a special position being mostly social (peace) and mixed (partnership) (Elder and Olsen, 2019). Organization for Economic Co-operation and Development (2015) confirms that the vast majority of SDGs combine the three dimensions.

Instead of a top-down design by experts or development institutions' bureaucrats, the SDGs were prepared by the Open Working Group established after the Rio+20 meeting in 2012. Along with the representatives of countries, this forum included various non-state actors (so-called major groups). This led to the better incorporation of the perspectives of the global south countries and acceptance of more ambitious and transformative goals than in the previous MDGs agenda (Fukuda-Parr and McNeill, 2019). Moreover, this also improved the SDGs' orientation toward countries and regions positioned at all levels of development and wealth, not only to the poorest countries, as previous MDGs did. Despite the generally positive reception of the SDGs, some critics pointed to the lowered ambitions of the goals with regard to sustainability due to the selection of particular indicators (Fukuda-Parr and McNeill, 2019) or due to the internal contradictions of some goals and the overall reliance on economic growth (Hickel, 2019). A lack of reflection of planetary boundaries (O'Neill et al., 2018) and the missing reference to any particular goal of climate change limitation (Elder and Olsen, 2019) were criticized as well.

The relation of SDGs to national and regional policies is not prescriptive – it rather sets particular targets and indicators but not the policies to achieve them (Fukuda-Parr and McNeill, 2019). SDG 17 aims to promote partnerships but leaves space for the activity of individual countries, which have the main responsibility for the SDGs implementation. The importance of regional and sub-regional (local) policies is expressed in the SDGs agenda and the need for reviews of the SDGs implementation at regional levels. When analyzing the wording of the SDGs, "region" is mentioned in six of them, and "urban"/"rural" in only one, namely, SDG 11, which focuses on cities and settlements (United Nations, 2015). The regional aspects are thus acknowledged but not defined in detail in the agenda. The SDGs provide a general framework for sustainability transformation, yet the way in which they are implemented regionally or locally relies heavily on the national, regional, and local actors and conditions.

When focusing on Czechia, the country's sustainable development agenda is set in the overarching strategy titled Strategic Framework Czech Republic 2030 (Kárníková, 2017), which is superior to other national and regional strategies and conceptions. According to the governmental analysis Implementace Agendy 2030 pro udržitelný rozvoj (Cílů udržitelného rozvoje) v České republice[3], all 17 SDGs are relevant for Czechia and are addressed in the Strategic Framework Czech Republic 2030. Recent research (IPSOS, 2020) has shown that half of the Czech population is aware of the SDGs, which is a lower number than in most EU countries. Czech respondents rank health and quality of life, drinking water, decent work, and economic growth (SDGs 3, 6, and 8) as the most important, while they believe that Czechia is most successful in solving the topics of drinking water and education (SDGs 6 and 4).

[3]https://www.mpo.cz/assets/cz/prumysl/prumysl-a-zivotni-prostredi/udrzitelny-rozvoj/2019/6/Implementace-Agendy-2030.pdf

Rural Development Paradigms and LAGs

While the above section introduced the global SDGs agenda, this section briefly illustrates some important changes in rural development paradigms, with a special focus on Europe. The changes in the understanding of rural development or the roles of rural areas in society were reflected in various studies, which accompanied the traditional agricultural productivist role of rural regions with other important roles. Holmes (2006) defined the multifunctionality of rural areas through three topics: production, consumption (amenity), and protection. In line with the new paradigm of rural development (Organization for Economic Co-operation and Development, 2006; Ward and Brown, 2009), which highlighted the role of tourism or services in rural areas, Holmes also acknowledges the importance of non-agricultural economic activities and additionally stresses nature protection.

Pělucha and Kasabov (2020) also describe a shift from traditional productivism to postproductivism, a new paradigm emerging in EU rural development policy documents—which is characterized by multifunctionality, environmental protection, involvement of various actors, diversification of the rural economy, and endogenous development. However, their analysis outlines another stage (appearing after ca 2014) labeled neo-productivism. Applied to the EU rural development policy and financial mechanisms, this means a kind of turn back to agriculture and support for farmers though with a specific focus and related regulations (conceptually linking agriculture and climate change mitigation, often within the framework of bioeconomy or green growth). Regardless of these paradigm shifts, EU rural policy has been emphasizing the agricultural sector for a long time, leaving a wide range of rural actors in most EU rural policy instruments neglected. The exception has been the support of LAGs implemented *via* the LEADER method since the 1990s. LEADER is a policy framework that aims to strengthen rural governance, improve local partnerships, and support endogenous development (Konečný et al., 2020). However, to implement this approach, only a marginal 5% share in the total allocation of the rural development policy funds is available. Therefore, criticism of the EU regional policies often concentrates on the lack of a comprehensive concept and understanding of rural areas.

As mentioned above, LAGs are associations at a sub-regional level comprised of the representatives of various local actors, including local authorities, entrepreneurs, local organizations (NGOs), groups of citizens, etc. (European Commission, n.d.). The first LAGs were established in the European Union in the early 1990s as a part of the LEADER framework, which aimed to support the economic, environmental, social, and cultural development of rural areas. Thus, all municipalities with a population of less than 25,000 inhabitants may participate in a LAG. LAGs always comprise the areas of several municipalities (i.e., different actors from the area of different municipalities can participate in a LAG). Regarding their legal form, LAGs follow the regulations of the particular countries in which they operate. Most often, they are established as a kind of NGOs. Their mission is to reflect the local situation by involving local actors and implementing strategic development goals in a participatory way within this context. They use EU and national financial support to realize this mission. LAGs are thus important actors of rural governance, which not only develop communities through networking and supporting the realization of their own projects (often funded from EU and national grants) but also work as a funding agency distributing finances from EU and national governments as well. Their fields of interest are very wide, including support for local businesses, environmental issues, or social cohesion [see also Section Context of Czech LAGs for some Czech examples or Dlouhá et al. (2022) in this special issue].

SDGs and Regional Development

While the bottom-up or endogenous approaches are, in general, seen positively by researchers as well as policymakers (contrary to directive top-down or exogenous approaches), what is, in fact, praised is neo-endogenous (networked) rural development, represented also by the LEADER. As Shucksmith et al. (2021) argue, purely bottom-up/endogenous development would catch poorly performing regions in a trap if they would have to rely only on the local endogenous resources. Contrary to this, neo-endogenous rural development "advocates local control and capacity building, but recognizes, in addition, the essential role of the state and other external actors at multiple scales" (p. 325). It potentially combines the benefits of both bottom-up (local knowledge and activity, decentralized governance, horizontal cooperation) and top-down approaches (expert knowledge, global context) while potentially avoiding their disadvantages: a democratic deficit and significant external investments in the case of a top-down approach along with the trap of limited local resources and divergence from general trends in the case of a bottom-up approach (Shannon and van Egeraat, 2013; Pělucha and Květon, 2016; Shucksmith et al., 2021). As such, it should allow LAGs to create their own development trajectories, which would be based upon local perspectives and knowledge of local specifics and to realize them in horizontal (within and outside LAGs) and vertical (region, state, EU) cooperation with multiple actors. This may open space for top-down support as well as empower local actors to contribute to sustainable development on a national and global scale.

According to the (Organization for Economic Co-operation and Development, 2020), it is not possible to globally deal with the majority of the SDGs targets (100 out of the total 169) if there is no coordination with local and regional governments. However, the SDGs were not designed primarily for these decentralized actors, which means that there is a great risk of what could be "lost in translation" at regional and local levels. To minimize this risk, the OECD's territorial approach to the SDGs suggests preparing local and regional development plans in accordance with the SDGs and to address concrete local issues in a holistic way. Thus, the "New SDGs Development Paradigm" is coined, which integrates equity, stresses the environmental dimension, involves civil society as a key actor in development, and applies a place-based approach within a global common development framework (Organization for Economic Co-operation and Development, 2020). This approach is similar to the concept of neo-endogenous rural development explained

above (Shucksmith et al., 2021). Therefore, in theory, the SDGs provide an ambitious and useful concept of how to make use of the social, economic, and environmental potential of regions to deal with global issues while respecting regional and local specifics and their own way of implementing global policies.

Yet, the reality is often more complicated as the research findings suggest. On one hand, the studies show that local and regional governments are aware of the SDGs, have some plans for their implementation, and participate in a dialogue with central governments, civil society, businesses, universities, and other stakeholders (Messias et al., 2018; Organization for Economic Co-operation and Development, 2020). On the other hand, the same studies show that regional governments find it difficult to prioritize the SDGs in their local context over their pragmatic needs and thus demand more capacities and financial resources. Additionally, Levarlet et al. (2019) argue that local governments feel that the SDGs' agenda is detached and brings further burdens. The authors list the obstacles for effective implementation of the SDGs, including, among others, problematic multilevel governance, administration, financial support, capacity building, or political and administrative commitment discontinuity. This suggests that to succeed with a territorial approach to the SDGs, attention should be paid to the actors at regional and local levels and their cross-sectoral relationships and perceptions of the sustainability framework as a whole.

Our Research Questions

The literature reviewed above has introduced the SDGs concept, brought some examples of the paradigmatic change in rural development (including a basic explanation of the LAGs' functioning), and highlighted some possible interactions between the SDGs implementation and the more recent concepts of rural and regional development. Based on the literature, we argue that the SDGs provide a promising overarching framework that opens space for regional and local actors to use the potential of their regions for sustainable development. We also acknowledge that the theoretical shifts of the development paradigms are compatible with the practical implementation of the SDGs. But little is known about the perception of the SDGs by the bottom-up actors, here represented by LAGs, which are one of the key driving forces of rural and regional development processes in the EU (Dlouhá et al., 2021). Therefore, to analyze LAGs' perceptions of the SDGs and their role in this context in Czechia, our paper focuses on the following research questions:

1. Which national and regional strategies do Czech LAGs consider the most important for sustainable development at the local level?
2. Which sustainable development goals (adapted for Czech local conditions) do LAGs perceive as the most important at the local level?
3. How do LAGs perceive their own contribution to the fulfillment of the sustainable development goals (adapted for Czech local conditions)?

LAGs usually work within particular national or regional development policies, which contextualize the sustainable development agenda for the Czech conditions and not with the global SDGs' concept itself (see also Section Context of Czech LAGs). Thus, our research did not literally reflect the original 17 SDGs but considered the 14 goals adapted to the Czech policies and conditions. We refer to them as Adapted SDGs or ASDGs. These Adapted SDGs cover the main important social, economic, and environmental aspects of regional sustainable development and reflect previous research among LAGs in the EU (European Network for Rural Development, 2018a; see Section Questionnaire for details).

CASE STUDY

Context of Czech LAGs

Czechia is a landlocked country in Central and Eastern Europe (CEE), which came into existence in 1993 after the split of Czechoslovakia into Czechia and Slovakia. Similarly, as in other CEE countries, Czechoslovakia had a communist government with a tradition of strong top-down governance until 1989. After the end of the communist regime in 1989, the democratization process and neoliberal economic reforms changed the political landscape substantially. However, local actors lacked experience with bottom-up governance and horizontal cooperation (which was very limited before 1989), and, as Czechia became an EU member only after 2004, they had no chance to acquire these competencies in the early implementation of LEADER in the 1990s.

The first LAGs began to form only in connection with the possibility of local actors to participate in the SAPARD—Special Accession Program for Agricultural and Rural Development from 2002. This program focused on preparing candidate countries for drawing funds from the EU Common Agricultural Policy and rural development policy instruments. However, a major wave of new LAGs emerged after Czechia joined the EU in 2004. This was followed by a second minor wave of LAGs' establishment between 2012 and 2015 (Konečný et al., 2020). Currently, there are 180 LAGs in the whole country (see text footnote 2 respectively). The population size of one LAG community is between 10,000 and 100,000 inhabitants. Over 60% of the Czech population lives in the area of municipalities eligible to join LAGs, and 95% of those municipalities are already members of a LAG (Binek et al., 2020). Therefore, LAGs cover the vast majority of the country's territory and a significant share of the population.

As mentioned above, LAGs do various activities, including promoting cooperation and networking, the realization of their own development projects, animation of the area, or distribution of the finance from national/EU grant schemes. Since 2014, LAGs have been preparing plans for the development of their area labeled as the Strategy of Community-Led Local Development (European Commission, n.d.a). Regarding finance, Konečný et al. (2021) show that, in the 2014–2020 period, important subsidies were allocated to education, transport, entrepreneurship both in the agriculture and non-agricultural spheres, agricultural products, and social inclusion. In comparison, strongly environmentally oriented topics (like flood prevention or the protection of trees) were marginal. According to the research of Binek et al. (2020), LAGs'

representatives perceive the contribution of LAGs to their areas, mostly through the provision of finance for local development, cooperation and networking, and support for specific issues (e.g., education). A list of inspiring examples of best practices consists of very diverse projects realized directly by LAGs, including charity shops, community centers, education and childcare, activation of long-term unemployed people, tourism support, short food supply chains, or planting trees (Binek et al., 2020).

While the LEADER and Community-Led Local Development (CLLD) is usually seen as guiding principles for LAGs' work, which are inherently bottom-up, LAGs' representatives perceive strong limitations for the implementation of this approach. It is obvious that these tensions appear in other European countries as well (e.g., European Network for Rural Development, 2018a; Shucksmith et al., 2021) but can be even stronger in Czechia, a country with a long tradition of centralized top-down governance. In such conditions, the risk of formalistic implementation of the intended-to-be bottom-up approaches is higher. Based on their study of LAGs' representatives, Konečný et al. (2020) argue that over 30% of them would like to reduce regulations and restrictions and respect local needs in the LEADER application.

LAGs in the Framework of Czech Regional Development Strategies

LAGs are important actors of regional and rural development situated in the context of the Czech national and regional strategies. The umbrella national strategy of sustainable development [Strategic Framework Czech Republic 2030 (Kárníková, 2017)] was introduced in Section Sustainable Development Goals. Spatial aspects of development are covered in the Regional Development Strategy of the Czech Republic 2021+, valid for the period 2021–2027 (Ministry of Regional Development, 2020), which identifies "which thematic areas need or require a territory-specific approach [. . .] to promote competitiveness, reduce regional disparities, and find solutions promoting sustainable development of the territory" (p. 3). The strategy defines various levels of objectives with a particular focus on different types of regions. At the most detailed level, so-called Type measures describe what the key problems of different areas are, how the are major challenges manifested, how should they be addressed, and who the key actors of development are. As such, the Regional Development Strategy is a mix of top-down and bottom-up approaches. In total, 58 particular Type measures are listed in the Regional Development Strategy, and 32 mention LAGs as a possible implementers of them. This proves that LAGs are seen as an important actor in regional development often mentioned especially among the type measures related to regional centers and vulnerable regions, which are typically situated in rural or peripheral areas. Among these two groups, LAGs can be implementers of 18 out of the total 24 Type measures, covering almost all social, economic, and environmental issues listed in the strategy.

Another relevant strategy, the Conception of Rural Development for years 2021–2027 (Ministry of Regional Development, 2019), deals with the implementation at the level of 17 Specific goals defined for various types of rural areas and linked to the Regional Development Strategy. LAGs are defined as implementers for all 17 Specific goals. Such a reflection of the universal potential of LAGs to participate in rural development is supported by the fact that LAGs are the only stakeholder, among the various public, private, and NGO actors, mentioned as an implementer for all of them in the Conception of Rural Development (p. 117). The LAGs, due to the application of the LEADER method, which should guarantee a bottom-up process of (sustainable) development, have been, therefore, included as an important stakeholder in recent Czech strategies of regional and rural development. Our research investigates whether and how LAGs are committed and equipped to implement the SDGs in the specific context of the Czech regions.

MATERIALS AND METHODS

Questionnaire

The research questions have been operationalized and included as questions in a comprehensive survey that mapped conditions for sustainable regional development from the perspective of LAGs. The questionnaire was developed by the research team in consultation with the members of the National Network of Local Action Groups (NN LAGs), an umbrella organization of Czech LAGs. It consisted of questions focused on the importance of various strategies and policies for sustainable development in Czech rural regions, the role of different actors in regional sustainable development, the prerequisites for the success of sustainable development, and the concrete experience of LAGs. The whole questionnaire included both closed and open questions[4]. The main results presented in this paper are based on the answers to the closed questions. The open questions were analyzed mainly in the duel papers, concerning the role of various local actors in the development, and the importance of local knowledge and education (Dlouhá et al., 2021, 2022). The data were collected from the representatives of the LAGs; the questionnaire was disseminated through the NN LAGs (see Section Data Collection, Sample, and Analysis for details).

The questionnaire addressed the research questions posed here in the following way. Firstly, the LAGs representatives' assessment of various national and regional strategies was investigated. Secondly, the respondents were asked to evaluate whether the concept of sustainable development is useful in the work of their LAG. These two questions shed light on how the local actors view the overarching idea of sustainable development and whether it is used at the local level. Thirdly, the respondents had to rank 14 goals of sustainable development according to their importance for Czechia as a whole. The set of the 14 items was based on the adaptation of the original 17 SDGs to the local condition with respect to Czech policies. As mentioned above, we refer to these 14 goals as Adapted SDGs (ASDGs). Fourthly, the respondents were requested to assess the possibility of their own LAG to contribute to fulfilling each of these Adapted SDGs. The exact wording of the questions, which were consequently analyzed, is available in the Section Results.

[4]For a complete questionnaire in Czech language, see Dlouhá et al. (2021).

The 14 Adapted SDGs are presented in the Section Results in short form (see below) but were included in the questionnaire in the more precise longer definition (in the brackets):

1) Regionally relevant education (education for the regional context, including lifelong learning).
2) Local culture (culture using local resources and supporting attractiveness of the region).
3) Decent work in the place of living.
4) Sustainable economy (sustainable economy, respecting circular principles, and reusing waste).
5) Local economy (local economy, using local resources and value chains).
6) Sustainable agriculture (agriculture providing natural balance and health).
7) Sustainable forestry (forestry providing natural balance and health).
8) Floods and drought prevention (prevention of floods and drought through landscape and soil management).
9) Affordable public services.
10) Regional disparities (quality of life and decreasing of regional disparities).
11) Climate change mitigation (climate change mitigation through lowering greenhouse gases emissions).
12) Climate change adaptation (adaptation to the consequences of climate change).
13) Community support (supporting the community and all its members).
14) Political participation (ensuring openness and participation in politics).

The selection and the adaptation of the original SDGs were based on the analysis of the Strategic Framework Czech Republic 2030 (Kárníková, 2017), with a special focus on regionally relevant aspects of the SDGs and national strategies. The 14 Adapted SDGs reflect themes of LAGs' local development strategies covered by recent EU-wide research (European Network for Rural Development, 2018a) as well. The process of their selection was consulted with the several members of LAGs, and the whole questionnaire was pre-tested with them before being sent to all LAGs (they also commented on the selection of assessed national and regional strategies included in the first research question). Instead of ascribing a score to each of the 14 Adapted SDGs separately, the respondents were asked to order all 14 items according to their perceived importance in the national context. This made them prioritize the goals and prevented a situation in which all ASDGs would be considered equally important.

The terms "perception", "assessment", or "evaluation" are generally used as synonyms in our paper and describe respondents' expression of their opinions and experiences in the form of answers to our questionnaire. These terms are equal to previous studies of local actors, which researched opinions, assessments, and experiences of respondents (e.g., Messias et al., 2018; Konečný et al., 2020, 2021).

Data Collection, Sample, and Analysis

In March 2021, an invitation to fill in the online questionnaire was sent to all 180 Czech LAGs by the NN LAGs to support the credibility of the research and to ensure a sufficient number and variety of respondents. As the whole research was of a combined qualitative and quantitative nature, the results benefit mostly from the diversity of responses, and not the response rate. We have received responses from 70 LAGs (39%); however, not all of them completed the whole questionnaire. In multiple questions (e.g., ranking of the Adapted SDGs), only the answers of those respondents who ranked all items were included in the analysis. Therefore, the number of responses for each topic may vary and is noted in the Results for each figure and table (answers in the range of 20–39% of all Czech LAGs). A varying response rate is common for such a type of research with relatively long questionnaires (e.g., European Network for Rural Development, 2018a). The rate was adversely affected by the COVID-19 pandemic, which required high online work demand in LAGs, but it was sufficient, given the fact that we aimed it at a special group of respondents representing their organizations. It is lower than in previous research among Czech LAGs by Binek et al. (2020), who reached a 72% response rate but comparable with recent LAGs' research in Czechia (European Network for Rural Development, 2018b), with a 30% response rate. The overall number of respondents is higher than in some recent surveys dealing with regional governments or municipalities in Europe (e.g., Spitz et al., 2016; Bardot et al., 2018).

The LAGs participating in the research cover an area of 28,923 km^2 (37% of the whole country), with 2,282 municipalities (36%) and 2.56 million inhabitants (24% of the population). LAGs in the sample are situated in all 13 NUTS3 regions of Czechia (except the capital city Prague), which provides good geographical representativeness. The group of LAGs' representatives in this study consists of managers (26%), CLLD managers (26%), project managers (21%), directors (17%), and administrative workers (10%). Of those who filled in the non-mandatory sociodemographic questions (half of the respondents), the majority are women (72%), with the prevailing age of 36–55 years (67%), and a university degree (83%) from various fields (mostly economics, social science/humanities, and engineering). The respondents are experienced with the everyday operations of the organizations, negotiations with partners as well as strategic decisions and, therefore, are relevant key informants for our research. The respondents' position in LAGs is comparable to a sample in a recent survey among LAGs in the EU (European Network for Rural Development, 2018a). The data for quantitative analysis were collected and cleaned; the analysis was then carried out using MS Excel and IBM SPSS software. Given the exploratory and illustrative nature of the research, the focus on the initial mapping of the problem, and a limited number of respondents, descriptive statistical methods were mostly used (frequency and percentage of answers and calculations of median). In one case, responses from open-ended questions were used to illustrate the quantitative results.

Limitations of the Methods

The benefit of a common method of an online questionnaire survey is the possibility to easily contact all potential respondents, yet there is a risk of a low-response rate (see above). Similarly, the opportunity of covering various specific topics in the

questionnaire is balanced by the lack of dialogue necessary for clarification and in-depth explanation, which would be possible only in qualitative interviews. We tried to limit the potential shortcomings of our method by cooperating with NN LAGs in the pre-testing of the questionnaire and including some open-ended questions, which are used in the analysis presented in other outputs of the research (Dlouhá et al., 2021, 2022) and, in one specific case, also mentioned in the discussion.

Similarly, as in the original SDGs, the environmental, social, and economic dimensions are strongly interconnected in most of our Adapted SDGs, although it is possible to say that one domain is usually prevailing in each of them: environmental (agriculture, forestry, climate change mitigation and adaptation, floods, and drought), economic (decent work, sustainable economy, local economy, regional disparities), and social (education, culture, public services, community, and political participation). Being aware of the limitations, we used this "dimension approach" for better visualization in some figures and tables and in the Section Discussion.

As mentioned above, due to the response rate and geographic coverage, our findings do not include all Czech LAGs, yet they represent a significant amount of them and reflect their distribution across the whole country. Therefore, the results provide insight into the opinions of important groups of local stakeholders who, in fact, often represent other local stakeholders in dialogue with national and European institutions responsible for regional development (and who deliver to them information from the other local actors). These results should thus be not interpreted as universally applicable; rather, they provide "food for thought," which may open new research fields and inspire initiatives in practice. From this viewpoint, the response rate is satisfactory for the purpose of this research, especially given its exploratory and novel focus on the, so far, under-researched aspects of understanding sustainable development at the local level. Further limitations of the study are mentioned at the end of the Section Discussion.

RESULTS

Assessment of National and Regional Strategies

The question on the importance of various strategies and policies for the sustainable development of the region—from the point of view of LAGs' representatives—was phrased as "Are these strategies and policies useful as an inspiration for planning your LAG's activities toward sustainable development?" **Figure 1** shows the percentages of the obtained responses. The more concrete strategies, like the national Regional Development Strategy (86% yes), the Development Strategy of the Region in which the LAG is situated (84%), or the Rural Development Strategy (78%), are found to be most useful. The overarching sustainable development's Strategic Framework Czech Republic 2030 is ranked lower (59%) and, along with the Green New Deal, is also evaluated as not useful by 16% of respondents. The European Green Deal and Just Transition Fund are, in general, unknown.

Perception of Adapted SDGs and LAGs' Potential to Fulfill Them

The results start with the general perception of sustainable development by local actors. In responses to the question "In your opinion, is the concept of sustainable development suitable for your LAG?" LAGs' representatives ($N = 70$) perceive this concept as generally useful for the activities of their LAGs (86%). Only 8% do not know/use it, and only 2% find it useless. With regard to the areas of sustainability most important at the regional level, the respondents were asked to order the 14 Adapted SDGs according to their importance for all Czechia: "Please, arrange [the Adapted SDGs] according to their importance for Czechia as a whole." The results are presented in **Figure 2**. The original scale (an order from 1 to 14) was transformed into a scale of 1–100 (100 being the highest). The numbers in **Figure 2** are the median of the normalized scale. Regionally relevant education, local economy, and sustainable economy were ranked as the top three Adapted SDGs for Czechia as a whole. The middle of the rank consisted of various social and economic goals (e.g., regional disparities, decent work, public services) and environmental goals (e.g., sustainable agriculture and forestry, floods, and drought prevention). Some of the social and environmental goals are ranked as less important, including social topics of community support and local culture, and environmental issues, such as climate mitigation and adaptation. For a better, yet simplified visualization of the dominant aspects of each Adapted SDG, different colors are used in the following **Figures 2**, **3** and **Table 1**: environmental is green, economic is yellow, and social is blue.

Table 1 shows the answers to the question focused on LAGs' own contribution to the fulfillment of the Adapted SDGs: "Based on your own experience, please assess whether your LAG can contribute to the fulfillment [of the Adapted SDGs]." Only in the case of regionally relevant education are LAGs convinced that they contribute significantly (56%). A relatively high share of respondents report significant contributions in the case of community support (31%). However, more than half of the goals received such a self-confident ranking by less than 10% of the respondents. For the majority of them, answers pointing toward the unutilized potential of LAGs are the most common. More than half of the respondents feel that LAGs contribute to the Adapted SDGs' fulfillment but could do more in the case of regional disparities, local culture, decent work, local economy, and sustainable agriculture. Sustainable economy, floods and droughts prevention, climate change mitigation and adaptation, and sustainable forestry are often seen as fields in which LAGs could contribute to fulfilling Adapted SDGs, but only if top-down support would exist[5]. Political participation, as well as climate change mitigation and adaptation, was most often seen as goals without any potential contribution of LAGs. However, for any of these three goals, the negative answer was not the most common (see **Table 1**). This suggests that LAGs' representatives see the

[5]The respondents were informed in the questionnaire that "top-down" support means "financial, legislative, methodical, etc., support by the central or regional authorities".

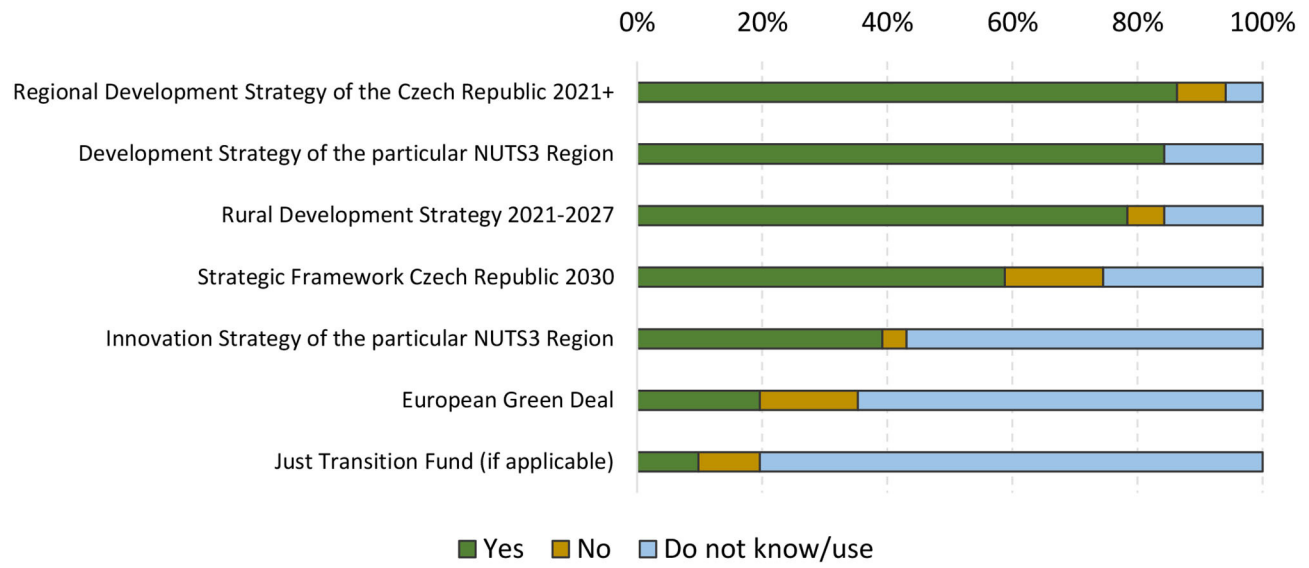

FIGURE 1 | Assessment of strategies and policies as an inspiration for sustainable development on the local level. Answers to the question "Are these strategies and policies useful as an inspiration for planning your LAG's activities toward sustainable development?" $N = 51$.

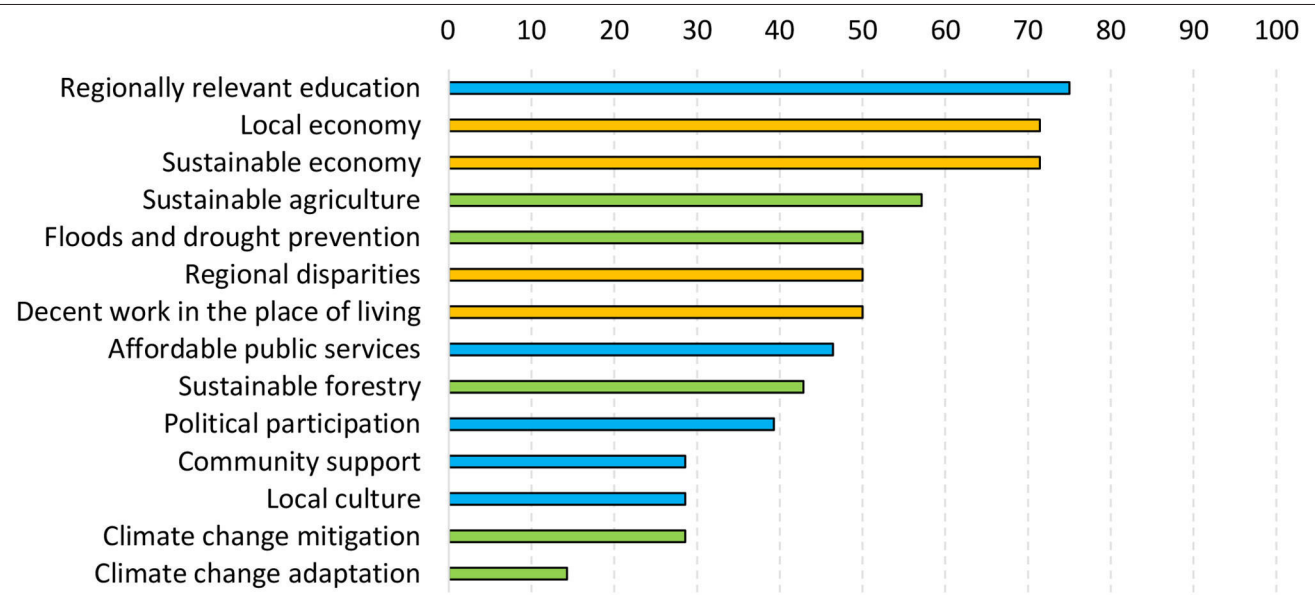

FIGURE 2 | Importance of the adapted SDGs for Czechia. Answers to the question "Rank these sustainable development goals according to their importance for Czechia as the whole country." $N = 44$. The respondents were asked to rank 14 offered goals. Numbers are median ranking normalized on the 0–100 scale (100 being most important). The colors show the main dimension of the Adapted SDG: environmental is green, economic is yellow, and social is blue.

possibility of their contribution in all topics they were asked to assess, even in those in which they have ranked lowest.

The comparison of the perceived importance of the Adapted SDGs and a LAGs' contribution to their fulfillment (**Figure 2** and **Table 1**) reveals interesting categorization. While some of the Adapted SDGs are seen as important and solvable by LAGs (e.g., regionally relevant education), some are seen as important but not within the LAGs' capacities (e.g., sustainable economy). In parallel, the Adapted SDGs perceived as less important in the context of Czechia are seen in some cases at least as partially solvable by LAGs (e.g., local culture or community support) but in other areas as out of their scope (e.g., climate mitigation and adaptation). For a better comparison, the answers from **Figure 2** and **Table 1** were combined in **Figure 3**. Both groups

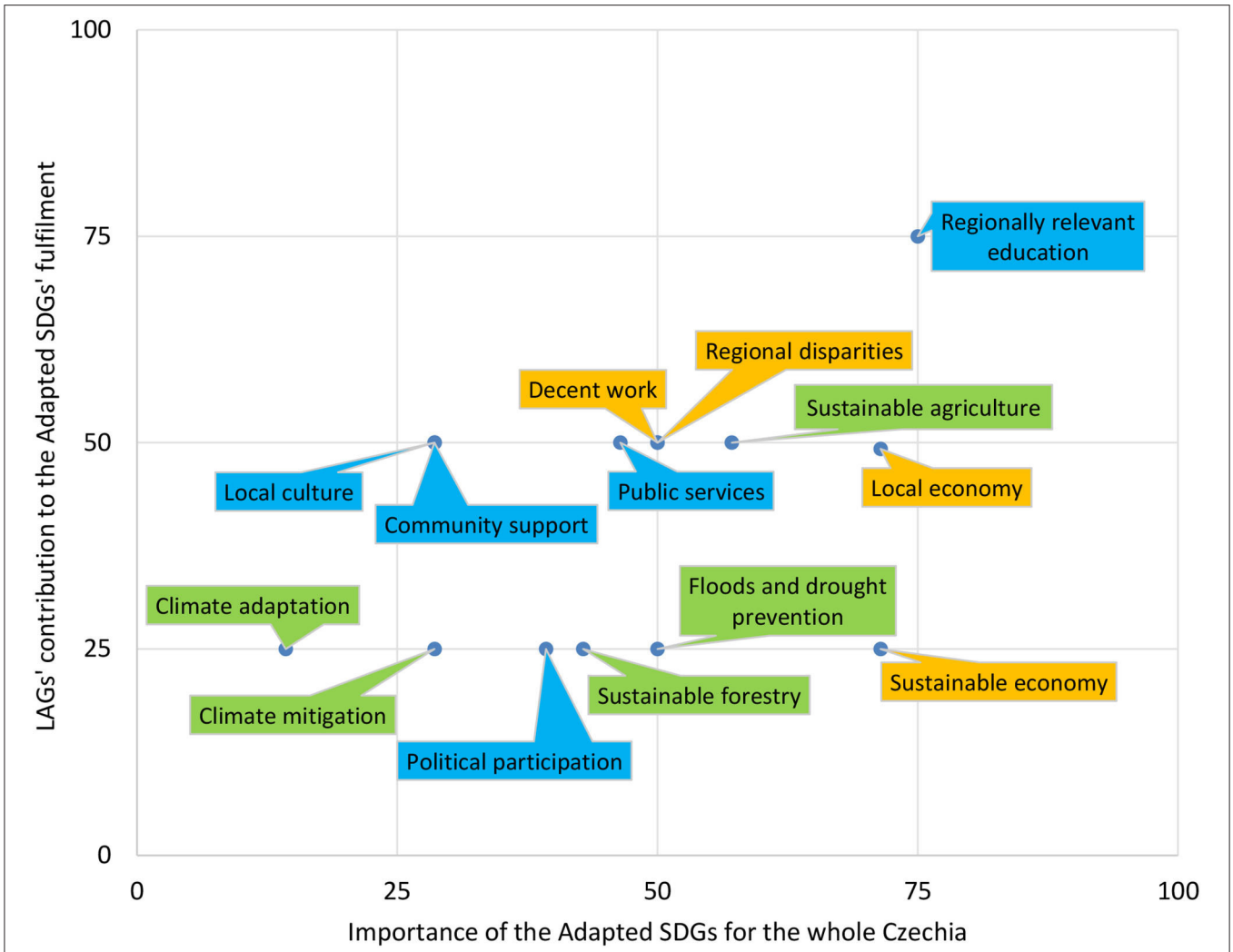

FIGURE 3 | Adapted SDGs' importance and LAGs' contribution to their fulfillment. The figure shows relation of the perceived importance of the Adapted SDG for whole Czechia (Y axis) and contribution to its fulfillment assessed by the respondent's LAG (X axis). Overall importance is calculated as normalized median of the Adapted SDGs' ranking (see **Figure 2**). LAG's contribution is calculated as median of answers: 1 = "Yes, the LAG contributes significantly"; 2 = "The LAG contributes and could do more…"; 3 = "The LAG does not contribute but could…"; 4 = "The LAG cannot contribute" (see **Table 1**). Answer "Do not know" was omitted; therefore, the number of respondents varies (*N* ranges from 35 to 42). The numbers were transformed and normalized on the 0–100 scale (100 being most important for both axes). The colors show the main dimension of the Adapted SDG: environmental is green, economic is yellow, and social is blue.

of data are median answers normalized on a scale of 1–100. The order of importance (position on the horizontal axis) in **Figure 3** is the same as in **Figure 2**. The ranking of perceived LAGs' contribution in **Figure 3** is calculated as a median of the answers in **Table 1**, with the following values: 1 (Yes, the LAG contributes significantly); 2 (the LAG contributes and could do more, but top-down support is missing); 3 (the LAG does not contribute but could if top-down support existed); and 4 (the LAG cannot contribute). The results were then transformed and normalized on a scale of 1–100, with 100 as the highest value. See the captions of **Figure 3** for details. The perceived level of LAGs' potential contribution to the Adapted SDGs is distributed in three groups in **Figure 3**: (1) high contribution of LAGs in fulfilling the goal–this has been, however, reported only in the case of regionally relevant education; (2) middle potential contribution of LAGs'—this group includes seven Adapted SDGs, with three of them each being related to the economic and social dimension; and (3) six Adapted SDGs fall into the group, with a low perceived LAGs' contribution to participate in their fulfillment; these goals combine all dimensions of sustainability but, most often, the environmental ones.

DISCUSSION

Related to the first research question, the most influential strategies and policies from the perspective of LAGs are those regionally oriented: Regional Development Strategy, development strategies of the particular region to which LAGs

TABLE 1 | LAGs' contribution to the fulfillment of Adapted SDGs (in percentages).

	Yes, LAG contributes significantly	LAG contributes and could do more but top-down support is missing	LAG does not contribute but could if top-down support would exist	LAG cannot contribute	I do not know
Regionally relevant education	55.8	40.4	3.8	0	0
Community support	30.8	50.0	13.5	1.9	3.8
Local culture	23.1	61.5	13.5	0	1.9
Local economy	21.2	55.8	17.3	1.9	3.8
Regional disparities	19.2	65.4	7.7	5.8	1.9
Sustainable agriculture	11.5	55.8	21.2	9.6	1.9
Decent work in the place of living	7.7	57.7	11.5	15.4	7.7
Affordable public services	7.7	42.3	23.1	21.2	5.8
Sustainable forestry	7.7	32.7	42.3	15.4	1.9
Sustainable economy	7.7	21.2	59.6	9.6	1.9
Floods and drought prevention	5.8	26.9	51.9	9.6	5.8
Political participation	5.8	25.0	19.2	32.7	17.3
Climate change mitigation	3.8	19.2	34.6	32.7	9.6
Climate change adaptation	1.9	17.3	42.3	26.9	11.5

Answers to the question "Based on the experience from the area of your LAG, answer whether your LAG can contribute to the fulfillment of the sustainable development goals." N = 52. Adapted SDGs are ordered according to the answer "Yes, LAG can contribute significantly". Numbers show the percent of responses; the sum of each row is equal to 100%. The colors show the main dimension of the Adapted SDG: environmental is green, economic is yellow, and social is blue.

belong, and Rural Development Strategy (**Figure 1**). This is expectable as the Strategic Framework Czech Republic 2030 is rather an umbrella document, suggesting how to link the SDGs with local and regional policies but not providing details for their implementation as usually required by LAGs. The low level of awareness of the European Green Deal and Just Transition Fund could be explained by their novelty and, in the case of the latter, also by its specific regional focus on only 3 Czech NUTS3 regions, which belong to the EU coal regions transitioning to a low-carbon economy (European Commission, n.d.b). The high awareness of the strategies is complemented by the general LAGs' opinion that sustainable development is a useful concept—which is in agreement with other research focused on regional authorities all over the world (Messias et al., 2018; Organization for Economic Co-operation and Development, 2020).

With regards to the second research question, regionally relevant education is seen as the most important Adapted SDG for Czechia as a whole, according to the LAGs' representatives, followed by the goals from the economic domain. The list ends with explicit climate change issues. The ranking shows that the order of social, economic, and environmental Adapted SDGs is mixed. The top ranking of education from both perspectives (importance for Czechia and LAGs' contribution) can be, at least, partially explained by the fact that LAGs themselves administer some of the EU funding for this topic and are, therefore, experienced with it. This "explanation by experience" with the funding could also be partially applied to, e.g., economic topics or sustainable agriculture—but definitely not to the relatively highly ranked floods or drought prevention. As Konečný et al. (2021) show, these topics have received only marginal support in the last funding period.

In general, economic goals, including decent work and regional disparities, are ranked relatively higher both in importance and contribution, while some social (political participation, community support, local culture) are lower in importance but relatively high in contribution. Some of the environmental topics were ranked lower in contribution but higher in importance (e.g., floods and drought). This suggests that LAGs feel more empowered in the social and economic dimensions, but the important environmental topics are generally perceived as beyond their capacities. The international comparison with the prioritized topics of local development strategies of EU LAGs shows some similarity with the preference for Adapted SDGs in Czechia. European Network for Rural Development (2018a) reveals that local economy and jobs, social inclusion and cohesion, and agriculture and farming are the top three priorities for LAGs in EU countries.

The ranking of the explicitly mentioned climate change as the least important challenge seems to be surprising, but this finding is supported by previous surveys among Czech as well as other EU countries' LAGs (European Network for Rural Development, 2018a,b). It can be argued that climate change could be seen as something rather distant, which must be solved globally, not by one country. However, the everyday problems related to climate change, which may include floods, drought, agriculture, and forestry, are ranked higher by LAGs and are also often seen as important by the general public, at least in the case of floods, drought, and water scarcity (Vávra et al., 2014). Therefore, the terminology matters when talking to local stakeholders. Focusing purely on "expert" concepts (e.g., climate change) may undermine the understanding between local actors on one hand and experts on the other. If the answers reflect

a general mistrust in the global impact of local activities (i.e., the possibility to contribute to climate change mitigation), then we could hypothesize the disempowerment of local actors with regard to their contribution on a global scale.

The research on perceptions of the SDGs by other authors shows some similarities and differences with our findings. The survey among Czech municipalities highlighted the importance of the water-related SDGs, followed by health and life quality, sustainable industry, terrestrial ecosystems (including environmental protection), and quality of education (Ministry of the Environment, 2021). Education, along with poverty reduction, climate action, and decent work, was prioritized by Dutch local governments (Spitz et al., 2016). Similarly, the general population in Czechia reported the importance of health and quality of life, decent work, water, and education (IPSOS, 2020). All these examples show the mixed dimensions of the SDGs ranked as the most important, which is in agreement with the mixed ranking of our respondents.

From the top-down point of view, LAGs are perceived positively as actors by the regional and rural development strategies (LAGs are seen as important implementers of the Type measures and Specific goals), while these strategies cover all three dimensions of sustainable development more or less evenly. From the bottom-up perspective, Czech LAGs assess national strategies as highly relevant (see the first paragraph of this section) and use them in their own work. These findings suggest that LAGs could be key actors in regional sustainable development from both perspectives. However, in the particular wording of the national strategies' measures or goals, the "translation" of global goals to local actions might bring about some misconceptions. For example, education is addressed in the Strategy of Regional Development mostly as preparation for future jobs or with respect to the school infrastructure, while our concept of "regionally relevant education" reflects a broader scope of SDG 4 implementation in the context of sustainable development of the region and community (Dlouhá et al., 2021), in accordance with the SDG 4 definition (United Nations, 2015).

Above all, the activities of LAGs are mainly framed by funding opportunities, which are obviously not precisely defined in the strategic documents. When the funding priorities do not encompass the local needs, LAGs – when formulating their strategic goals – tend to either modify local priorities or find some "new" problems and needs (which might not be of the highest importance) to meet the criteria of support and receive some funding (Konečný et al., 2021). This can lead to the situation where the bottom-up potential of LAGs is not fully utilized, and important problems are not being addressed. On top of that, reflecting local needs was the most preferred principle of the LEADER method implementation among Czech LAGs, along with reducing regulations and restrictions (Konečný et al., 2020). The administrative burden was criticized even if the aim of the particular funding scheme was evaluated positively (Slach et al., 2021). The previous survey among Czech LAGs has also pointed to the high bureaucracy and administration as well as the top-down limitations of themes in local development strategies, which hinder bottom-up approaches (European Network for Rural Development, 2018b). When assessing conditions for the SDGs implementation, the lack of top-down support and regional resources or capacities has been reported as an obstacle in other surveys among regional and local authorities from various countries. The prioritization of the SDGs agenda over other issues was also seen as a challenging task in various studies, including wide international surveys (Messias et al., 2018; Organization for Economic Co-operation and Development, 2020), as well as in a Dutch case study (Spitz et al., 2016).

This must be kept in mind when interpreting the relationship between the perceived importance of the Adapted SDGs for Czechia as a whole, and LAGs' contribution to their fulfillments (third research question). The results in **Figure 3** show that there is high internal variability within the goals in the social and environmental dimensions of sustainability, but the goals with a dominant economic dimension are seen as more similar to each other. **Table 1** shows that, for the vast majority of the Adapted SDGs, the options that LAGs could contribute more (combination of "already contributing" and "not contributing yet") are dominant, with over 60% of positive answers. The only exception is positively evaluated Adapted SDG in education. However, even in this case, 40% of the respondents answered that their LAGs could do more.

To better understand this problem, we can refer to one of the open questions in the questionnaire. LAGs were asked for the reasons why they do not contribute more to the SDGs that they found important. The three most often mentioned reasons included the lack of financial resources, the conditions defined in top-down policies, and the lack of their own competencies[6]. This interpretation of LAGs' disempowerment to contribute to the SDGs achievement is backed-up by previous findings (European Network for Rural Development, 2018b; Konečný et al., 2020) among Czech LAGs. In the case of environmental issues (especially climate change), the low perceived contribution potential could also be explained by limited experiences with these topics and the lower importance ascribed to them. There are, however, more reasons for this situation. According to the answers to the other open-ended questions, LAGs do not feel to be responsible in this field as the environmental strategies are formed by the legislature and implemented by specialized institutions of nature protection. Moreover, usually, there are numerous actors missing in the region that could potentially contribute to the environmental field (such as active experts, environmentally friendly enterprises, relevant institutions, etc.), and there are also several actors that have an overall negative effect on the environment (typically, large businesses and agricultural companies with political power are mentioned here).

Based on these results, we argue that LAGs generally believe they have the potential to contribute more (than they currently do) to the regional implementation of the SDGs; and they think that the central governments should take their local perspectives and experiences more seriously into account. In

[6]The original question was phrased as follows: "Please explain why your LAG cannot contribute sufficiently to the fulfillment of sustainable development goals that you find important." The answers were coded and placed into three categories, which we mention here (the lack of financial resources, the conditions defined in top-down policies, and the lack of their own competences).

this regard, they were probably still mostly influenced by the Regional Development Strategy 2014–2020 (Ministry of Regional Development, 2013), which was more in line with a top-down approach and an economic perspective of development. The new Regional Development Strategy 21+, which was agreed in 2020 (Ministry of Regional Development, 2019), promised some changes – the LAGs were aware of it and used it in their preparation of new Strategies of Community-Led Local Development. However, as the research suggests, particular funding opportunities, which are associated with the top-down approach, still prevail.

It is worth mentioning that, according to the research among EU states, all LAGs complain about bureaucracy, administration, project application procedures, limited decision power, or project reporting requirements, in general (European Network for Rural Development, 2018a). However, the perspectives of the Czech LAGs are even more critical than other EU LAGs in comparison (European Network for Rural Development, 2018b). This applies, for example, to the opinion that LEADER implementation is constrained by the country's rural development program (75% of Czech LAGs report a negative effect compared to 53% of EU LAGs). When asked about the freedom to pursue their own "operational priorities" in their national framework, 52% of Czech LAGs report limited freedom, and another 27% seriously constrained freedom. This number is extremely high in comparison to EU LAGs with 27 and 11%, respectively. Similarly, 64% of Czech LAGs argue that greater independence would help them to improve their contribution to achieving their goals (only 42% in the EU). When comparing perceptions of the 2014–2020 EU programming period to the previous one, Czech LAGs' report decreased freedom to find innovative solutions (49% compared to 37% in EU) and decreased autonomy (CZE, 56%; EU, 33%), despite the increased budget (CZE, 73%; EU, 30%).

The above-mentioned results, and works by other authors cited in the discussion, suggest that the Czech legislative, governance, and funding frameworks limit the bottom-up potential of LAGs even more than the frameworks do in other EU countries. While the bottom-up approach, local development strategies, and networking are of the same high importance for Czech and EU LAGs (European Network for Rural Development, 2018a,b), the country's framework hinders their potential. We hypothesize that this is at least partially caused by the long tradition of top-down centralized government, which was not fully replaced by functioning bottom-up governance after the 1989 social and economic transformation, and by the highly bureaucratic governance culture. The relatively short period of a dialogue between LAGs and state authorities (since the early 2000s) may also play a role in the slow institutional and cultural changes in governance.

Summarizing the opinions of LAGs' representatives and referring to the EU comparison, we argue that the top-down measures have, so far, not fully reflected the regional potential for the SDGs' implementation—not to prescribe what local governments should do but to take advantage of what they are already doing and to provide a common supporting framework (Bardot et al., 2018). While the shift from the traditional to the new paradigm of rural development (Organization for Economic Co-operation and Development, 2006) is obvious and manifested, for example, by the importance of non-agricultural topics in practice, and also revealed in our research, the more recent conceptual changes are still to be discussed. Especially, the strongly expressed LAGs' potential to contribute to sustainable agriculture, sustainable forestry, and flood and drought prevention (perceived by ca 75% of the respondents in our research) suggests that LAGs are aware of the abilities of rural areas to deal with local manifestations of global challenges (even though they may use different terminology than experts). This can be seen as a way toward the New SDGs Development Paradigm and the territorial approach toward the SDGs (Organization for Economic Co-operation and Development, 2020) or the neo-productivist concept of rural development (Pělucha and Květon, 2016) in practice.

However, according to our research, this potential seems not to be reflected nor utilized. This limits the agency of LAGs, which is crucial in the neo-endogenous concept of rural development (Shucksmith et al., 2021). Our research thus supports the recent findings of Konečný et al. (2020) who, in relation to Community-Led Local Development, claimed that the "…framework of supported activities set at the national level does not meet the needs and problems of rural communities" (p. 189). However, interpreting the problem in a wider perspective of the SDGs, this is not only a local problem of rural development but an important part of the global sustainability challenge: local communities are hindered from utilizing their potential to deal with challenges and megatrends, e.g., by implementing climate change adaptation and mitigation through management of agricultural and forest land.

Our research, exploratory in its nature, is novel, but our findings need to be carefully interpreted. We argue that the novelty is based on the connection of LAGs and SDGs' perception in an empirical study and by putting them into the context of discussions about regional development paradigms. Our findings are supported by the results of other authors on regional governance and on the roles of actors (e.g., Spitz et al., 2016; Messias et al., 2018) and by the experiences of LAGs in Czechia as well as in other countries, which point to the problems with top-down regulations (e.g., European Network for Rural Development, 2018a,b; Konečný et al., 2020; Shucksmith et al., 2021). Nevertheless, our study has some limitations that should be kept in mind when interpreting the results. The number of respondents was limited; therefore, no complex statistical analysis of the data was realized. Additionally, the case study presents the situation of a sample of LAGs in only one country with a specific history and socio-political conditions and was focused primarily on the opinions of LAGs' representatives. Different research approaches, such as a financial and document analysis or the assessment of LAGs' projects, would help to view the implementation of the SDGs from another perspective.

CONCLUSION

Our findings corroborate previous results of research among Czech LAGs by suggesting that there is a mismatch between LAGs' perceptions of their own potential to be driving forces

of regional sustainable development and the top-down defined legislation and funding with a similar focus. According to their experience, the local actors find only a few sustainability themes (labeled here as Adapted SDGs) as beyond their scope, but they feel that they are constrained in contributing to the fulfillment of almost all of them. The findings of perceived LAGs' potential to contribute to the sustainable development agenda link the discussions about SDGs with the regional development debates, which is a novelty in the academic discourse and added value to this research. Interpreting the results within the context of Czechia, a country with a specific history of post-communist transformation since 1989 and with a legacy of bureaucracy and top-down governance, illustrates observed phenomena in its particular context, which may be typical for some of the other EU countries as well. Based on the results, we argue that, despite the formal policy and institutional support for the LAGs, Czech regional sustainable development strategies are still far away from the concept of successful multilevel governance and do not build upon the new development paradigms like the New SDGs Development Paradigm (Organization for Economic Co-operation and Development, 2020) or the neo-endogenous paradigm (Shucksmith et al., 2021).

Within the context of other recent research on LAGs, and regional and local governments in Europe, our results uncover similarities in local and regional actors' perceptions of the global and national agendas of sustainable development. Our research, novel because of its particular focus on the perception of the SDGs by LAGs, may be a starting point for a future in-depth dialogue concerning specificity (of the regions) vs. universality (of the commonly agreed SDGs). We consider this to be an important step toward the analysis of the role of non-state actors in sustainable regional development framed by the New SDGs Development Paradigm (Organization for Economic Co-operation and Development, 2020)—the initial endeavor in this respect is introduced by a complementary article in a special issue (Dlouhá et al., 2022). More research is necessary in this field to shed light on the topic investigated by this exploratory study. Future studies need to focus on the regional aspects of particular strategies, documents, financial schemes, and practical LAGs' activities, with attention paid to the conditions for the SDGs implementation. Both qualitative and quantitative approaches are needed. The former is necessary to deepen the understanding of how LAGs' representatives relate to the sustainable development agenda and of the drivers and barriers of local actions. The latter may then provide data-based evidence and enable a comparison of the progress in SDGs' implementation at the regional and local levels in various European countries with different social, environmental, economic, and political backgrounds.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

JDlouhá and JV prepared the conceptualization of the research and interpreted the data. JDlouhá, JV, MPo, MH, and JDlouhý prepared the methodology and data collection. All authors except MPě jointly prepared the questionnaire. JDlouhý and MH managed questionnaire data collection. JDlouhý curated the data. JV and IŠ provided and curated complementary data on LAGs in Czechia. JV, JDlouhá, MPo, and MH did the data analysis. JV was the leading writing author of the article, led the process of writing revisions with the strong support of JDlouhá, and the participation of MPo and MPě. JDlouhá and MPě contributed to the writing process and provided important conceptualizations. All authors commented on the manuscript drafts. JDlouhá acquired funding and coordinated the research project. JDlouhý, ZDL, and IŠ participated in the project administration. All authors have read and agreed to the published version of the manuscript.

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Minding the GAP: An overview of five years of Education for Sustainable Development (ESD) projects under the Global Action Programme (GAP) within Regional Centres of Expertise (RCEs) on ESD

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Research on Regional Centers of Expertise (RCEs) on Education for Sustainable Development (ESD) has focused on how multi-stakeholder and cross-sectoral partnerships can work to enable ESD projects, with a particular focus on how higher education institutions could effectively collaborate with community partners. However, much of this research has focused on *how* partners worked together (for example, what governance and coordination structures allowed higher education institutions to effectively collaborate with partners) without as much focus of investigation on *what* activities RCEs were working on. While diverse and compelling research on RCEs already exists, much of this research falls into conceptual theory building or case studies of individual RCE activities. In this article, an overview and analysis of activities from RCEs around the globe is offered to provide some trend analysis for topics and modalities of ESD projects conducted during the Global Action Programme (GAP) on ESD which ran from 2015 to 2019. This empirical analysis can serve as record of where the Global RCE Network has been over the 5 years of the GAP, where it is now, and where it may wish to go in the future.

KEYWORDS

Education for Sustainable Development (ESD), Regional Centers of Expertise (RCEs), Global Action Programme (GAP), environmental education, community education

Introduction

The year 2015 was the beginning of the Global Action Programme (GAP) on Education for Sustainable Development (ESD). Led by the United Nations Education, Scientific and Cultural Organization (UNESCO), the GAP was a follow-up programme to the United Nations Decade of Education for Sustainable Development (UNDESD), which ran from 2005 to 2014. The GAP was designed to further generate and scale-up ESD actions, using education as a mechanism for sustainable development (United Nations Educational, Scientific, and Cultural Organization (UNESCO), 2014) (United Nations Educational Scientific Cultural Organization, 2014). Launched during the same

year as the United Nations' Sustainable Development Goals (SDGs) in 2015, the GAP was the result of the Member States recognizing the critical nature of education in implementing the global goals. However, how ESD activities would develop within the context of the SDGs was unknown.

In order to implement ESD activities for the GAP, UNESCO worked with a coalition of partners to coordinate and serve as a global community of practice in relation to ESD. A total of 90 institutions and networks participated from around the world, including national ministries of education and the environment, UN agencies and institutes, local governments, non-governmental organizations (NGOs), student unions, and private sector partners (United Nations Educational Scientific Cultural Organization, 2015) (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2015). While all of the partners involved in the GAP had been working on ESD before the commencement of the GAP, the GAP offered an opportunity to view how these diverse multi-stakeholders could work as a network—or for the network partners, as a network of networks—to innovate and scale up best practices and modalities for implementing ESD.

One of the multi-stakeholder networks serving among these partners during the GAP was the Global Network of Regional Centers of Expertise (RCE) on ESD. With the Secretariat at United Nations University–Institute for the Advanced Study of Sustainability (UNU-IAS), the RCEs have been working as a global network of smaller multi-stakeholder networks since their inception in 2005. RCEs are networks of formal, non-formal, and informal education organizations that facilitate education programmes to enable sustainable development within a given local (often municipal) or regional community. RCEs are partnership networks that include stakeholders such as universities and local school systems that explicitly work with formal education, as well as local governmental bodies, NGOs, museums, zoos, parks, and private sector actors who are engaged in non-formal education and training (United Nations Educational Scientific, and Cultural Organization and United Nations University–Institute for the Advanced Study of Sustianability, 2020) (Figure 1).

As it states within the UN General Assembly resolution on ESD (2020), the concept of ESD has transformed from a target in and of itself (4.7) within Goal 4 of the SDGs (Quality Education) into "a key enabler of all the other SDGs," with capacity building, learning, empowerment, and knowledge creation providing the foundation to any efforts to address and solve sustainable development problems and issues (United Nations General Assembly, 2020)(United Nations General Assembly, 2020) (United Nations General Assembly, 2020). With ESD being reframed as not only a target of but a critical enabler for the sustainable development agenda, it is critical to use empirical research in order to establish which areas of the sustainable development agenda ESD is being implemented in.

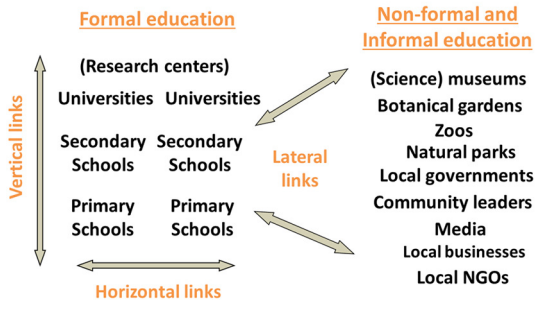


FIGURE 1
Individual RCE structure.

Furthermore, identifying key trends in regional, institutional, and other thematic areas of ESD implementation within the contexts of the SDGs will allow for a more nuanced view of ESD programme development in relation to the global sustainable development agenda. A multi-stakeholder network such as the RCEs are a compelling focal point for such an investigation, due to their broad modes of engagement (RCEs work explicitly with both formal school curriculum as well as non-formal education and awareness activities), diverse geographical and cultural contexts (RCEs exist in over 40 countries across Africa, the Americas, Asia and the Pacific, and Europe), the varied topics within ESD (RCE projects work across all 17 SDGs as well as a number of other sustainable development topics and themes).

The aim of this paper is to provide both an overview as well as insight into how the RCEs as multi-stakeholder networks organize and implement ESD activities within their regions within the context of the GAP and the SDGs. In the following sections, the authors provide a description and analysis of how a multi-stakeholder network of ESD actors operated as an implementing partner to the GAP in the first 5 years of the SDGs, from 2015 to 2019. An overview of findings focusing on answering which SDGs and Priority Action Areas were predominant among ESD projects within the network, what types of actors and audiences were involved in these ESD projects, and if there were any broad regional or thematic trends among ESD projects during the GAP is offered in the below analysis. The paper concludes with a discussion of the contributions of RCEs in implementing the GAP, implications of the findings, and possible next-steps for RCEs and other multi-stakeholder partnerships undertaking ESD activities in the future, including for UNESCO's most recent ESD initiative, ESD for 2030.

Background on ESD and the RCEs in the context of the GAP—literature review

During the DESD, education researchers began to conceptualize ESD as a set of competencies that learners at all stages of life should apply to problem solving, as opposed to a definitive topic within formal education curriculums. Building on an earlier framework by Wiek et al. (2011) and Rieckmann (2018) highlights eight competencies that are particularly relevant for learners to achieve within an ESD framework:

- **Systems thinking competency:** The ability to recognize and understand relationships in complex systems, across different domains and scales;
- **Anticipatory competency:** The ability to understand and evaluate different futures, thru assessing consequences and dealing with risk and change;
- **Normative competency:** The ability to understand and reflect on norms and values, in a context of conflicting interests, trade-offs, uncertain knowledge, and contradictions;
- **Strategic competency:** The ability to develop and implement innovative actions that further sustainability;
- **Collaboration competency**: The ability to learn from others, facilitate collaborative and participatory problem-solving, and to use respect and empathy when dealing with conflict;
- **Critical thinking competency**: The ability to question norms, practices, and opinions, and to reflect on one's own values, perceptions, and actions;
- **Self-awareness competency:** The ability to reflect on one's own role in society, and to evaluate and motivate one's actions; and,
- **Integrated problem-solving competency:** The ability to apply different problem-solving frameworks to complex problems in sustainable development, so that solutions are viable, inclusive, and equitable.

While the concept of ESD as a set of competencies for learners to master in order to solve problems began to take shape during the DESD, the types of problems learners were being asked to solve began to solidify around specific topics during the GAP. While topical themes within ESD as a field began to be emerge during the UNDESD as well (Læssøe and Mochizuki, 2015), topical themes began to coalesce around the newly announced Sustainable Development Goals (SDGs) during the GAP period. Rather than focusing on where ESD should be inserted into a formal school systems' curriculum, the discourse on ESD during the GAP began to cluster ESD topics around which problems they were intent on solving—and most of these were organized around the SDGs. Rieckmann (2018) notes that SDGs related to climate change, biodiversity conservation, consumption and production, and poverty alleviation became especially prevalent in ESD content and policy objectives by the mid-point of the GAP, but cautions that regional, national, and local contexts could play a significant role in which topics were emphasized in a given location. However, little analysis appears around how regional, national, or local contexts influence topical themes within ESD.

The specific sector of education or audience that ESD was intended to engage with also began to transform during the GAP. While Hallinger and Nguyen (2020) found that research papers on ESD proliferated during the DESD years (2005–2014), most of these focused on formal education of primary and secondary school students. At the beginning of the GAP, Wu and Shen (2016) note the need for increased attention to the role of formal higher education in ESD. By the end of the GAP, ESD in higher education was one of the most rapidly growing knowledge bases within the ESD field (Hallinger and Chatpinyakoop, 2019). But while research into formal education's implementation of ESD proliferated during the GAP, little attention was paid to the role on how these education programmes related to one another (for example, outside of teacher education, little research exists into how ESD for learners in primary or secondary education relates to ESD for learners in higher education, or vice versa). Nor has much attention has been paid to the role of non-formal ESD programmes in the implementation of the SDGs. In order analyze a broader purview of ESD initiatives, it becomes necessary to go beyond analyzing the ESD projects of a given school or school system, and look at ESD projects in the context of a broader educational ecosystem. This educational ecosystem would look something like an RCE.

The concept of the RCEs originated within United Nations University, where the idea of multi-stakeholder networks was proposed as a mechanism for local actors to engage with global sustainable development objectives within the context of their own communities, using education as a tool to implement sustainable development (Glasser, 2008). During the UNDESD, the concept of RCEs proliferated as the network grew and the innovations around multi-stakeholder partnership in ESD began to capture the imagination of university faculties, local school administrators, and local government policy makers who were looking to accelerate action on sustainable development in their own cities and regions (United Nations University – Institute for the Advanced Study of Sustainability (UNU-IAS), 2014) (United Nations University–Institute for the Advanced Study of Sustainability, 2014). In the beginning, research on RCEs focused on how cross-sectoral partnerships could best work to enable ESD projects, with a particular focus on how higher education institutions could effectively collaborate with community partners (Itoh et al., 2008; Brown et al., 2013). The majority of the research on RCEs during the DESD focuses on understanding and explaining the partnerships and coordination structures within

RCEs as opposed to any overarching analysis of the ESD activities they were implementing (Fadeeva and Mochizuki, 2010; Urenje, 2010). Additionally, the research during this time period tends to be more descriptive than analytical. The focus on multi-stakeholder partnerships in the literature—RCEs in particular—for much of the UNDESD focused on *how* partners worked together (for example, what governance and coordination structures allowed higher education institutions to effectively collaborate with partners) without as much focus of investigation on *what* activities they were working together on. Although research indicates that universities in multi-stakeholder networks were observed to be more proactive in seeking community engagement during the UNDESD (Wals, 2012) (Wals, 2012), what topics or type of projects they were seeking engagement on remains largely undefined within the academic literature. While some case studies are offered, there is little overall analysis of the sum total of ESD projects of a given multi-stakeholder ESD network, including those of the Global RCE Network (Buckler and Creech, 2012).

During the GAP, much research done in relation to multi-stakeholder ESD partnerships, and RCEs in particular, continued the research trend of the DESD, which was to focus on how higher education institutions could (and should) contribute to such partnerships. In their research, Beynaghi et al. (2016) frame possible future university models through social, environmental, and economic orientations toward sustainability, using the RCE model as one model of partnership and collaboration across all three orientations. Isenmann et al. (2016) also use the RCE model for scenario building, specifically in the context of how universities can work with city governments to advance ESD as part of a core mission for both institutions. In their article, Restrepo et al. (2017) showcase how university educators can improve on ESD pedagogy through multi-stakeholder networks such as RCEs, but little detail is given on specific forms of activities *per se* under this type of pedagogy. The issue of how to improve higher education courses of study using the RCE multi-stakeholder model, particularly around problem-based and applied university progammes of study, is also investigated by Tikhomirova et al. (2015) and Holgaard et al. (2016). The possibility for universities to engage with multi-stakeholder networks through an RCE model to improve both the quality and applicability of university education, as well as scale up sustainable development initiatives at the national level, is explored by studies in the United Kingdom's context (Vargas et al., 2019) and a Central European context (Dlouhá and Glavi, 2017). The RCE model is also examined as a model to transform the field of higher education in general from hierarchal and competitive toward one that is interdependent and collaborative (Poleman et al., 2019). While it is clear that RCEs are seen as vital conceptualization by education researchers as to how higher education should transform to respond to the challenges associated with sustainable development, analysis of what topics and themes universities and other stakeholders are engaging with under the RCE model remain scant.

While much of the research in relation to RCEs during the GAP appears focused on higher education institutions within the RCE network, theoretical and conceptual works that go beyond higher education are also found. Indeed, Wals (2015) cites the RCE model as a concrete example of where schools (formal education) work with community educators (non-formal education). Petry et al. (2015) illustrate that education and learning must be linked to policy actions through a multitude of different actors (not just universities) at the local level through an RCE model to achieve sustainable development outcomes at a sub-national level. This need for formal education institutions, as well as other actors engaged with non-formal education, to go beyond their institutional boundaries by using an RCE model to engage with sustainable development in policy and practice is further explored by Wade (2016) and Dahms et al. (2017). RCEs seem to take central stage in research narratives calling for transformation of what education and learning could and should be in relation to sustainable development, with the need for partnerships as embodied by RCEs' multi-stakeholder model to link formal and non-formal ESD activities and reduce the number of redundant ESD initiatives. The need for such an integrated regional ESD agenda as provided by the RCE model is highlighted in research by Didham and Ofei-Manu (2015), Fernandez and Shaw (2016), and Rauch and Pfaffenwimmer (2015). Shulla et al. (2019) use a Hierarchical Classification Analysis to group RCEs into clusters with similar characteristics, and discuss challenges and possibilities for scaling-up ESD activities in line with the 2030 Agenda under these different RCE operating models. However, here again the focus is on organizational structure of the RCEs and not which topics they were focusing on *per se*. Kolenick (2020) provides a comparative analysis of RCEs that are working on poverty and health issues (along with Indigenous and traditional ways of knowing). But while these case studies are illuminating, how these particular projects on these particular issues fit within the larger context of the global network's total ESD activities remains unclear.

Other research conducted on ESD activities during the GAP years examines how stakeholders share knowledge within an RCE framework. Wals et al. (2017) analyze RCE projects as case studies for examples of non-formal modalities for community-wide learning during the GAP period. The idea of non-formal and informal community education is also explored in RCE activities in more detail by examining how RCEs facilitate knowledge-transfer though dialogue between RCE partners. In Kolenick (2018) work on green economies, the author notes how RCEs can allow for both bottom-up and top-down knowledge transfer in relation to sustainable consumption and production, as opposed to strictly top-down favored by formal education institutions. Hirsch et al. (2021) expands on this by showcasing how higher education students in an RCE model can collaborate not only to learn about sustainable development,

but to create curriculum for other students about it. RCE activities are also analyzed in the context of their linkages with non-formal education actors to formal school systems during the GAP. This is seen with Mahat and Idrus (2016) research on how RCE activities increase teacher and student awareness of the UN sustainable development agenda through partnership with NGOs in Malaysian schools. This is also seen in O'Donoghue et al. (2018) research on how RCEs non-formal education partners in South Africa assisted school environments in transforming toward more sustainable operation models. A thorough analysis of RCE activities across the five GAP priority actions areas emanates from Watson (2015) research on how policy change in education was able to occur at the national level in Scotland through an RCE model and RCE activities by linking formal and non-formal education. By using an RCE multi-stakeholder model to improve communication and better coordinate action between education bodies, government ministries, NGOs, and other stakeholders, the research details how Scotland has been able to advance ESD policies at the national level for primary and secondary education, further and higher education, and non-formal community education. With their explicitly multi-stakeholder structure, and mode of using education as an enabling mechanism for regional sustainable development, researchers throughout the GAP time period propose that RCEs are well positioned to translate global goals into local actions for sustainable development (Yeong et al., 2021).

While diverse and compelling research on RCEs already exists as evidenced by this brief overview, much of this research falls into conceptual theory building or the profiling of individual RCE activities. Hallinger and Nguyen (2020) note that the current knowledge base for ESD since 1990 is heavily weighted toward theoretical, critical, and prescriptive papers in the field, with an insufficient amount of analytical empirical research in the field. The goal of this paper is to add to the analytical empirical research within the field of ESD thru an examination of ESD projects within the RCE network during the GAP from 2015 to 2019 by addressing the following questions:

- What regional trends are apparent among ESD projects implemented by RCEs during the GAP?
- Which SDGs and Priority Action Areas (PAAs) of the GAP are the predominant focus for ESD projects among RCEs during the GAP?
- What type of audiences and institutions are ESD projects engaging with during the GAP?, and
- What other thematic trends occur within ESD projects implemented by RCEs during the GAP?

The preceding questions are an entry point to analyzing the data rather than a comprehensive list of all analysis possible with the existing dataset. In what follows, an overview and analysis of activities from RCEs around the globe is offered to provide some empirical trend analysis for topics and modalities of ESD projects conducted during the GAP. This analysis can not only serve as record of where the Global RCE Network has been, but also a starting point for conversation about where it may wish to go in the future.

Methods

The primary data sources for this research were RCE project reports from the RCE portal's archives. As part of their conditions for acknowledgment, RCEs are required to submit regular project reports on ESD initiatives they undertake during the course of a given calendar year. An RCE can undertake as many ESD projects as they wish over the course of a year, as the network is designed to allow for RCEs to operate under their own capacities with regards to resources, timelines, and thematic areas of focus. Projects varied in length from 1 week to one full calendar year. If a project runs over one calendar year, RCEs are asked to create separate project reports for each year a given project operates in order to update data collection on the project. All projects were completed by the end of the GAP, though some successful projects have been renewed after the GAP years. Projects vary widely in scope, scale, and audiences that are engaged with the given project.

The following methodological steps were undertaken in order to collect and analyzes the data from the RCE project reports: (1) Formulation of a search strategy to identify and tag data within the text of the RCE project reports; (2) Delineation of the time period for the dataset and data collection through content analysis and data tagging of the RCE project reports from this time period; (3) Data analysis and information processing.

(1) Formulation of a search strategy to identify and tag data within the text of the RCE project reports

In order to create as comprehensive an analysis as possible, the research team decided to use a combination of deductive (starting with a predefined set of codes) and inductive coding (deriving the codes from the data itself) for all of the RCE project reports submitted on the RCE portal for analysis. These codes have subsequently been used to create a codebook as well as to guide the RCEs in project reporting through a series of data tags that allow RCEs to tag their reports with various data labels for categorization purposes. The following categories and data tags were developed by the research team for the codebook:

- **Region:** A deductive code, with data tags developed for regions based on the regional organization within the

RCE Global Network, which is in turn informed by the United Nations geoscheme[1];

- **GAP priority action areas**: A deductive code, with the categories for the data tags being the five GAP Priority Action Areas;
- **Sustainable development goals (SDGs)**: A deductive code, with the categories for the data tags being the 17 SDGs;
- **Audience:** An inductive code, with the categories for the data tags being the intended educational target audience(s) for a given RCE project;
- **Leading organization:** An inductive code, with the categories for the data tags being the type of institution (university, local government, NGO, etc.) that served as the coordinating organization for a given RCE project (though not necessarily the RCE's governing secretariat);
- **Ecosystem:** An inductive code, with the categories for the data tags being the type of ecological setting(s) that a given RCE project was conducted in and about; and,
- **Theme:** An inductive code, with the categories for the data tags being a list of common key words and concepts (for example, curriculum development, traditional knowledge, etc.) that appeared repeatedly within RCE project reports.

For a complete list of all data tags generated by the research team, see Table 1.

(2) Delineation of the time period for the dataset and data collection through content analysis and data tagging of the RCE project reports from this time period

The time period for analysis was then selected to be from 2015 to 2019, the entirety of the GAP as well as the first 5 years following the launch of the SDGs. Once the research team had created the codebook, all RCE project reports submitted during the GAP ($n = 479$) were coded using the data tags from the codebook.

(3) Data analysis and information processing

Following the coding of all of the RCE project reports submitted during the GAP, a quantitative analysis of the data from all of the reports was undertaken by the research team. Quantitative data on all of the data tags for the RCE project reports were uploaded into Microsoft Excel software on a shared drive, allowing for shared access by the research team members. Data entry for each of the RCE project reports was entered by one member of the research team, and validated by a separate member of the research team in order to avoid duplication and check for accuracy in data entry.

After the quantitative data from all of the data tags from all of the RCE project reports had been entered and validated, a statistical analysis of the dataset was run using Excel and SAS Jmp Pro, which included descriptive quantitative analysis, multiple linear regression, and logit regression techniques. This statistical analysis was done in order to quantify to what extent a given data tag appeared in a given category, as well as to describe how the data within the categorical datasets related to one another.

The researchers used this statistical analysis to illustrate trends and gaps among subjects and modalities of ESD activities in the network during the given timeframe. During analysis, the researchers were interested not only in categories that occurred in high frequency, but also those that occurred in low frequency, which can point to gaps, or at least absences, in the data. The following sections are based on this analysis and provide an overview of some of the findings from the quantitative content analysis of RCE project reports from around the world during the GAP.

Results

Regional analysis for RCE projects

A total of 479 RCE project reports from 46 different countries around the world (Figure 2) were submitted to the Global RCE Service Centre during the GAP between January 2015 and December 2019.

A regional overview of where RCE projects emanated from during the GAP is presented in Figure 3, with the bulk of RCE projects coming from Asia-Pacific and the Americas.

In terms of the scope of SDGs that RCE projects addressed, projects that took place in the Americas tended to cover the most SDGs, with four SDGs on average per project in the region. This is compared to RCE projects within Africa, Asia-Pacific, and Europe which tended to focus on fewer SDGs but often in greater detail (Table 2).

Furthermore, RCE projects in Europe and the Americas tended to involve more organizations in the implementation of a project than RCE projects in Africa or Asia-Pacific (Table 3).

In terms of contributions from individual countries, the greatest number of RCE projects came from the United States ($n = 103$), Malaysia ($n = 66$), India ($n = 34$), Nigeria ($n = 29$), and Mexico ($n = 27$). Interestingly, all five of these countries are federal republics, with educational policy often delegated from the national level to the state level. Therefore, RCEs working

1 The RCE Global Network classifies the Africa region as all countries and territories in Northern Africa, Western Africa, Middle Africa, Eastern Africa, and Southern Africa; the Americas region as all countries and territories in North America, Central American, South America, and the Caribbean; the Asia-Pacific region as all counties and territories in Central Asia, Southern Asia, South-Eastern Asia, Eastern Asia, Australia and New Zealand, Melanesia, Micronesia, and Polynesia; and the European region as all counties and territories in Northern Europe, Eastern Europe, Western Europe, and Southern Europe.

TABLE 1 Data categories and data tags for RCE project report coding.

Region			
Africa	**Americas**	**Asia-Pacific**	**Europe**
Global action programme (GAP) on ESD priority action areas			
Priority Action Area 1–Advancing policy	Priority Action Area 2–Transforming learning and training environments		Priority Action Area 3–Building capacities of educators and trainers
Priority Action Area 4–Empowering and mobilizing youth	Priority Action Area 5–Accelerating sustainable solutions at local level		
Sustainable development goals (SDGs)			
SDG 1–No poverty	SDG 2–No hunger		SDG 3–Good health and well-being
SDG 4–Quality education	SDG 5–Gender equality		SDG 6–Clean water and sanitation
SDG 7–Affordable and clean energy	SDG 8–Decent work and economic growth		SDG 9–Industry, innovation, and infrastructure
SDG 10–Reduce inequalities	SDG 11–Sustainable cities and communities		SDG 12–Responsible consumption and production
SDG 13–Climate action	SDG 14–Life below water		SDG 15–Life on land
SDG 16–Peace, justice, and strong institutions	SDG 17–Partnerships for the goals		
Educational target audience			
Primary education	Secondary education		Higher education
Teacher education	Technical and vocational education (TVET)		Community education
Youth non-formal/informal education			
Leading organization for ESD project			
Higher education institution		Non-governmental organization (NGO)	
City government		Other	
Ecosystem			
Agricultural	Coastal or marine		Drylands
Forest	Freshwater		Grasslands
Mountains	Urban		Wetlands
Theme of ESD project			
Agriculture	Arts		Curriculum development
Disaster risk reduction	Eco-tourism		Forests and trees
Plants and animals	Traditional knowledge		Waste

in these nations most likely interact with state-level as opposed to national level government ministries/departments on many policy issues related to ESD.

Analysis of GAP priority action areas for RCE projects

Over half of all RCE project reports submitted during the GAP included engagement with Priority Action Area 5—*Accelerating sustainable solutions at the local level*, while over one-third of all RCE projects reports submitted during the GAP included engagement with Priority Action Area 4—*Empowering and mobilizing youth* (Figure 4). Nearly one-third of all RCE project reports submitted during the GAP integrate Priority Action Area 2—*Transforming learning and training environments* into their ESD activities. Of all of the Priority Action Areas under the GAP, only Priority Action Area 1—*Advancing policy*, had less than 20% of all RCE projects reporting significant engagement with policy processes, whether at the local, sub-national, or national level.

The global trend for engagement with the different GAP Priority Action Areas remains consistent for RCE project reports at the regional level in Africa and the Americas, however differs somewhat for Asia-Pacific and Europe. Nearly half of RCE project reports submitted by European RCEs engaged with Priority Action Area 3—*Building capacities of educators and trainers*, whereas only a little over a third of RCE project reports from other regions reported engaging with teacher training. Teacher training was especially apparent in the ESD activities

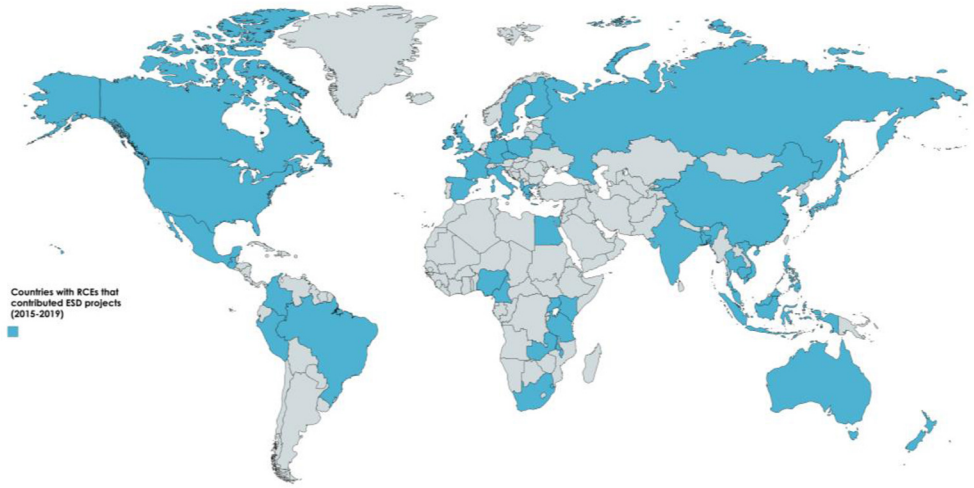


FIGURE 2
Countries with RCEs that submitted RCE project reports during the GAP (2015–2019).

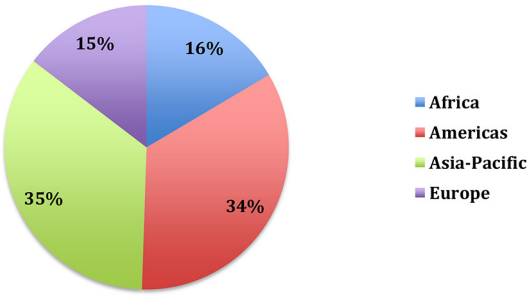


FIGURE 3
RCE projects (n = 479) submitted during the GAP (2015–2019) by region.

of RCE project reports from France, England, Germany, and Scotland. In addition, engagement with Priority Action Area 5—*Accelerating sustainable solutions at the local level*, was present in over half of ESD projects in other regions, but present in less than one-third of RCE projects from the Asia-Pacific region. While all regions submitted RCE project reports that engaged with more than one of the GAP Priority Action Areas, the median number of GAP Priority Action Areas engaged per RCE project was slightly higher in Africa (2) than the other regions.

Analysis of sustainable development goals within RCE projects

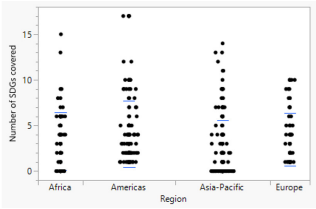
Because all RCE projects are in and of themselves education initiatives, every RCE project reported during the GAP touched upon SDG 4 (Quality Education), specifically positioning activities around Target 4.7 within SDG 4 on Education for Sustainable Development.

Goal 4—Target 4.7—"*By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development*" (United Nations General Assembly, 2020).

Apart from Goal 4, RCE projects within the global RCE network during the GAP also had a significant focus on Goal 13 (Climate Action), Goal 15 (Life on Land), Goal 12 (Responsible Consumption and Production), and Goal 3 (Good Health and Wellbeing) (Figure 5).

The high frequency of RCE projects working on some of the Sustainable Development Goals directly related to environmental governance is to be expected, given that ESD has been formally integrated into many sustainable development frameworks and conventions on the environment prior to the launch of the GAP or the SDGs. These include Article 6 of the United Nations Framework Convention on Climate Change (UNFCCC) and its work programmes, Article 13 of the Convention of Biological Diversity (CBD) and its work programmes, and the Sustainable Lifestyles and Education Programme of the 10-Year Framework of Programmes on Sustainable Consumption and Production (10-YFP on SCP) (2012–2021) (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2014) (United Nations Educational Scientific Cultural Organization, 2014). In fact, all three of these conventions/frameworks are referenced frequently

TABLE 2 Number of SDGs covered by region.

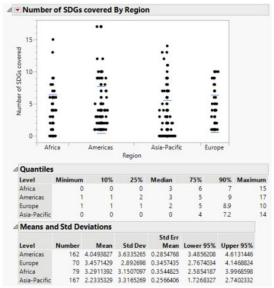


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
Africa	0	0	0	3	6	7	15
Americas	1	1	2	3	5	9	17
Europe	1	1	1	2	5	8.9	10
Asia-Pacific	0	0	0	0	4	7.2	14

Means and Std deviations

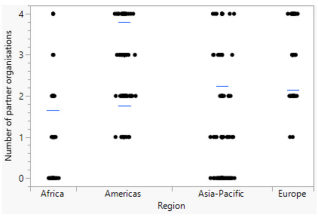
Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Americas	162	4.04	3.63	0.28	3.48	4.61
Europe	70	3.45	2.89	0.34	2.76	4.14
Africa	79	3.29	3.15	0.35	2.58	3.99
Asia-Pacific	167	2.23	3.31	0.25	1.72	2.74



within the RCE projects reporting on these respective topics. The only major exception to this trend among the top four most-cited SDGs is RCE projects working on Goal 3 (Good Health and Wellbeing), which cover a wide variety of health and sanitation issues, but no single framework or convention around health is referenced more than once among all submitted RCE projects. The attention to SDG 13 (Climate Action) in particular—which is the most frequently tagged SDG among RCE projects during the GAP—is supported in the academic literature. Læssøe and Mochizuki (2015) highlight the RCE model as one being used by national governments looking to expand ESD on climate change beyond the formal education sector, with Sung (2015) highlighting the case of RCEs working on climate change education within South Korea as a national case.

Statistical analysis of RCE projects using logit regression, whole model test, and prediction profilers were used to analyzes which audiences of learners were more likely to be the focus of RCE projects on the two most cited SDGs from the RCE project reports. The effect summary and parameter estimates for logit regression indicate that RCE projects that target primary education, higher education, and/or informal youth education are more likely to be focused on SDG 13 (Climate Action), while RCE projects that target higher education are more likely to focus on Goal 15 (Life on Land) (Table 4). While whole model tests for both SDG 13 (Climate Action) and SDG 15 (Life on Land) were significantly different from the null model, the low R2 indicates a lack of fit, meaning there may be variables other than educational audience that influence whether RCE projects focus on either of these two SDGs. Nevertheless, the result of the whole model test provides meaningful information on whether RCE projects are focusing more on these SDGs for specific audiences (Table 5). The prediction profiler further showcases that RCE projects that target primary education, higher education, and/or informal youth education are more

TABLE 3 Number of partner organizations by region.



Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
Americas	1	2	2	3	4	4	4
Europe	1	2	2	3	4	4	4
Africa	0	0	0	0	1	2	4
Asia-Pacific	0	0	0	0	1	4	4

Means and Std deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Europe	70	3.08	0.94	0.11	2.86	3.31
Americas	161	2.77	1.01	0.0	2.61	2.93
Asia-Pacific	167	0.89	1.35	0.10	0.68	1.09
Africa	77	0.59	1.05	0.12	0.35	0.83

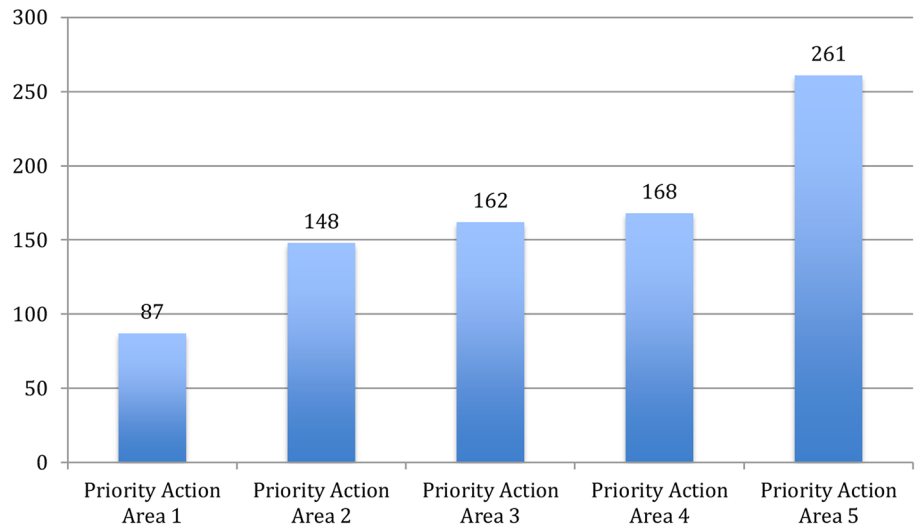


FIGURE 4
RCE projects reports tagged by GAP Priority Acton Area (2015–2019). *n* > 479, as RCEs were able to tag more than one GAP Priority Action Area if the RCE project incorporated more than one. For example, an RCE project may have worked with training youth as educators (Priority Action Area 4), and then facilitated the same youth to work on public awareness campaigns on ESD for an entire community (Priority Action Area 5), thus the project would have two tags for this variable.

likely to focus on SDG 13 (Climate Action), and that RCE projects that target higher education audiences are more likely to focus on SDG 15 (Life on Land) (Table 6).

The predominance of SDGs 13 (Climate Action) and 15 (Life on Land) at the global level of analysis is only seen in one of the four regions—Africa—when looking at a regionalized analysis of the data. SDGs 13 (Climate Action) and 12 (Responsible Consumption and Production) are the top two SDGs within European and Asia-Pacific RCE project reports, while RCE project reports submitted from the Americas most frequently

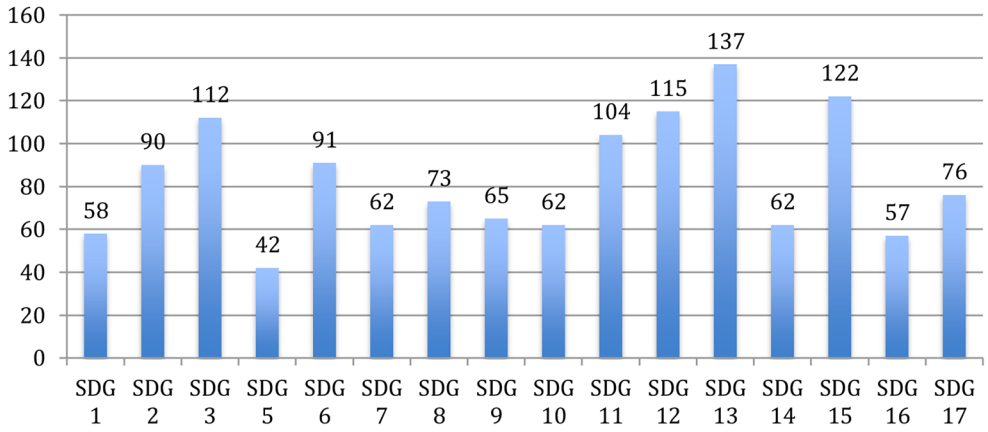


FIGURE 5
RCE project reports tagged by Sustainable Development Goal (SDG), omitting SDG 4 (Quality Education) during the GAP (2015–2019). $n > 479$, as RCEs were able to tag more than one Sustainable Development Goal (SDG) if the RCE project incorporated more than one. For example, an RCE project worked with education to teach how to respond to climate change by forest conservation, SDGs 13 (Climate Action) and 15 (life on Land) would both be tagged.

cite SDG 11 (Sustainable Cities and Communities), followed by SDG 12 (Responsible Consumption and Production), and SDG 3 (Good Health and Wellbeing). SDGs related to the biophysical environment, such as SDG 13 (Climate Action) and SDG 15 (Life on Land) are less predominant in project reports emanating from RCEs in the Americas during the GAP, and when these SDGs are tagged, tend to be integrated in ESD curriculum covering all SDGs as opposed to ESD activities that are particularly focused on either climate change or terrestrial biodiversity conservation. This is a different trend than in ESD projects seen in RCE reports from Africa, Asia-Pacific, and Europe (Figure 6).

Globally, the least tagged SDGs within RCE project reports are Goal 5 (Gender Equality), Goal 16 (Peace, Justice, and Strong Institutions), Goal 7 (Affordable and Clean Energy), and Goal 10 (Reduced Inequalities).

Analysis of audience within RCE projects

The majority of RCE projects in each region targeted multiple educational audiences within a given RCE project (Figure 7). While RCE projects reported during the GAP targeted a wide variety and combination of educational audiences across formal and non-formal education settings, nearly two-thirds of all RCE projects had a non-formal community education component (Figure 8). Typically, these took the form of public awareness campaigns supplemented by symposiums, workshops, and trainings. For projects that target a single audience, community is the largest audience among all RCE projects. Over one-third of all RCE projects reported incorporating a non-formal youth education component, usually with youth taking leadership positions in community education project after receiving training. How these particular projects contributed to empowering youth in terms of capacity building and degree of participation should be further analyzed. This global trend is consistent across all regions.

Within formal educational settings, the greatest proportion of RCE projects occurred in a higher education setting, typically a university in the form of a course or programme of study at the Bachelor's or Master's level. Because information about teacher training activities were reported to UNESCO during the GAP, all projects using the tag for teacher education were counted as a discrete category, whether this included the education of new teachers or the training and up-skilling of existing teachers. As mentioned previously under Priority Actions Areas of the GAP, teacher education was cited as a component of ESD activities in a greater proportion of European RCE projects compared to other regions. Primary and secondary school learners are incorporated into approximately one-fourth and approximately one-third of all RCE projects, respectively. With few exceptions, engagement with both primary and secondary schools tends to be at the individual school level, and not at the school system level. Across all regions, technical and vocational education and training (TVET) was the least tagged for educational audiences, showing a lack of RCE projects engaging with workforces and trades training in relation to ESD.

Analysis of leading organization within RCE projects

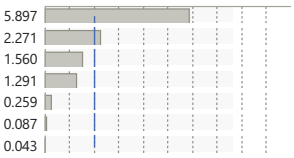
Globally, over half (54%) of RCE projects submitted during the GAP were coordinated by a university or other type of

TABLE 4 Effect and parameter estimates on the likelihood of RCE projects to focus on specific audiences of learners for SDG 13 (Climate Action) and SDG 15 (Life on Land).

Goal 13: Climate Action logit regression

Effect summary

Source	Log worth	P-value
Audience-Higher	5.897	0.00000
Audience-Youth (informal)	2.271	0.00536
Audience-Primary	1.560	0.02755
Audience-Community	1.291	0.05120
Audience-Secondary	0.259	0.55112
Audience-TVET	0.087	0.81822
Audience-Teacher Ed.	0.043	0.90593



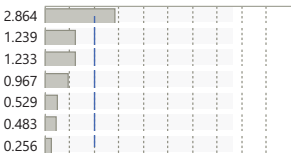
Parameter estimates

Term	Estimate	Std error	Chi square	Prob>ChiSq
Intercept	−0.749045	0.1952943	14.71	0.0001*
Audience-Community[0]	−0.232596	0.120821	3.71	0.0542
Audience-Primary[0]	−0.3385452	0.1526617	4.92	0.0266*
Audience-Secondary[0]	−0.0907794	0.1517935	0.36	0.5498
Audience-Higher[0]	−0.5604995	0.1170946	22.91	<0.0001*
Audience-Teacher Ed.[0]	−0.016835	0.1423291	0.01	0.9058
Audience-TVET[0]	0.04708985	0.2052512	0.05	0.8185
Audience-Youth (informal)[0]	−0.3367467	0.1199658	7.88	0.0050*

Goal 15: Life on Land logit regression

Effect summary

Source	Log worth	P-value
Audience-Higher	2.864	0.00137
Audience-Primary	1.239	0.05774
Audience-Community	1.233	0.05854
Audience-Youth (informal)	0.967	0.10787
Audience-TVET	0.529	0.29552
Audience-Teacher Ed.	0.483	0.32860
Audience-Secondary	0.256	0.55483



Parameter estimates

Term	Estimate	Std error	Chi square	Prob>ChiSq
Intercept	−0.8311992	0.1863886	19.89	<0.0001*
Audience-Community[0]	−0.2286161	0.122749	3.47	0.0625
Audience-Primary[0]	−0.2917894	0.1528631	3.64	0.0563
Audience-Secondary[0]	−0.0916494	0.1546186	0.35	0.5534
Audience-Higher[0]	−0.3759808	0.1175705	10.23	0.0014*
Audience-Teacher Ed.[0]	0.14356042	0.1485028	0.93	0.3337
Audience-TVET[0]	−0.205399	0.1945911	1.11	0.2912
Audience-Youth (informal)[0]	−0.1990235	0.1228975	2.62	0.1054

The symbol * indicates *p < 0.05, which means that the term is statistically significant.

TABLE 5 Whole model test on the likelihood of RCE projects to focus on specific audiences of learners for SDG 13 (Climate Action) and SDG 15 (Life on Land).

Goal 13: Climate Action whole model test

Whole model test

Model	-Log likelihood	DF	Chi square	Prob>ChiSq
Difference	34.86962	7	69.73925	<0.0001*
Full	251.83230			
Reduced	286.70193			
RSquare (U)		0.1216		
AICc		519.971		
BIC		553.038		
Observations (or Sum Wgts)		479		

Goal 15: Life on Land whole model test

Whole model test

Model	-Log likelihood	DF	Chi square	Prob>ChiSq
Difference	19.46794	7	38.93588	<0.0001*
Full	252.33440			
Reduced	271.80234			
RSquare (U)		0.0716		
AICc		520.975		
BIC		554.042		
Observations (or Sum Wgts)		479		

The symbol * indicates *p < 0.05, which means that the term is statistically significant.

higher education institution as the leading organization or secretariat for a project. NGOs were the second most common leading organization, with 30% of RCE projects being led by NGOs (Figure 9).

The role of city governments as coordinating actors on RCE projects varies greatly by region, with approximately 10% of all RCE projects in both Europe and Asia-Pacific headed by city governments, but less than 1% of all RCE projects in both Africa and the Americas led by city government. Indeed, any involvement of city or other local government at all in RCE projects is exceedingly rare in both Africa and the Americas, with less than 3% of RCE projects from either region involving any type of government partners in RCE projects during the GAP period.

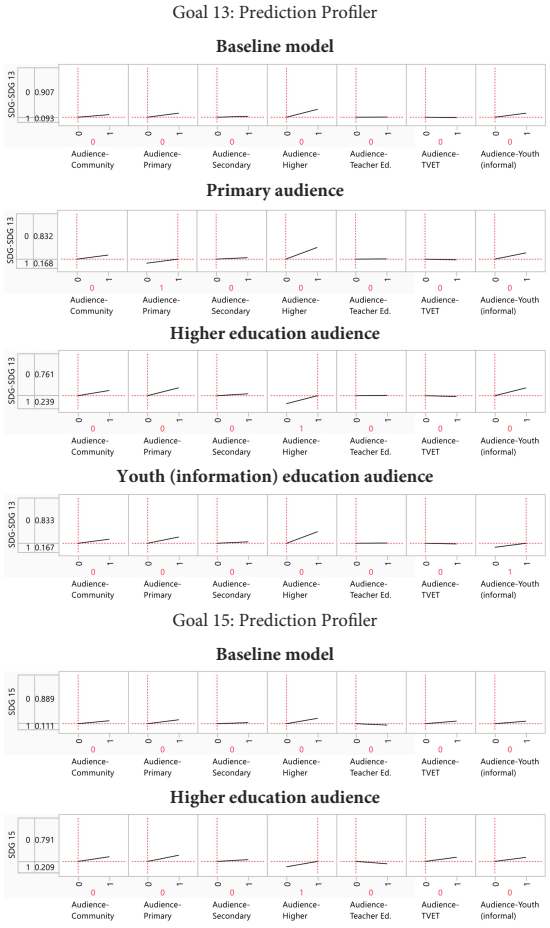
Eleven percent of all RCE projects reported during the GAP were led by actors outside of academia, local government, or the NGO sphere. This assortment includes members of the private sector, local media outlets, museums, national park systems, and UN agencies based in specific localities. Despite a wide range of diversity among these actors, no sector within this group accounted for more than 1% of the lead organizations in the total number of RCE projects reported. With the RCE model being explicitly multi-stakeholder, it is intriguing to observe that private sector actors rarely took on a leadership role in reported ESD activities. Nor did many museums or park systems, despite non-formal education institutions such as these being prolific in non-formal education.

All leading organizations predominantly focused on projects for multiple educational audiences and for community education audiences. However, ESD projects targeting primary or secondary learners only emanated exclusively from higher education institutions or NGOs (Figure 10).

Analysis of ecosystems within RCE projects

Over half (53%) of all RCE projects reported during the GAP had a component on ESD in urban environments. This is perhaps unsurprising, given that the 2018 *Revision of the World Urbanization Prospects* (United Nations Department of Economics and Social Affairs (UN DESA), 2018) (United Nations Department of Economics Social Affairs, 2018) notes that humanity is a rapidly urbanizing species, with 68% of the total global population projected to live in cities by 2050. Many of the RCE projects during the GAP period included

TABLE 6 Prediction profiler on the likelihood of RCE projects to focus on specific audiences of learners for SDG 13 (Climate Action) and SDG 15 (Life on Land).



ESD activities on sustainable urban development, with themes of urban design, food supply chains, waste management, and water consumption recurring frequently among different RCEs. As previously noted, the Americas region was particularly focused on sustainable urban environments, with Goal 11 (Sustainable Cities and Communities) being the most frequently tagged SDG among all RCE projects in the region. ESD activities around housing and transit in urban environments were also significantly higher among RCE projects of the Americas compared to other regions.

Ecosystem settings for ESD activities that also featured prominently in RCE projects during the GAP included agricultural production systems (25% of total projects), freshwater ecosystems—such as rivers and lakes (19% of total projects), and forest ecosystems (17% of total projects; Figure 11).

The bulk of the RCE projects set in these ecosystems focus on the sustainable consumption of resources produced by these ecosystems, such as crops, drinking water, and timber. While RCE projects set in these ecosystem settings stress sustainable usage of resources, the focus of the ESD activities in these ecosystems is very much set in the context of ensuring a high quality of life for local communities. The conservation of resources and biodiversity in forests or fresh water ecosystems tends to be framed anthropocentrically, in terms of what benefits local inhabitants may reap over the long term as opposed landscapes or other species having intrinsic value in and of themselves. However, RCE projects set in more marginal landscapes such as mountains, drylands, or wetlands tend to frame conservation of resources and biodiversity as more intrinsic values in ESD activities. This may suggest that RCEs frame ESD activities around intrinsic values of nature more often when ecosystems are not the target or resource extraction by human populations. Few RCE projects focused on coastal or marine ecosystems, despite a high number of RCEs situated in coastal regions.

Analysis of themes within RCE projects

In order to capture the nuance and diversity among RCE activities, a category titled 'theme' was created from an inductive coding exercise using RCE project reports submitted during the UN DESD. The data tags created from this coding exercise fall outside of any formal categorization linked to a UN agency agenda working on ESD, but are useful in capturing details among RCE projects that would otherwise be overlooked (Figure 12).

The most frequently cited data tag for theme of RCE project reports during the GAP is curriculum development (38% of total RCE projects), referring to the creation of guidelines for a planned sequence of instruction activities. While some RCE projects working on curriculum development reported updating existing curriculum to incorporate ESD principles, the majority of reports highlighted creating new curriculum from scratch. This was especially prevalent among RCE projects led by universities, with educators working in formal education reporting existing curriculum being insufficient. Many reports on curriculum development highlighted existing curriculum being out-dated, with university educators stressing text books and class syllabi were being used for teaching students a twentieth century concept of development in a twenty-first century world. This sentiment was echoed across curriculum development projects for primary, secondary, and higher education.

Additional themes of ESD activities with RCE projects that were frequently cited include traditional knowledge (24% of total RCE projects), waste education (22% of total RCE projects), and individual plant and animal species (22% of total projects). RCE projects incorporating elements of traditional knowledge occurred in over 20% of each region's total number of RCE projects. However, while Traditional knowledge tended to be refer explicitly to the knowledge and practices of Indigenous

FIGURE 6
RCE projects and their SDG focus by region.

Peoples within RCE projects reported from the Americas and the Asia-Pacific region, RCE projects reported from Africa and Europe tended to frame traditional knowledge in terms of intergenerational knowledge transfer and practices from within rural communities. RCE projects that included a focus on the theme of waste education (22% of total projects) tended to champion teaching waste sorting practices, and capitalizing on the 3Rs—reduce, reuse, recycle—many using pedagogies which were introduced in public awareness campaigns beginning in the 1970s (Winans et al., 2017). A number of RCE projects also incorporated themes of teaching about particular plant and animal species (22% of total projects), with most RCE projects using this species-focused entry point as a foundation to conserve a wider ecosystem. While disaster risk-reduction made up a significant amount of RCE projects reported from the Asia-Pacific region—especially in regards to earthquakes, flooding, and tsunamis and explicitly linking to the Sendai Framework for Disaster Risk Reduction– other regions reported comparatively few projects in relation to this theme.

Discussion and conclusion

The overview presented here is a snapshot of RCE activities reported to the RCE Global Service Centre over a specific period of time—from 2015 to 2019—during the Global Action Progamme for ESD. The analysis is meant as a window offering a glimpse of ESD activities within the Global RCE Network during the GAP, and is not meant as an authoritative boundary that assumes perfect information about all RCE activities around the globe. Nor is it meant as a value judgment—when little activity is observed around one given issue, it is not an implicit instruction for RCEs to engage with it, nor when much activity is observed is it an implicit instruction for RCEs to diversify. Because RCEs are localized multi-stakeholder networks, they themselves are in the best positions to decide what the priorities for sustainable development are and should be within their own communities.

Rather, the analysis presented here is a starting point for dialogue about what has been done (and reported) over a 5-year period of activities.

Regional trends

While further analysis will greatly enrich the narratives around this data, clear trends around ESD are apparent in this initial overview. During the GAP period, the majority of ESD projects within the Global RCE Network emanated from Asia-Pacific and the Americas. While all RCE projects are designed to be multi-stakeholder projects with at least two organizations involved, RCEs in Europe and the Americas tended to work with a larger number of partners on average than RCEs in Africa and the Asia-Pacific region. RCEs in the Americas tended to

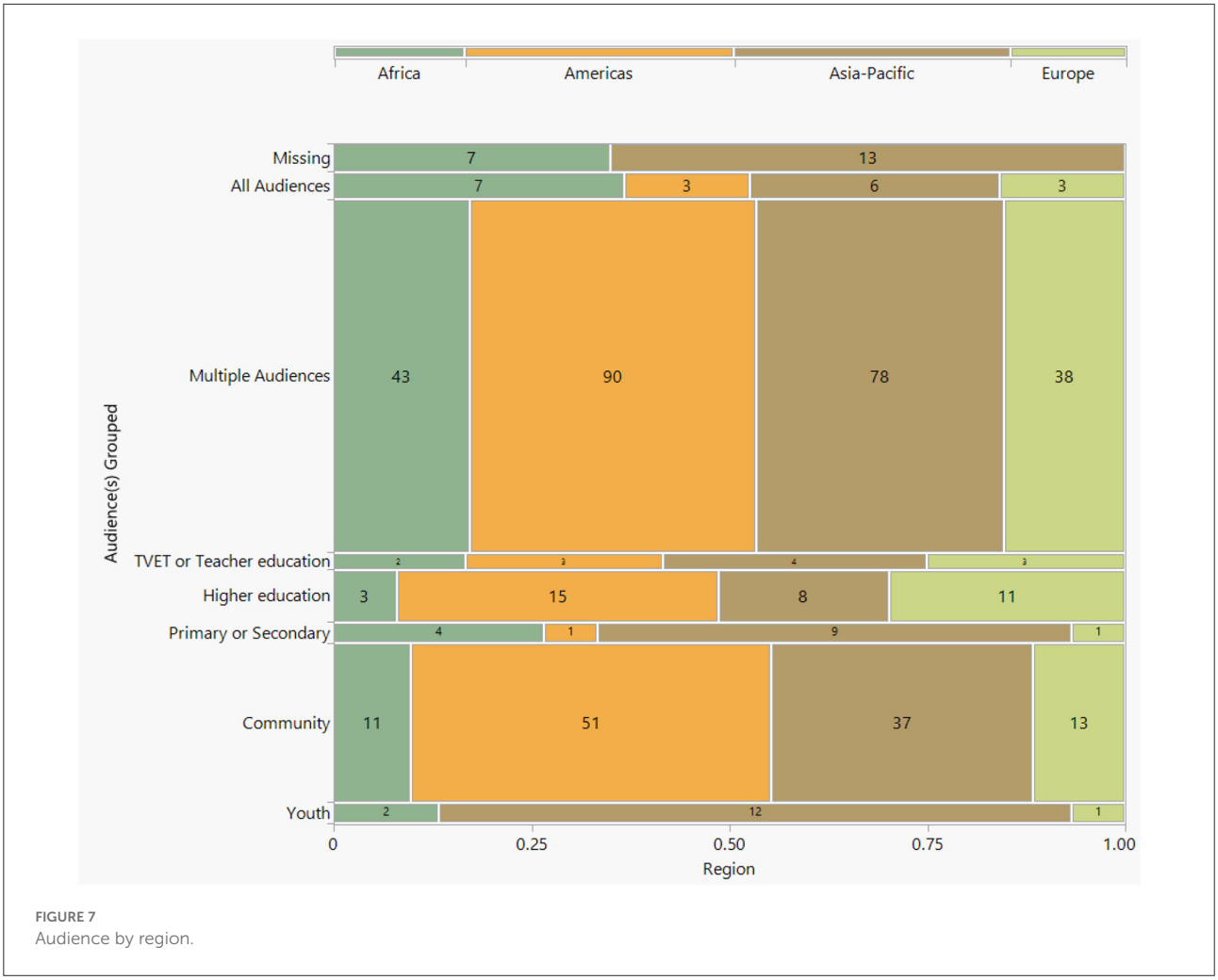


FIGURE 7
Audience by region.

incorporate a greater number of SDGs into ESD projects for a wider breadth of the global sustainable development agenda, while ESD projects from Africa, Asia-Pacific, and Europe tended to focus on fewer SDGs in a given ESD project but in greater depth. In addition, a large proportion of ESD projects came from nations which were federal republics (such as the India, Nigeria, and the United States) where education is devolved by the central government to sub-national ministries of education at the state level. This may suggest that there are more entry points for ESD initiatives in governmental systems where education policy and programming are created at the sub-national level.

Trends in SDGs and priority action areas of the GAP

RCE projects reported during the GAP tended to focus on SDGs related to climate change, terrestrial biodiversity conservation, and sustainable consumption and production. These trends illustrate that the network is continuing to work on ESD work programmes linked to international platforms that incorporate ESD into their work programmes, such as the UNFCCC, CBD, and 10YFP on SCP, which began during the 2000s. This indicates that having work plans that incorporate ESD activities for UN or other international platforms on other topics may stimulate the creation of ESD activities on these other topics, such as gender equity or sustainable energy systems. It is clearly visible in this research that where international platforms have incorporated ESD initiatives into their platforms, ESD projects have proliferated. While climate change and biodiversity conservation appear to be the predominant areas of focus for ESD projects among the RCEs at the global level, this research shows one exception to this trend at the regional level, with health and sustainable cities being predominant areas of focus on ESD projects in the Americas compared to other regions. Furthermore, the focus of RCE projects for climate action and terrestrial biodiversity conservation on audiences of children and youth points to a critical gap in education for adult learners on these topics, especially since adults' decisions and behaviors produce the majority of emissions driving climate

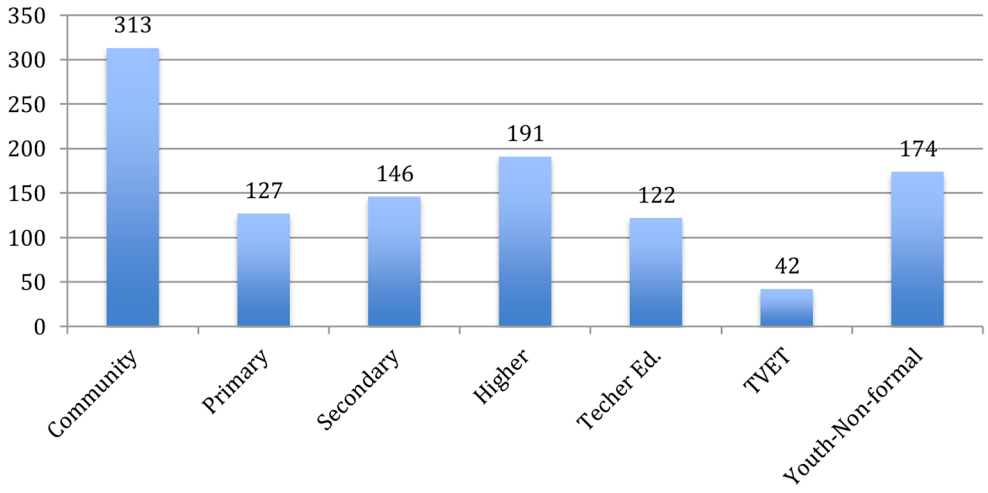


FIGURE 8
RCE projects reports tagged by educational audience during the GAP (2015–2019). $n > 479$, as RCEs were able to tag more than one educational audience if the RCE project incorporated more than one. For example, an RCE project worked with training youth in a non-formal ESD, youth may have then gone on to create a public awareness campaign for an entire community, and the project would have two tags for this variable.

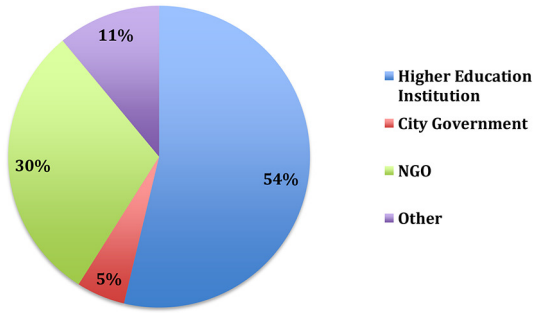


FIGURE 9
RCE projects by leading organization during the GAP (2015–2019).

change and effecting land use (O'Neill et al., 2010). For Priority Action Areas (PAAs) during the GAP, RCEs primarily focused on PAA 5, or community engagement. While most regions only incorporated one of the PAAs into a given ESD project, ESD projects from Africa incorporated two PAAs on average. ESD projects from European RCEs incorporated PAA 3 (teacher training) into ESD projects at a greater frequency than ESD projects emanating from other regions.

Trends in audiences and institutions for ESD projects

While RCEs are explicitly multi-stakeholder networks, universities often take the lead on ESD projects conducted by RCEs. There may be important reasons for this related to institutional capacity and flexibility that are worthy of further examination. NGOs also make up a significant proportion of institutions among ESD projects during the GAP. But while local governments seem to play a role in initiating around 10% of ESD projects among RCEs in Asia-Pacific and Europe, local governments are virtually absent from ESD projects emanating from Africa and the Americas. In terms of audiences targeted for capacity building among ESD projects during the GAP, a high proportion of RCE projects reported on engaging with communities at large under the GAP, but a much lower proportion reported engaging with policy processes related to ESD. Of the RCE projects that did work with government partners, most worked on implementation of activities rather than drafting of policy or the capacity building of policy makers. And those projects that did report on working with policy reported on lack of a clear interface between practitioners and policy-makers, as well delayed schedules and a focus on schools as opposed to educational policies for the general public. By in large, ESD projects targeted children and youth in capacity building, utilizing both formal and non-formal education as an entry point to ESD initiatives within communities. In contrast, engaging with adult learners (other than teachers) is largely absent from most ESD projects during this time period.

Trends in thematic areas for ESD projects

Most ESD projects reported by RCEs during the GAP dealt with creating curriculum, as educators often encountered

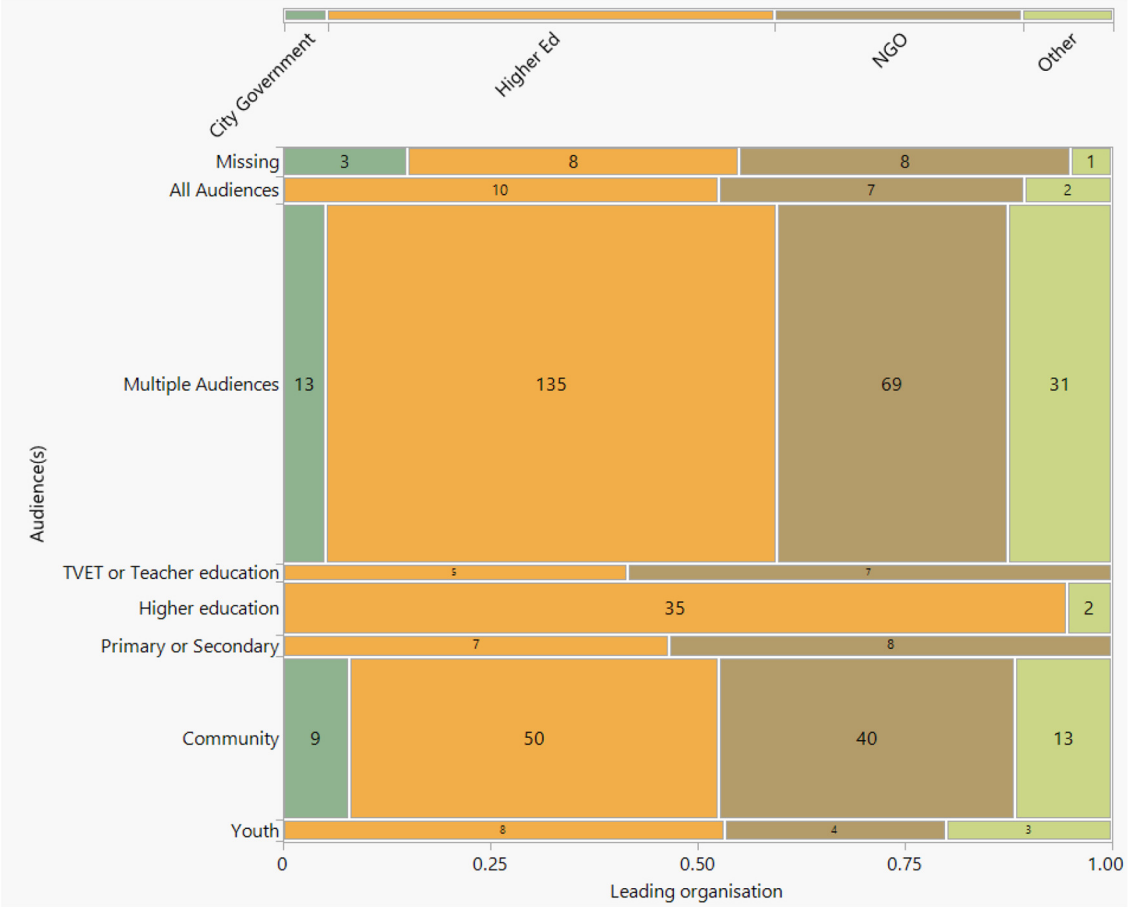


FIGURE 10
Educational audience targeted by leading organization.

a dearth of resources for capacity building in relation to sustainable development in their region. This means that a great deal of an individual project's time was spent on content creation, not only programme implementation. The theme of *waste* was often used as an entry point for ESD projects on sustainable consumption and production models, while the theme of *plants and animals* was often used as an entry point for education on biodiversity conservation, both terrestrial and marine. The thematic area of *forests and trees* was often used as an entry point for ESD projects on both terrestrial biodiversity conservation as well as climate action. Traditional knowledge was incorporated into ESD projects across a variety of topics, but reportedly emanated from different sources across different regions. For Asia-Pacific and the Americas, traditional knowledge tended to refer to the knowledge systems of specific Indigenous peoples, while in Africa and Europe, traditional knowledge tended to be framed as intergenerational knowledge transfer and/or knowledge coming from rural communities.

Limitations

While the ESD projects analyzed here represent a large and diverse dataset, there are of course limitations on the data collection and data analysis within this study. ESD projects are all self-reported from RCEs to an online portal at UNU IAS. The authors fully recognize that access to ICT technology as well as time for voluntary reporting limit the number of ESD projects reported by many RCEs. Furthermore, the RCE portal interface is in English only, meaning an additional burden of translation is placed on RCEs where English is not a spoken language. Many more ESD projects likely were conducted during the GAP, but were not captured in this research for these reasons.

In addition, while all ESD projects are 'completed' in reports—meaning instruction has concluded for a given project, the outcomes of these projects will be ongoing for many years and are difficult to capture at this time. While studies on education in general, and ESD in particular, can document the number of people educated and whether they have

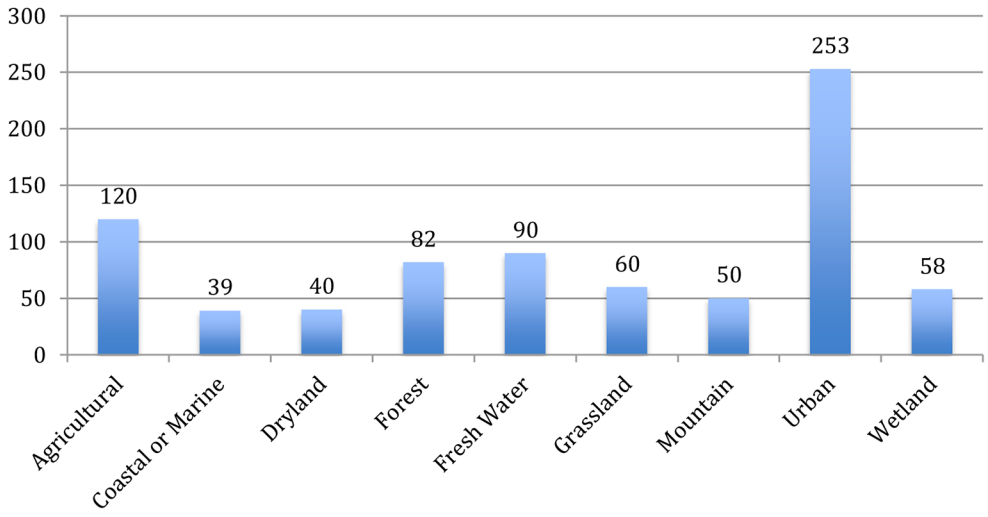


FIGURE 11
RCE projects by ecosystem setting during the GAP (2015–2019). $n > 479$, as RCEs were able to tag more than one ecosystem if the RCE project incorporated more than one. For example, an RCE project worked with training school students about sustainable food supply in an urban setting, it also may have worked with training farmers in an agricultural setting, and the project would have two tags for this variable.

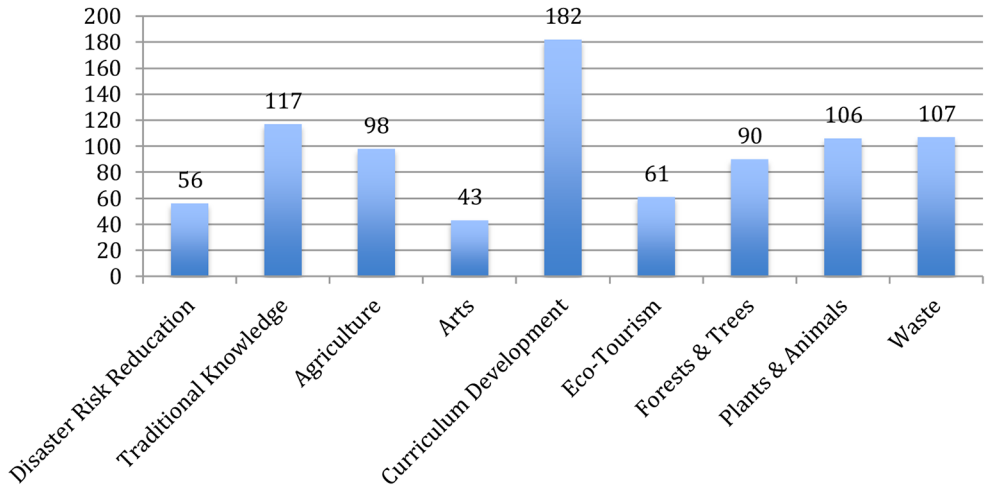


FIGURE 12
RCE projects by theme during the GAP (2015–2019). $n > 479$, as RCEs were able to tag more than one theme if the RCE project incorporated more than one. For example, an RCE project worked with curriculum development may also have worked on incorporating traditional knowledge into curriculum, and the project would have two tags for this variable.

completed a given course with a given grade or score, the desired outcome of ESD is a lifetime of decision making leading to more sustainable behaviors. Longitudinal study of how education has impacted the behavior of learners is exceedingly across many fields from education for health to education for finance, and ESD is unfortunately no exception. While knowledge transfer did occur for all learners in these projects, how this knowledge will continue to shape decision making and behavior over a lifetime remains to be seen.

Suggestions for future studies

Next steps in research may involve examining why given activities were prioritized and how they were implemented within the Global RCE Network or at the regional level, utilizing more in-depth qualitative content analysis of RCE project reports and/or interviews with the actors involved with the implementation of projects. While this study has provided an empirical analysis of what topics in ESD RCEs have been engaging with, a more qualitative investigation using interview

and survey data might get at why RCEs have selected working on various topics as opposed to others. Other future directions of research may involve focusing in on qualitative and/or multi-variable statistical analysis to explore ESD practices around other given themes, SDG, or types of institutional actor within the RCE project database. From the analysis presented in this overview, it is clear there are many stories to tell.

Further research into regional or national differences among which areas of sustainable development are predominant within given ESD content may also reveal important trends. For instance, an investigation into why teacher education was prioritized among European RCEs but not other regions could reveal interesting insights into how the responsibility for ESD if framed through a regional lens. Another avenue of investigation for future research would be to look at the relationship between leading organization and audience reach for ESD projects within RCE networks. Higher education institutions are no doubt crucial for the development and implementation of ESD initiatives, but the role of local governments and other actors in reaching a wider audience should be examined. This would be particularly compelling in understanding how these actors work to educate learners not traditionally attached to formal education.

It is hoped that this research can lay the foundation for future research examining trends, gaps, and narratives relating to the great diversity of ESD activities conducted by the Global RCE Network, both during and after the GAP.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://www.rcenetwork.org/portal/rcemap.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ecocritical analysis of "glocal" essays on Lived Experiences of Climate Change in higher education

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As a "super-wicked problem," climate change deserves a multidisciplinary approach in higher education that actively engages students with this global issue that has both local and regional consequences. The online short learning program "Climate change: from global to local action" combines environmental scientific, economic, and social knowledge. The conceptual model of Lived Experience of Climate Change (LivExpCC) aims at engaging students with climate change and explicitly adds the human dimension. Students write an essay using the LivExpCC-model: they connect their personal and local experiences with regional proximate influences and with broader global contextual influences of climate change. This stimulates the knowledge–reflection–engagement–action cycle. We analyze student essays from an environmental humanities perspective, looking specifically at distances (spatial and temporal distances and distances in interest). The results of these ecocritical analyses show that limited local distances and vivid inherited histories reflect the awareness of students of the effects of climate change and how they engage with it in different ways.

KEYWORDS

climate change education, sustainability, higher education, lived experience, knowledge, multidisciplinary approach, science education, environmental humanities

Introduction

Climate change is an all-encompassing problem and a complex threat to the ecosystem of our planet (Intergovernmental Panel on Climate Change (IPCC), 2021). Environmental scientific research aims at understanding its consequences on both a global and a local scale. In general, within this type of research, the issue of climate change is approached from an "objective" point of view, including that the world that is studied is placed outside the subjective self (De Jong et al., 2013). However, the way individuals, as well as social groups, understand climate change and its consequences is highly dependent on the stories connected to it: experiential narratives ("lived experience") as well as imagined, fictional narratives (visual arts, performances, literature, film, television

series, etc.). Equivalent to scientific data, these cultural narratives may be seen as sources of knowledge that help us to understand and engage with climate change (Hulme, 2009; Perez Salgado et al., 2020). The Lived Experience of Climate Change (LivExpCC) is a people-centered concept introduced by Wilson et al. (2011), Abbott and Wilson (2014, 2015) that connects abstract and global scientific knowledge on climate change with individual and local experiences of humans. This concept re-examines the relationship between humans and the nonhuman world, and it expands the types of knowledge beyond "objective" knowledge from the natural sciences.

Within the discipline of the humanities, scholars investigate how people, through their cultural products, such as art and literature, engage with each other and with their natural environment. With this, underlying values are brought to the surface so they can be questioned and reflected on. Doing this, enables us to actively engage with the diverse aspects of the super-wicked problem of climate change, creating a space for multiple viewpoints on the problem and the supposed solutions. By creating this space, a more diverse population of citizens will be represented in the debate and can contribute to change that is necessary to cope with climate change. Questions considering the relationship between the human and the nonhuman world (nature, animals, and the ecosystem) are specifically relevant in the sub-disciplines of narrative theory, posthumanism, and ecocriticism. Ecocriticism specifically studies the representation of nature and the relationship between the human and the natural world in texts [these can be fictional texts as well as nonfictional texts or hybrid texts (Clark, 2011)] or other cultural expressions such as works of arts (Boettger, 2016), documentary, or film (Furuseth et al., 2020). In contrast to other diverse contemporary literary and cultural critiques, such as poststructuralism, ecocriticism does accept that to a certain degree we know the world as it is. Therefore, ecocritics acknowledge science as a source of truth concerning the natural world which is after all a prerequisite for assuming the influence of the role of human behavior on climate change (Bertens, 2014, 229–230). Although there is not one single method for such an ecocritical analysis, certain themes emerge regularly in ecocritical studies: the way the nonhuman world is represented and in what way the human world is situated in relation to the nonhuman world; whether the interests of humans are depicted as the only legitimate interests; how the human accountability toward the nonhuman world is depicted; and whether nature is a given fact or a process (Bertens, 2014, 226–227). By integrating such questions that derive from the field of the humanities into the discourse of discussing the challenges of climate change and sustainability, a broader view of the challenges is made possible.

Education is one of the most powerful tools that may help humanity to limit and withstand the effects of climate change (UNESCO, 2017). To be responsive to the challenges of the "super-wicked problem" (Levin K, 2012) of climate change, we need to prepare students to contribute to a society in transition. The ecological crisis is also a crisis of—mainly Western—thinking, as it is dominantly organized by the objective/subjective dichotomy. Therefore, it is a crisis in our educational system for this is the very practice that shapes that thinking (De Jong, 2019). There is an urgency for learning as constructing (new) knowledge to modify and expand our thinking competence in dealing with new situations in our modern society (Perez Salgado et al., 2014). This not only calls for more "holistic" knowledge construction but also calls for new didactics to stimulate other ways of thinking and acting (Sipos et al., 2008; Brundiers et al., 2010; Caniglia et al., 2016). Creating climate change education that fits a resilient future society asks for a truly new educational design, creating new, multidisciplinary, and interdisciplinary knowledge and new ways of thinking (Horn et al., 2022).

Theoretical background

The people-centered concept of the "Lived Experience of Climate Change (LivExpCC)" was introduced by Wilson et al. (2011) to address the human dimension in CCE: individual and local human experiences considering climate change are accepted as valid sources of knowledge. The conceptual model is people-oriented and explains scientifically that there are simultaneously multiple perspectives on a sustainability process. The concept is visualized by a learning–action cycle with the elements of knowledge–reflection–engagement–action (Figure 1, middle), based on the experiential learning theory of Kolb (1984). The knowledge includes "exact" scientific facts and "experiential" situated knowledge (Haraway, 1988, 2015, 2016), accumulated during one's lifetime in a certain place at a certain time (and with a specific [socio-economic, gendered] history). The different types of knowledge are integrated into a person and lead to reflection on that knowledge. This may lead to action through engagement in the immediate environment and in the event of an acute threat. This process also takes place on a collective level when individuals group and unite. Individual experiences can be translated to collective experiences when citizens exchange their ideas and organize with respect to the threats or dangers that matter. This model also maps regional influences and factors that are relevant to the specific situation, as proximate (Figure 1, middle circle) or broader contextual influences and factors as glocal (Figure 1, outer circle). Finally, the model also pays attention to the effects of power on knowledge development (Foucault, 1980). This holistic and integrated approach provides insight into the most important aspects for individuals (and groups) that play in their nearby specific climate change issue. Also, it might contribute to their knowledge and actions in their immediate living environment.

The Lived Experience of Climate Change concept connects individual and local experiences *via* regional influences and

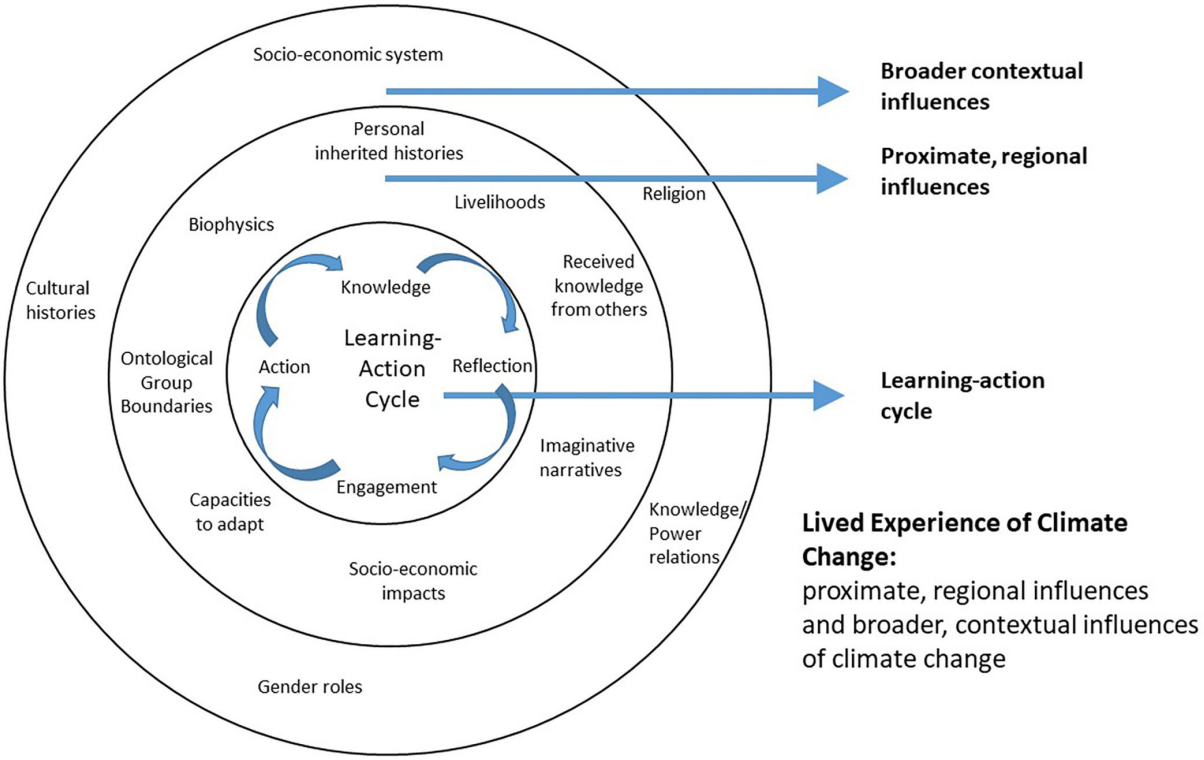

FIGURE 1
Visualization of the concept of the Lived Experience of Climate Change [based on: Perez et al. (2022)—accepted for publication]. Three iterations can be discerned on the following levels: 1 **(inner circle)** the individual learning–action cycle; 2 **(middle circle)** the regional proximate (local) influences; 3 **(outer circle)** broader and more long-lasting contextual (glocal) influences.

broader contextual influences and power relations to the global climate change crisis. This creates a learning environment that we can refer to as "glocal." In doing so, we align with the meaning this term has in higher education for sustainable development, as defined by Caniglia et al. (2018). Glocal refers to a learning environment that enables students to relate global and local knowledge, experiences, and engagement in relation to ontology, epistemology, and ethics. Glocal ontology acknowledges the interconnectedness of diverse local and global realities, deriving from, for instance, political and cultural processes. Glocal epistemology acknowledges that sustainability issues ask for the connection of local and global considerations. Glocal ethics acknowledges normative and ethical implications of knowledge as knowledge indicates social actions in both global and local contexts and questions the existing systems of values and power (Caniglia et al., 2018, 369). These three components are found in the LivExpCC model that at the same time visualizes their underlying structure. In the current study, our aim was to investigate how students in higher education engage with their local lived experiences and their global context, using an ecocritical lens on essays that were written as part of the Master's course The LivExpCC (~80 study hours). We examine what insights an ecocritical analysis that derives from the humanities can provide in understanding how students internalize a holistic approach offered in climate change education. This analysis can contribute to defining starting points in the program for future extension of the multidisciplinary character of courses where the discipline of the humanities can play a meaningful role. This would meet the call to develop Climate Change Education (CCE) in an inter-/multidisciplinary manner (Horn et al., 2022) and also specifically to involve the humanities in this (Allison and Miller, 2019). The added value of humanities in approaching climate change is also explained and illustrated in the special issue "Environmental Humanities Approaches to Climate Change" (introduced by Higgins et al., 2020). By offering critique and "analyzing, nuancing, and challenging totalizing narratives" (Higgins et al., 2020, 1), the humanities can, for instance, stimulate underprivileged groups to respond to climate change, help to frame climate change-related issues and narratives in a socially just way, and encourage students to think critically about these issues (Higgins et al., 2020, 2–3). A critical mindset is one of the characteristics that students should develop to address sustainability issues, and that is also one of the specific aims of a glocal curriculum (John et al., 2017, 19).

Methodology

We analyze student essays from the Master's online course LivExpCC (∼80 study hours). This course is part of a so-called Short Learning Program "Climate change: from global to local action" (∼300 h) and was developed in cooperation with three universities, namely, Universidade Aberta (Portugal), UNED (Universidad Nacional de Educación a Distancia, Spain), and the Open Universiteit (the Netherlands). A glocal curriculum that enables students to connect global and local interconnectedness and interdependency ideally bring together students from different countries (John et al., 2017, 20), as was the case in this course that was followed by students from the Netherlands, Portugal, and Spain. Moreover, the course meets the three principles of a glocal curriculum described by Caniglia et al. (2018, 369); it includes knowledge from local to global contexts and scales, the course has a transnational setting based on collaboration, and in the course, digital technologies are combined with experiences and engagement in local contexts. The course takes a competence-based approach and aims at connecting knowledge with transformative action, as described by Dlouhá et al. (2019), and in the competency framework for sustainability (Wiek et al., 2011; Brundiers et al., 2020). The course ran from February until June 2020 and coincided with the start of the COVID pandemic. The aim of the course is to introduce the concept of the LivExpCC and its potential contribution to policy and actions for adaptation and mitigation. The course aims to inform and analyze information about climate change from different perspectives, whereby scientific, political, economic, and social knowledge is integrated, applying the conceptual model of LivExpCC. The course also aims to discuss the different adaptation and mitigation measures of climate change that humans can implement to improve and cope with their environmental surroundings. Students write an essay (that is graded) in which they choose a subject close to them and demonstrate knowledge and understanding of the concept of the LivExpCC, and the contextual aspects of people's lives, on an individual and collective level. They also critically learn to analyze whose lived experience counts: from practical knowledge to knowledge as a power. The essays (∼3,500 words) are graded according to several criteria that the students get at the start of the course. These include describing a specific example or case of the Lived Experiences of Climate Change in the vicinity or elsewhere (city, region, country). The essay should show elaborations of individual lived experiences, collective lived experiences, effects of power/knowledge relations (regimes of truth), and a final conclusion where a connection is made between previous results with policy (making) on climate change, and the student's reflections on this connection.

Three essays were selected for an *ecocritical analysis*, where students chose a regional subject and provided an extensive analysis of the LivExpCC model. For reasons of spreading, we chose one essay from each participating country; the essays were chosen at random (no further selection criteria). Because we provide an in-depth analysis of each essay, we had to constrain ourselves to three essays. Performing an ecocritical analysis of cultural products means that the representation of the natural world in these products is studied. By connecting these representations to meaningful frameworks (such as moral and esthetic), the attributed function of nature appears explicitly. Because of the emerging awareness of human influence on nature and climate, as well as the shifting viewpoints on the Western, dominating relation with nature, ecocritics concentrate on the position of the nonhuman and critique the traditional human-centered viewpoint. This results among others in interest in questions relating to scales. Originally, ecocritics focused on literary texts, but the field of vision has expanded and included nonfictional texts as well as works of art, film, and documentary. The essays that students wrote for this academic course form an interesting new medium to submit to an ecocritical analysis. A notable starting point is, however, that the essays we analyze here are *inherently* human-centered for they were part of a course on the Lived Experiences of Climate Change. Students were asked to engage with their own experiences, after having gained scientific, political, economic, and social knowledge in two previous modules. The concept of the learning–action cycle is also human-centered and shows the relation between knowledge and action. The ecocritical analysis still enables us to extract the relationship between the students and their (natural) environment. Moreover, due to the LivExpCC model, students will relate local and regional data to a more global scale as well as looking at diverse points in time (looking backward as well as looking forward). We base our ecocritical analysis largely on the work of Ameel (2017), who specifically looks at *distances* between humans and the natural nonhuman world. In the current analyses, we look at three types of distances, namely, distances in location, time, and interests.

Materials

The first essay is written by Raquel from Spain. She describes the Ebro Delta, which has suffered a deep transformation during the last decades and is extremely vulnerable to the effects of global warming. The second essay is written by Paulo from Porto in Portugal. Here, the sandy coastline is decreasing due to climate change (rising sea level and the increase in extreme weather). This has consequences for nature and human use of the coastline. The third essay is written by Sanne from the Netherlands, and she chose climate depression in the Netherlands as her subject. She does not suffer from this herself but knows diverse persons in her surrounding that do suffer from it.

Extreme storms on the Iberian Peninsula vs. indirect impacts of cc in the Netherlands

Essay 1: Raquel (Ebro Delta)

Raquel describes her lived experiences of a place she visits regularly since childhood: the Ebro Delta on the east coast of Spain. Her knowledge is expanded through the transmittance of lived experience to her by her uncle Manolo for some 60 years. So, one generation of experiences is added to her own lived experience; this personal inherited history is a proximate influence of her LivExpCC. This LivExpCC is further extended to the past by referring to a broader contextual influence of cultural history, namely, the history of agriculture in the Ebro Delta, which she explicitly frames as a "human cohabitation with the natural ecosystem." By this, she more or less seems to refer to a stable balance between culture, agriculture, and nature throughout a longer period. This balance is now being disturbed. This can be concluded from the individual observations from Raquel and her uncle, considering, for instance, the sea moving land inwards, but also from the proximate and broad collective influences. Most obvious for Raquel was the storm "Gloria" (January 2020) that hit the Ebro Delta only a few months before she wrote her LivExpCC essay and which she connects to the knowledge that was already available as a lived experience of her uncle:

> *"So, Manolo has the historic memory of the progressive transformation due to human action and we both have the proof of what an extreme natural event additionally has. [. . .] Human activity has led to this situation due to construction of water infrastructures that have changed the dynamics of the area."*

With help from the LivExpCC model, Raquel connects types of knowledge from local (including knowledge on the economic infrastructure of the area and scientific knowledge on the complex ecosystem of the delta and its biodiversity, the balance between fresh water and saline water, and the degenerative dynamics of the deltaic plain) to global scales (the predictions considering the rising of the sea level due to melting polar ice and the rising temperature of seawater). Meaningful is the consensus that already seemed to exist between the inhabitants of the Ebro Delta considering the problems they face in their living environment, which have increased as more entities became interested in the protection of the natural spaces in the delta. Inhabitants together opposed the building of dams, initiated by the central and regional governments. The knowledge of the area of the inhabitants made it clear dams would break the balance in the delta. However, the government was not interested in this knowledge, nor did it intend to gain any other knowledge on the area and the effects the dams would initiate. Storm Gloria served as an eye-opener to the governments. This one-time disaster of extreme weather served as a warning and a vision of the future. Instead of trusting the LivExpCC of local inhabitants, a taste of the future was necessary to persuade a distant government of the upcoming threat of climate change. The value of this storm as a source of knowledge for a distant power agency brought Raquel insight into the importance of connection and belonging in the learning–action cycle: not only can different pieces of knowledge be connected to each other, so that a broader vision is possible, but also the urgency of action is enhanced.

Essay 2: Paulo (Porto)

In Paulo's story of the Portuguese coastline, and more specifically the coastline near Porto, many sources of knowledge come together, indisputably creating urgency considering the threats of global warming. These sources of knowledge include data on temperature and weather conditions, future scenarios, but also personal experiences and personal inherited histories.

Paulo characterizes specifically coastal areas as zones that "assume an increasing strategic importance in environmental, economic, social, and cultural terms," which implies diverse types of knowledge. These are indeed available, and Paulo focuses on scientific data on temperature rise and the increase in extreme weather conditions. Moreover, two future scenarios have been calculated that indicate how the coastal line will look in 2,100. However, although the diverse types of knowledge he observes create an evident image of the threats of global warming to this local environment, any coherence seems to be lacking in policymaking. This lack of coherence speaks directly from Paulo's description of the learning–action cycle (first iteration) of the LivExpCC model when he tells how he has visited Madalena beach. Paulo, who is originally from Porto, not only draws from his own experiences since childhood but also explicitly states his experiences are "enriched" by those of his parents (born in the 1930s), a personal inherited history that serves as a proximate influence on Paulo's learning–action cycle. The knowledge he gains from his lived experience, therefore, goes back one generation. Over this time, he has collected observations of himself, his parents, and friends considering changes in the coastal area: changes in the amount of sand on the coast, changes in extreme weather, and changes in the occurrence of sea life. Striking is the way he now visits the Madalena beach and his perception of the area, compared with how he and his father visited this beach in his childhood and how the area looked like then:

> *"I want to share the lived experience of the drastic alteration of dozens of kilometers of seafront, that I've frequented for over fifty years, in the summer and frequently during the winter, practicing winter sports. My father took us camping near one of the beaches I still go today, Madalena Beach, due to the legislations and real estate market, it's only possible to camp in one authorized camping ground.*

> *The entire coastal area evolved so to satisfy mainly tourist demand. Most beaches along this coastal area had at almost twice the sand we have today, the sea was not as "brutal", being a rocky coast, sea life was abundant and was easy to find, different types of molluscs (mainly mussels), also octopus, today most of this life has disappeared. Friends of mine, amateur fishermen, have told me that it seems to be more difficult to catch fish on the coast line and even along on the Douro River bank (Douro River), than a few years ago."*

Local inhabitants cannot freely go to their coastline due to the privatization of the area. Paulo describes the collective proximate influences and the broad influences. This enables him to connect what is happening at the coastline near Porto to what is happening on a global scale due to climate change. This results in an image of the availability of an extensive and broad amount of knowledge (on temperature, erosion, and rainfall, all calculated through scenarios). However, the missing connection to actual policymaking is repeated on an ever-increasing scale from local to global. The concrete outcome of this lacking policy manifests itself in the further construction works on the coastal area. Besides all the data and scenarios, an actual storm in the winter of 2014 acted as a warning and made clear what will happen in the future. Even despite this very tangible visionary, no action has been taken or a change in policy has been made. So, political and economic pressure and prioritizing short-term investments did not only detach Paulo from his Madalena beach, but it does not acknowledge the collective types of knowledge of the local residents for the action that would be needed.

Essay 3: Sanne (The Netherlands)

Sanne has climate depression in the Netherlands as the subject of her LivExpCC essay. Climate change-related depression has set foot in the Netherlands, although no exact numbers of sufferers from this form of depression are available yet. Although Sanne does not suffer from climate depression herself, the fact that many of her friends do enables her to choose this as a suitable subject for an account of LivExpCC. Sanne stresses the strong relation between the impacts of climate change, a person's lived experience, and the impact of depression on engagement and action: essential parts of the learning–action cycle. For several people, climate depression is a trigger to engage in climate activism; for others, climate depression like other forms of severe depression is precisely what prevents them from taking any action. The choice made in this essay to discuss the situation *in the Netherlands* was prompted by the author's place of residence. There are her friends and acquaintances located that inform her of proximate influences: personal inherited histories of dealing with climate change-related depression, mainly of people involved in climate activism (such as Extinction Rebellion). Furthermore, Sanne links sensitivity among Dutch people for climate depression to the Dutch past, the Netherlands being an aggressive colonizer and slave trader. According to Sanne, the Dutch are said to feel consciously guilty about the impact of their own actions on climate change, which mainly causes damage elsewhere around the globe. Other types of knowledge Sanne includes are related to psychological knowledge on depression and policy. She describes how climate activists suffering from climate depression value scientific knowledge on CC:

> *"I am in close contact with someone with CC related depression who joined XR [= Extinction Rebellion] last year and saw him change his view and thoughts on what impacts CC has and will have on the world. He used to always base his view on scientific knowledge, but now seems to rely even more on information from within XR than anything else. If scientific publications show less destructive predictions than thought of within XR, he is very skeptic on the quality and background of the research, where he would not have been before joining XR. Which (...) could make one argue that joining an action group could even worsen CC related depression."*

However, this scientific knowledge itself is not directly relevant to her essay, which aims at relating climate depression to policymaking. This Dutch manifestation of depression has an important characteristic: in the Netherlands up to 2021, climate depression was mainly caused by a confrontation with the *indirect* consequences of climate change. Although direct consequences of climate change are indeed noticeable in the Netherlands, such as raising average temperatures, the direct threats are more pressing in the Global South, which Sanne acknowledges in her essay. She explicitly notes that she did not find any accounts of climate depression in the Netherlands caused by direct impacts. In the meantime, the unusual and severe flooding in the southern part of the Netherlands in the summer of 2021 (the essay was written in the spring of 2020) has changed this for the residents living in that part of the country.

Although one might think that depression negatively influences willingness to act and therefore the "action" in the learning–action cycle, Sanne seems to describe an opposite effect that only seems to apply to a part of the people suffering from this type of depression. For them, climate depression actually leads to actively engaging in climate activist groups. According to Sanne's experiences, the negative effects of climate depression are to be found in other parts of the learning–action cycle, namely, the knowledge and reflection, and concern the extent to which people value the outcomes of new scientific research. In general, knowledge derived from the natural sciences on climate change is valued high among climate activists. For those who suffer from climate depression, however, it seems that only the most negative scientific scenarios that correspond to the convictions that foster the feelings of climate depression are considered *true*. Scientific knowledge and other types

of knowledge provided by proximate or broad contextual influences that are inconsistent with these most negative scenarios are depreciated. This triggers Sanne to consider the feelings and experiences of sufferers of climate depression a useful source of knowledge for policymakers because it can bring related problems on health to the surface. Prioritizing and communicating policy may be done differently, so it will lead to ways to better create support and engagement among citizens.

Results

Having summarized the essays, we show the results from the ecocritical viewpoint, specifically addressing the *distances* between the human and the natural or nonhuman world, considering location, time, and interests. With the concept of spatial distances, we look at locations of the personal, inherently human-centered experiences and the connection to locations of the natural world that are made. With temporal distances, we investigate the span of the narratives that are described in history and the future, and how this time span is connected to present-day experiences. Our third focus point is interests: what weight is given to diverse stakes and in what way are the human interests related to the concerns of the nonhuman world?

Spatial distances in the human and nonhuman world

All three essays acknowledge the global character of climate change, both causes and effects, and the huge local differences that these have. The first two essays, both originating from the Iberian Peninsula, describe places located on practically the same latitudes: the first is situated on the western coastline facing the Northern Atlantic Ocean and the second is situated on the eastern coastline of the peninsula that borders the Mediterranean Sea. These essays remain close to their own living environment, and they connect it to the global consequences of climate change including sea-level rise. Both students describe places they feel connected to; the spatial distance is close. These sentiments of attachment are reinforced in both narratives by emphasizing the connection is already existing for more generations in the family, and that is still valid for several family members: there is a collective connection that spans more than one lifetime, but not more than two generations. Older family members pass knowledge of the areas and experiences with it on to the students who expand their own knowledge and views. However, the rapid changing of the local environment seems to make inhabitants feel detached from their living environment. A prime example of this is the limits to visiting one's own coastal area as described by Paulo, which seem to be in line with the low appreciation by governments for local lived experiences as sources of knowledge. This detachment of humans and their living environment seems to be illustrative of the missing coherence between the diverse sources of knowledge and the willingness to implement appropriate local- and regional-based policy.

Although climate change is evidently acknowledged as a global problem, the focus is on the direct consequences for the students' own living environments and the consequences for different layers of the population of the areas. The vulnerability of coastal strips worldwide is acknowledged, but the focus stays on the local situation. Contemplating the effects of global warming, both Iberian essays recognize the nonhuman world explicitly by looking at local wildlife and sea life, vegetation, and the natural environment, although these environments were created by humans. The balance between the human and the natural world is always the starting point of thinking about these environments: this balance is measured using human-centered values.

The third essay describes climate depression in the Netherlands, although it states that climate depression can also occur elsewhere. Sanne chooses the Netherlands because she lives there and the sufferers she knows personally also reside there. They are part of her immediate environment and are therefore proximate influences. Climate activists are mentioned as a specific group where climate depression can occur, caused by indirect effects of climate change (although this may have changed since the flooding in the summer of 2021, i.e., after Sanne wrote her essay). With this, the author makes a significant choice. The Dutch essay links depressive feelings about climate change mainly to the situation outside the Netherlands because of the direct impact of global warming yet is limited in the Netherlands. Sanne adds a reflection on the feelings of guilt that she links to the colonial past of the Netherlands. However, it is likely that this observation is mainly shared in left-wing activist circles of which Extinction Rebellion is part of and this reflection is not widely spread in the Dutch population. Although Portugal and Spain also have colonial pasts and involvement in slavery, a similar reflection on guilt and the colonial past is not part of the Portuguese and Spanish essays. This subject does not seem to be directly relevant to these cases that focus on the *direct* local and regional impacts of climate change. Where the Dutch student already links the current situation in the Netherlands with their colonial past, she does this in a very limited way by trying to explain the feelings of guilt felt by the Dutch. However, the transfer to a sustainable society raises many moral questions related to inclusion and white privilege, power, and post-coloniality. In the Intergovernmental Panel on Climate Change (IPCC)'s (2022) latest *Mitigation of Climate Change* report, "colonialism" is finally included as a driver of the climate crisis but also as an ongoing problem that increases the vulnerability of communities to it. A more extensive relationship between the local lived experience and the power relations in the past and present in these essays could not only expand the case itself

but also lead to more realistic and inclusive handling when considering possible solutions for both the human and the nonhuman world.

Temporal distances in the human and nonhuman world

Both Iberian students include the past in their essays: Raquel mentions that rice has been grown in the Ebro Delta for two centuries. Paulo looks back at his childhood and covers therefore about 50 years in which he (and his father) in their leisure time frequented the natural environment close to their home. Both students describe the changes in the area since one generation above them: these developments are outlined by observations of themselves and family and friends (such as the coastline retreating and less fish caught). These observations are linked to scientific data such as measurements of salinity in the Delta. The Dutch student mentions the colonial past of the Netherlands, which she relates to part of the Dutch being sensitive to feelings of guilt, but she does not explicitly include a more personal past to the case she describes, presumably because climate depression and the related terms eco-anxiety and solastalgia are relatively new concepts.

Similar to the past, visions of the future play a prominent role in the essays. Partly, scientific future scenarios were used to complete the LivExpCC. Next to this, visions of the future were included in relevant policies. Both Iberian essays speak explicitly about the particularly vulnerable status of both areas to the effects of climate change: the impact not only is great now but also threatens to be much greater in the future. Next to the gradual changes that have been visible to the students and their families in previous years, both essays explicitly mention a recent storm as a turning point: the storm "Gloria" in January 2020 near the Ebro Delta and the winter storm that wreaked havoc near the coast of Portugal in 2014. The specific storms with their extreme waves feature as visible turning points: both storms destroyed things that can never be restored. Raquel states: '[….] *the strong waves provoked by "Gloria" awashed farmland that will no longer recover*'; Paulo writes: '*The sea came with extreme violence, destroying almost all these facilities along the several kilometers of beaches, in some cases it was not possible to rebuild [...].*' In the case of the storm "Gloria," Raquel observes that it has an impact on the awareness of the diverse local parties, and this affected local policymaking. Paulo did not see effects in policymaking after the 2014 storm he described in his essay.

Although the Netherlands can be seen as a vulnerable area in view of its partial location below sea level, the Dutch essay does not discuss the direct impact on the living environment in the Netherlands now or in the future. This may have to do with the dominant narrative of the Netherlands as the master of the water: coping mechanisms are culturally determined. Also, at the time, no climate change-related floodings happened yet (this changed in July 2021, a year after Sanne wrote her essay). Although Sanne does not include a historical view on the Dutch dealing with water, currently Dutch scientists and water management policymakers are interested in these historical data on the Dutch landscape and the dealing with water.

The views of the future that Paulo describes and uses for his LivExpCC analysis are mostly based on scientific predictions up to the year 2100 of temperature rise and sea-level rise. Raquel and Sanne focus on more short-term use of the experiences for policymaking that should have an impact on short notice. Including specifically a more extensive *historical* viewpoint that explicitly includes attention to the natural world may provoke thinking about alternative ways of living and dealing with the natural world, which also may affect the views on future goals worthy of pursuing.

Distances in the interests of the human and nonhuman world

The interests of the human and nonhuman world may be intertwined considering accelerated global warming (e.g., loss of biodiversity will affect food production for people). In that sense, this interrelatedness can be put forward in these essays that start from a human-centered perspective. There is a clear division between the representation of nonhuman interests in both the Iberian essays and the Dutch essay, which may be related to the experiencing of direct impacts of climate change or indirect impacts of climate change. These differences emerge when describing solutions: exactly which problem has to be solved?

Both Iberian essays describe areas that have long been influenced by humans for economic reasons. The fact that people live together with nature is mainly colored by an anthropocentric perspective (agriculture and tourism). The landscapes and their uses are linked to climate change and sea-level rise and loss of economic yields now and in the future. The area of the Ebro Delta has been inhabited and cultivated by humans for centuries, the cultivation of rice that set in motion the current economic development of the area started about two centuries ago. For the Porto coastline, tourism seems to be of great economic impact and has been important for decades. However, the expansion of tourism in this area has not only economic consequences but also made certain areas inaccessible to local inhabitants. By losing the possibilities of personal experiences of wild camping, local inhabitants have fewer opportunities to connect with and be a part of their natural environment.

The Iberian essays look for solutions that call for governments and residents and their different interests to be more aligned. The Dutch essay also sees a role for the

government in a problem, although it is a psychological problem. The surplus value of including policymaking is only formulated by Sanne as useful for humans as it is good for their psychological health. The fact that depression can have a paralyzing effect and therefore negatively affect the willingness to act remains implicit in the proposed solutions. Climate depression is, of course, an anthropocentric concept, but it can have effects on the willingness to take action and thus have negative consequences for the mitigation of climate change.

Discussion

Integrating the humanities in Climate Change Education (CCE) seems a promising route using the LivExpCC model. The humanities may increase the level of attending critique, nuance, and multiple perspectives to the current model, which is important for education on sustainability issues (John et al., 2017, 19). It may also increase students' awareness of diversity and enable them to acknowledge this as well. This then will lead to a better ground for transnational collaboration and possibilities of knowledge production with fellow students in a glocal curriculum. Specifically, ecocriticism shows to be a promising paradigm for the expansion of the LivExpCC model. Adding the subsequent discipline of ecocriticism, embedded in the humanities, as a source of knowledge in the learning–action cycle, students may be more actively challenged to question and nuance their LivExpCC analysis of the complex matter of climate change. Explicitly questioning the human-centered starting point of the model in CCE may make room for a more broader view on the matter and therefor nuance the base values of the students in their LivExpCC. Questioning anthropocentrism, which is now lacking, could enrich the essays and with this add to the paradigms that lead to thinking about actions and solutions that eventually lead to policy recommendations. Also, intended goals may be critiqued and choices for aiming at certain goals can be nuanced or adjusted.

This field of scholarship seems to be a fruitful addition, and with this approach, the evaluation of the students' essays may be enriched as well. Therefore, we plan not only to integrate the humanities to improve the didactics and assignment of the present course, but also to investigate how this implementation would help to evaluate the students' essays (Perez et al., 2022—accepted). Moreover, in future, we aim to add cultural products related to climate change as a specific feature of proximate influence (the middle circle in the model). Next to environmental artworks, fictional narratives in diverse forms (books, films) may be explicitly useful in expanding students' understanding of climate change and the diverse dimensions considering place, time, and interests in particular. Fictional narratives are claimed to engage readers in the problem of climate change (Nixon, 2011; Ghosh, 2016; Weik von Mossner, 2016; Schneider-Mayerson, 2018). By adding such narratives, experiential and imaginary process thinking tools, and as sources of "authoritative" knowledge, a more holistic understanding of climate change in higher education can be created. In both, narratives and imagination can play a fruitful role. In diverse levels of education, initiatives exist to insert climate education into humanities, arts, language (or literature) education (see, e.g., Climate Generation.org, in press; Siperstein et al., 2016; Siegner and Stapert, 2020; Djapo.be, in press). The value for adding fictional narratives as a source of knowledge in the CCE seems to be promising and aligns with including the humanities in CCE. The main study objects of the humanities are the infinitely diverse cultural products such as fictional narratives. These cultural products react and reflect on all sorts of (social) issues in many diverse ways and levels and also can influence the public domain in dealing with or thinking about these issues. Climate change is one all-encompassing and major issue that requires holistic viewpoints, and we need a multidisciplinary educational setting for our future professionals.

Conclusion

We used an ecocritical lens to analyze higher education student essays on climate change experiences. We specifically looked at distances in location, time, and interests between humans and the nonhuman world. Surfacing the way these three types of distances play a role in the LivExpCC essays showed us how students relate to climate change as a complex problem with diverse consequences on global and local scales. The LivExpCC model proves to be a model that enables students to make connections between points in this complex issue between which there is a distance. By making these distances visible and attributing significance to them, it is possible to further develop the use of the LivExpCC model in CCE critically.

In the essays that were analyzed, diverse forms of knowledge are identified: situated knowledge and local knowledge about residents' living environments are integrated with scientific knowledge about the consequences of climate change. The difference in appreciation of scientific knowledge by different groups is discussed. All essays have a human point of view that influences, for instance, the value of the economy and the relation with timescales. Anthropocentrism is not rejected nor questioned, which is inherent to the current design of the assignment of the students.

Using the LivExpCC model in higher education on climate change proves to result in valuable analyses of local and regional situations relating to this global problem. The model enables students to directly relate to climate change despite the fact that the experience of effects of climate change is very diverse around the globe. Especially for students whose daily lives are not so much affected by global warming, it is eye-opening to more consciously relate to climate change. The LivExpCC model

ensures that students understand the connection between their local and regional environment and recognize the (future) effects of climate change. They will realize the relationship between scientific data and their own living environments and the value of their own experiences as a source of knowledge. Awareness and feeling connected with this global problem will probably positively influence their learning and their ability to add to sustainable developments in their own region.

What is striking is that the LivExpCC model encourages the students to make explicit connections between the local and the global. The local and personal experiences are decisive for them (they see the changes and thus the dangers with their own eyes). Other inhabitants of the areas have similar knowledge. This knowledge is not appreciated by the authorities (or in Raquel's case, not *initially* appreciated). The Iberian students present a storm as a moment of panic in the present that breaks with the current trend and therefore serves as a very tangible glimpse into the future: this is how it will be. In the case of Raquel, this has narrowed the gap between the local population and the persons in power: the persons in power also have this experience and value it. This may relate to limitations of our imagination, as stated by Indian climate fiction novelist Amitav Ghosh (2016): describing a real, self-experienced tornado comes across as implausible to the reader who has not experienced it. In the Iberian cases that were described, the effects of the storms, however, differ. In the Portuguese case, there remains a discrepancy between the diverse types of knowledge and the actual action and policy. This discrepancy may be caused by the fact that the policymakers do not sufficiently take into account this knowledge in their decision making. Education should be aimed at (re)valuing different forms of knowledge, to ensure future policymakers do not wear blinkers and are more open to valuing diverse forms of knowledge more equally and viewing problems at a holistic level.

Data availability statement

Further inquiries about the original contributions presented in the study can be directed to the corresponding author.

Ethics statement

Written informed consent was obtained from the individuals for the publication of any potentially identifiable images or data included in this article.

Author contributions

MH was involved in methodology. PP was involved in conceptualization. MH and PP were involved in the investigation, formal analysis, and writing. Both authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Transformation through learning: Education *about*, *for*, and *as* sustainability

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The United Nations foregrounds education as a means to achieving the Sustainable Development Goals (https://sdgs.un.org/goals). In this conceptual paper, we argue education must offer learning that is transformative to better prepare learners to respond to the current global challenges. We argue that the dominant educational approaches fall short of realizing learners' potential for transformation toward sustainability. Focusing on the region of Southeast Asia we draw on educator experiences working with and at the Green School (Indonesia) and United World College (Singapore) to map some of their educational successes and identify some of the key processes and conditions that have contributed to those successes. The potential that exists in the context of independent international schools maybe a relevant factor in their success. We see the lessons that can be learned from these examples as useful in other school contexts. We draw on three sequential pedagogical development phases of learning in engaging with sustainability: namely, Learning *about* Sustainability, Learning *for* Sustainability (LfS), and Learning *as* Sustainability. We argue that the third transformative learning phase, Learning *as* Sustainability (which also incorporates processes of learning *about* and *for* sustainability) offers the best fertile ground for engaging learners as active social change agents within and outside of the learning environment. We see these learning phases as all interconnected, dynamic, and fluid rather than a formulaic progression. This paper contributes to advancing schools toward a perspective on education that reflects an ecological approach toward sustainability and support educators to better integrate education *as* sustainability in their learning activities. It is worth mentioning that changes in the school that reflect an ecological approach does not guarantee that the experience of the learner will result in transformative Learning *as* Sustainability. Instead, it is our contention that attaining a clear understanding of these learning processes empowers educators to facilitate an environment by identifying and incorporating the necessary conditions required to inspire deep ecological transformation, thus increasing the potential to arrive at Learning *as* Sustainability.

KEYWORDS

education *for* sustainable development (ESD), participatory learning (PL), systems thinking (ST), transformative learning (TL), pedagogical approach, education *as* sustainability

Introduction

Education *for* Sustainable Development (ESD) is a term that can be traced back to the 1990s as an educational response to the concept of sustainable development, as presented in the Brundtland report produced by the World Commission on Environment and Sustainability (WCED, 1987). Since then, there have emerged different iterations of ESD with varying emphases, including some utilizing alternative titles such as Education *for* Sustainability (EfS) and Learning *for* Sustainability (LfS). Despite the urgency of the growing climate and ecological crises (Almond et al., 2020; Smith, 2020; IPCC, 2022), the literature records limited progress in terms of ESD breaking through into mainstream education (Jucker and Mathar, 2015). This is a relatively new and contested field of education as illustrated by the debate around terminology, which is partly rooted in the choice between sustainable development, as brought to the fore by Brundtland (WCED, 1987) and sustainability, which has a long-established meaning before it has become shorthand for sustaining the living environment of the planet including the social and cultural aspects of the human species. The term sustainable development has been dogged by the criticism that economic development and economic growth is implied by the use of "development" (Jucker, 2014, p. 2), and this criticism has to some extent carried over into ESD. For the purposes of this conceptual paper, we propose to use "sustainability" in relation to the *about, for,* and *as* forms of education that we discuss below, while acknowledging, as Jucker (2014) does, that ESD is the most common internationally used acronym in this field.

Education *for* Sustainable Development, EfS, and LfS are all action-oriented approaches to education, labeled as "education *for*." Herein, we firstly explore the genesis of the education *for* approach and ask whether it is necessary to move beyond ESD, to education *as* sustainability. In doing so we explore the origins of the classification of *about, for,* and *as* in education to illustrate what distinguishes the concept of education *as* sustainability. In drawing attention to the importance of education *as* sustainability we aim to expand the debate in the wider education community about the need to go beyond current ESD practices to achieve transformative learning. In the literature much of the debate has been on education *as* sustainability in the higher education sector (Holmberg et al., 2008), this article focuses on moving the debate into the school sector and supporting the theoretical concept with some practical examples. We refer to two schools, which operate as part of private International School organizations, and which have been independently recognized for their commitment to sustainability. These schools are the Green School (Indonesia) and United World College (Singapore). We have chosen to focus on Southeast Asian schools for a number of reasons. As an International School teacher, one of the authors is currently employed by United World College, Singapore (UWC) and is part of their Service and Sustainable Development department. The author has also worked with the World Wildlife Fund (WWF) to establish Eco Schools in Thailand, is as a Certified Educator with Compass Education, based in Thailand (compasseducation.org) and is active part of a Green Educators network based in the region. This first-hand experience of ESD in Schools in Southeast Asia provides an insight into how ESD might evolve when schools have the autonomy and resources to prioritize sustainability. In addition to this, Singapore provides a notable example of how state-run education can prioritize sustainability and has the potential to influence regional change (Deng and Gopinathan, 2016; Deng, 2019). We are members of the London Regional Center for Expertise (RCE Network, 2022) and all have connections to the EfS MSc degree at London South Bank University, either as tutors, students, or both.

The outcomes from this conceptual paper are limited by the examples drawn from the experience, and geographical location, of the one author rather than a broader criteria-based sample. However, these international school examples, which have attracted independent recognition for their work in sustainability, provide an alternative context to the majority of state-run schools and the possibility of identifying different factors that can facilitate education *as* sustainability. The conceptual model that is presented in this article is a response to the gap between the theories around education and sustainability in the existing literature and the lack of the wide adoption of a form of education that can lead to a transformative step change toward sustainability. The model is based on a re-examination of aspects of the literature, in particular the pedagogical roots of education *about, for,* and *as* sustainability. The model is also informed by recognized examples of ESD best practice from international schools in southeast Asia. Thereby linking theory to practice, which has always been a central tenet of the EfS MSc degree at London South Bank University.

The emergence of *about, for,* and *as* in the literature

That elusive paradigm where education has merged seamlessly with sustainability, where all learning is viewed through the lens of sustainable development, and where all education is seen *as* sustainability, has only been glimpsed in certain contexts and has never broken through as the dominant paradigm in mainstream education. While there have been top-down political and structural barriers to change in the direction of sustainability, it has been at the school and classroom levels where examples of ESD have been successful, often due to the drive of individuals, but these are sometimes short-lived if the personnel involved change school. These examples are characterized by the pedagogy that is associated with ESD. Pedagogical approaches have been a defining characteristic of ESD (Strachan, 2012), for example, participatory activities,

questioning, critical thinking, outdoor learning, and trans-disciplinary learning. This approach to learning is captured within Sterling's ecological view of education as juxtaposed to what was, and in many cases still is, a more traditional mechanistic view (Sterling, 2001).

These pedagogical approaches did not suddenly appear with the emergence of ESD; they were drawn from existing educational traditions, most notably environmental education. Development education in the post-colonial era in former European imperial powers has also been influential, as manifested by the network of development education centers in the UK (see the Consortium of Development Education Centers, www.codec.org.uk), promoting learning that was supported by resources most notably from NGOs such as Oxfam Education and Action Aid and the multi-stakeholder global networks of Regional Centers of Expertise (RCEs) on ESD. The pedagogical implications of the relationships between education and the environment, and education and development cast light on how ESD (as well as EfS and LfS) adopted the approach of "education *for*."

A key text in analyzing the relationship between education and the environment is *Environment and Environmental Education: Conceptual Issues and Curriculum Implications* by A. M. Lucas, published in 1979. Lucas developed a typology for classifying environmental education as follows:

The label "environmental education" makes literal sense when applied to a number of different classes of educative programmes. It can refer to education *about* the environment, *for* the (preservation of the) environment or *in* the environment. Combinations of any two or all three of these possibilities are also sensible (sic, Lucas, 1979, p. 50).

Typologies of this nature raise many questions, such as: are the categories independent or connected? Are they hierarchical? Are they part of a continuous process? Do they signify different types of pedagogy and learning? Lucas (1979) explored many of these questions, with the debates he generated enduring in subsequent years, including how to understand the relationship between education and sustainable development.

Lucas explores each "class" of environmental education in his typology in some depth. The objectives of education *about* the environment are "clearly cognitive" according to Lucas, but he did not see it as merely a process of learning and recalling knowledge. In this class of environmental education students may also be expected to comprehend, interpret, analyze, and synthesize aspects of the environment and environmental data. Education *about* the environment does not imply that there is already a complete understanding. On the contrary, within the scope of education *about* the environment, students should be taught the skills for gaining and extending environmental data and knowledge. This perception of "education *about*" can be seen within ESD in the concept of knowledge being emergent and, as a result, the continual re-evaluation of what may be considered sustainable.

Whilst the goal of education *about* the environment is a knowledgeable individual, the aim of education *for* the environment is "to assist the preservation or improvement of the environment for a purpose" (Lucas, 1979, p. 52). The following quotation illustrates how Lucas saw attitudes incorporated into education *for* the environment: "Typical programmes *for* the environment will attempt to inculcate attitudes of concern for the features of the environment that enhance the chances of continued human life ...." (sic, Lucas, 1979, p. 52). Lucas looks for linkages between knowledge, attitudes, and action, finding that in the environmental education literature of the time: "Almost invariably, "attitude" denotes, or at least connotes, "a predisposition to act"" (Lucas, 1979, p. 52). This is something which he goes on to critically review while exploring the knowledge-action gap. In doing so Lucas makes a connection between "education *about*" and "education *for*," raising the debate about the extent to which knowledge is a necessary element of the attitudinal and action components inherent in "education *for*." This debate has continued through to the current discourse around competences for ESD (Rieckmann, 2018).

Education *in* the environment was identified by Lucas as a particular pedagogical approach associated with learning taking place outside the classroom, a characteristic that has persisted into ESD. For Lucas education *in* the environment is conceptually different to the goal oriented *about* and *for* the environment. Focusing on educational goals such as developing citizens who are knowledgeable about the environment or developing active citizens who preserve (or nowadays restore) the environment led Lucas to analyze the potential linkages between knowledge, attitudes, and action. He went on to critically review a range of models that attempt to cast light on the relationships between knowledge, attitudes, and action, without finding evidence of causal connections. His position is best summarized as follows.

Environmental education programmes should be "education *about* and education *for* the environment," with a heavy emphasis on education *for* the environment. The education *about* the environment component act as vehicles for the needed knowledge "that" and knowledge "how" that are essential prerequisites for effective action. However, existing models connecting knowledge, attitudes, and environmental actions do not imply necessary connections. Attitudes do not entail knowledge, knowledge does not entail attitude formation of a particular type, and neither knowledge nor attitude entail particular actions (sic, Lucas, 1979, p. 87).

The potential addition to the typology of "education *as*" raises the possibility of extending the understanding of links between education and change and exploring why the knowledge-action gap is still seen as a barrier to change and remains as a subject of debate (Maiteny, 2002).

Downs (1993) included "education *as*" in the typology he developed for analyzing development education. While there is no single encompassing definition of development education, its aims are to raise awareness and understanding of global issues, and it is now more commonly referred to as global learning or education for global citizenship (see: www.codec.org.uk/global-learning/what-is-global-learning/). The pedagogy associated with development education is characterized by active and participatory learning, equality, cooperation, and inclusion.

Downs' typology has three categories that consider education as being *about, for,* and *as* development, and like Lucas, he sees these approaches to education as being interrelated in achieving specific outcomes. For Downs education *about* development falls short of nurturing critical thinking concerning the causes and systems that lead to and maintain global inequalities. Although acquiring a good basis of knowledge is important, this approach does not mobilize the learner into action. Education *for* development encourages the learner to take action to contribute to some level of change after having acquired knowledge and learning, but, according to Downs, the extent of any change of attitude is "spasmodic" and "moderate" (p. 6). However, education *as* development is likely to achieve a "deep" change in attitude, thus forging a long-term synthesis between this type of development education and action (Downs, 1993). It is education *as* development that has the maximum potential for transformation and long-term impact on learners in their engagement with global development issues. This conceptualization of education offers a basis for exploring the potential use of "education *as*" in and beyond the context of ESD.

Simple typological models of education are helpful in categorizing examples of education, but both Lucas and Downs recognized the limitations of typologies, hinting at the complexity underlying these models by recognizing that the relationships between the different types within the models are as important as the types themselves. The concept of transformative learning, which is often referenced in relation to ESD, can be seen as an example of how *about, for,* and *as* are interdependent, particularly in the relationship between *for* and *as* sustainability.

Transformative learning is defined as a process which nurtures a deep structural shift, but also implies there is a shift in consciousness in both the inner and outer dimensions (O'Sullivan et al., 2002). Although Sterling (2011) charts the historical landscape of transformative learning and its relevance to ESD, there emerges two important questions; What are the prerequisites in the learning experience for transformative learning to potentially occur? What roles do education *about* and *for* sustainability play in transformative learning that leads to education *as* sustainability? While education *as* sustainability does not guarantee transformative outcomes, there appear to be certain pedagogical approaches, which are not exclusive to education *as*, that can contribute to transformative learning: for instance, relevant knowledge, awareness of alternative perspectives, learning in small groups, learning that is facilitated through intensive residentials, and learning in a conducive environment that reflects what is being taught (Sterling and Baines, 2002). Additionally, engaging in learning that leads to third order change, as described by Bateson (1972), would not only require learners to be prepared for the difficulties and emotional revelations that potentially lie ahead, as the practice of reflexivity is intrinsic to transformative learning, but also to the need for learners to have access to support if required. Boström et al. (2018) and Singer-Brodowski et al. (2022) identify similar requirements for transformative learning in the context of higher education.

In a narrative approach to her own teaching and learning journey O'Neil (2018) brings together transformative learning and sustainability education to suggest a more "relational and interconnected way of being in the world" (O'Neil, 2018, p. 368). O'Neil presents a progressive model that links *about, for,* and *as* with the three orders of change described by Bateson (1972) and developed further in terms of levels of learning by Sterling (2011). Education *as* sustainability is a transformational step from education *about* and *for,* it is a third order change resulting in an ontological shift that "…allows us to cocreate ourselves at the experiential level" (O'Neil, 2018, p. 372). This view of education *as* sustainability finds a degree of synergy with Foster (2001), who in a paper on EfS in higher education discussed deepening the meaning of the concept "towards something more experiential, something more like an ongoing individual and collective habit of attention to time and change within the natural order…" (Foster, 2001, p. 156). The depth and complexity of education *as* sustainability is also revealed in a model presented by Scott and Vare (2007).

Scott and Vare (2007) provide an insight into the complexity and interdependent levels of ESD in their paper *Learning for Change: Exploring the relationship between education and sustainable development*, wherein they introduce the concepts of ESD 1 and ESD 2. ESD 1 approaches can be summarized in terms of cause-and-effect type learning, where the solutions can be identified, agreed, and measured. Learners are taught about issues of sustainable development in order to change behaviors for more sustainable futures. In an ESD 1 approach learners consider, "how to do things differently and more efficiently," in order to encourage more sustainable behaviors and practices. ESD 1 fits into more traditional models of education, starting with knowledge building and expert facilitators guiding the learning down a particular path. Scott and Vare (2007) explain that this is an appropriate approach for certain types of sustainability problems. They use the idea of reducing waste and saving energy as examples of behavioral change that can be brought about through an ESD 1 approach. However, ESD 1 falls short when faced with the kinds of complex and wicked problems that characterize many of the systemic issues surrounding sustainability.

ESD 2 can be characterized as a critical thinking approach, which goes beyond the expert-knowledge approach seen in ESD 1. As a result, ESD 2 has the potential for deeper behavioral change and learning. Unlike ESD 1 approaches, ESD 2 does not attempt to measure or quantify outcomes, but instead focuses on the ongoing learning process. The ability to critically analyze, question, and negotiate are central to the ESD 2 approach and, therefore, learners become active participants in ESD. ESD 2 is necessary to address the complex problems in sustainable development in a way that ESD 1 cannot.

Scott and Vare present ESD 1 and ESD 2 in terms of the Chinese concept of Yin and Yang, where Yin cannot exist without Yang and vice versa. This is the key to understanding the complexity of the model, and although Scott and Vare refer to ESD 1 as education *for* and ESD 2 as education *as*, because they are so interrelated and dependent on each other the whole model can be seen as education *as* sustainable development. In the same way, education *as* sustainability can be viewed as an interdependent whole incorporating education *about* and *for* sustainability. Education *as* sustainability shows how the pedagogy around this kind of learning must consider and include multiple approaches. The learning is not necessarily linear, or even directional, as one approach feeds into, and results in, the other. Learning facilitators must understand this dance and plan accordingly, demonstrating "openness to the unplanned directions that learners take," as highlighted by Scott and Vare (2007, p. 5). Education *as* sustainability, when viewed from a complex, interrelated ecological perspective, demands mixed pedagogical approaches, and multi-directional processes.

Implications of *about, for,* and *as* in the international school classroom

Drawing on case study examples of private international schools in southeast Asia, we begin to look practically at how education *as* sustainability might develop and be applied. All three phases of learning, *about, for,* and *as,* are important to transformational change and the lack of achieving a transformative approach can be due to a lack of emphasis on one or more of the three elements. As with Scott and Vare's (2007) model of ESD 1 and ESD 2, these different approaches to ESD are not a case of either/or, but rather equally important parts of a learning process. Moving through the *about, for*, and *as* phases of the learning process is not necessarily directional, nor is there a clear starting point. Instead, we see a process that has three layers of learning that complement, overlap, and feed into each other. In many ways, considering the *about, for,* and *as* phases of learning in terms of day-to-day classroom practice provides some clarity as to what education *as* sustainability means for a classroom teacher. Translating the learning process in simple terms, the *about* phase relates to content and curriculum, the *for* phase highlights the important role of the pedagogical approach, and the *as* phase links intention and values to practice and behavioral change as a culmination of all three phases.

Figure 1 summarizes our model and highlights some of the key features of the *about, for,* and *as* phases of learning, drawing on the literature previously highlighted. The initial idea for a model with phases of learning was inspired by the typologies discussed earlier in this paper from Lucas (1979) and Downs (1993), although they do not correspond directly to either of their classifications. The model integrates aspects of the debates around the characteristics of ESD including the role of transformative learning and draws on the concept of education *as* sustainability raised by Scott and Vare (2007). Practical classroom observations further shaped our thinking behind the model, in that we wanted to empower teachers, who are often time and resource poor, to better understand the pedagogical shifts between the phases of learning and develop their professional practice. To move this from theory to practice, a programme of continual professional development (CPD) for teachers that is based on understanding the changes in pedagogy through the phases illustrated in the model can further support the transition practically toward education *as* sustainability in the classroom.

We suggest that in order to arrive at a point of education *as* sustainability it requires all three phases. Education *as* sustainability cannot exist without the prior two phases. As referenced above, O'Neil (2018) provides a model that outlines the relationship between first, second, and third order change and *about, for,* and *as,* in higher education. This is something that we also acknowledge and include in our model, although our central focus is primary and secondary schools. However, we feel that it is important to emphasize that *about, for,* and *as* is neither linear nor hierarchical, but necessary phases toward and within education *as* sustainability. Inspired by Scott and Vare (2007) and their model of a Yin Yang representing ESD 1 and 2, this model gives equal importance to the *about, for,* and *as* phases of learning.

The aim of this model is to identify practical application of the *about, for,* and *as* phases of learning and allow educators to identify and plan for each as part of an overall approach to education *as* sustainability. The model can be seen in terms of simplified practical steps, especially when considering how education *as* sustainability might develop beyond individual examples at teacher and school levels and begin to have significant impact on a regional scale. This simplification also serves to translate education *as* sustainability in practice to teachers who work within pedagogical and content specific frameworks and overcomes some of the ambiguities of what embedding sustainability means in practice. By addressing the phases of learning associated with education *as* sustainability in this way, we can identify encouraging examples of good practice in each area. Whilst there are individual examples of *about, for,* and *as* taking place in schools, there appears to be significantly fewer examples

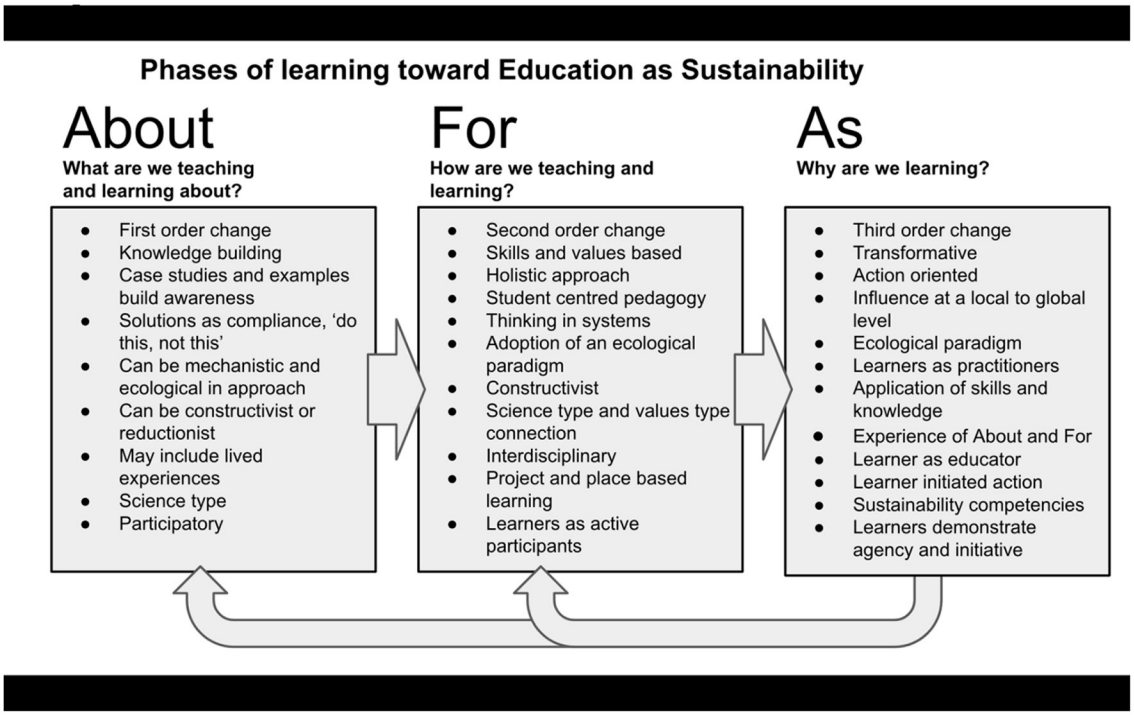

FIGURE 1
Phases of learning toward education *as* sustainability.

of all three phases that are fully integrated and taking place concurrently.

About

As we look at what has been referred to as education *about* sustainability, it is important to consider what this might mean in practice at school level. With this in mind, we can think about this phase as the "what" in learning, that is to say, what teachers are teaching and what learners are learning. As such, we consider this phase to be largely content driven and knowledge-based learning around sustainability.

Content and resources relating to sustainable development are widespread and expanding daily, thanks largely to the internet and the growing number of organizations that have identified education as key to behavioral change and sustainable futures. Teaching *about* sustainable development is the first step toward education *as* sustainability and a necessary stage through which students can build their understanding of the world and the challenges of sustainability, before they begin to work through the *for* phase of education *as* sustainability. This is perhaps the easiest phase of this journey for teachers to apply, as it fits within even the most mechanistic of models. Education *about* sustainability can essentially exist as a form of information delivery, but within the context of sustainable development. Scott and Vare (2007) identify this kind of information and content-based approach as a vital part of ESD learning. Relevant and high-quality resources that support the *about* phase of ESD have been easily accessible to teachers and schools for some time, regardless of national curriculum or state affiliation.

The World Wildlife Fund (WWF), for example, has provided an abundance of quality content and learning resources for decades (www.worldwildlife.org/teaching-resources), including developing a systems perspective through resources such as "Linking Thinking: New Perspectives on Thinking and Learning for Sustainability" (Sterling et al., 2003). The nature of the WWF global operation means that the educational content provided is both regionally focused and aimed at complementing that of various local curricula in the countries that they serve. For example, WWF Thailand offers a variety of quality resources and case studies based in Vietnam on their Mekong Delta, tiger conservation, and elephant poaching projects, among others, as well as supporting and facilitating the Eco Schools programme for Thailand (https://www.wwf.or.th/en/project_in_thailand/eco_schools_programme/). Whilst the work of the WWF is most certainly not limited to the *about* phase of LfS, the broadest reach of their work is in this phase. The WWF utilizes several platforms to share their learning content and resources, perhaps most notably a recent

collaboration with Netflix (online streaming service) in making the series "Our Planet" (https://www.worldwildlife.org/pages/our-planet), with the accompanying educational resources introducing issues relating to sustainable development to a wider audience than ever before.

Whilst the context of sustainability in education is a natural starting point for educators with sustainability mindsets, education *about* sustainability that is integrated into the learning journey of the student may not occur, even if it is written into curricula. Unless curriculum guidance is explicit about the inter-related nature of *about, for,* and *as,* there is always the danger that education *about* sustainability will be an isolated "bolt-on," and it will never take students through the *for* phase to the transformative *as* phase. In the same way that ESD 1 supports and feeds into ESD 2 (Scott and Vare, 2007), it may be that more explicit curriculum guidance necessary to engage students, and most importantly teachers, in the development of education *as* sustainability at a regional level, rather than solely on a school-by-school and teacher-by-teacher basis.

For

Moving beyond the *about* phase, we can begin to think about how educators can move toward educating *for* sustainability. How might teachers equip students with the necessary skills and attributes to make change and move us toward sustainability? There is a need to consider a holistic and critical approach when teaching *for* sustainability. Scott and Vare (2007) would refer to this as part of ESD 2, the point at which we move beyond simple knowledge and information and begin to make new meaning and ask critical questions.

Many of the approaches that complement ESD are becoming increasingly common in mainstream schools. Claxton (2021) highlights how student-centered pedagogies are becoming more popular in the post-internet age, where dispositions and so-called soft skills are replacing knowledge and skills as primary requirements in the future world of work. Schools are working to align themselves with future-oriented educational approaches, such as those suggested by the intergovernmental organization the OECD (2018). Sterling (2001), for example, provided a model that he refers to as an ecological paradigm (p. 58–9) in education, where he goes into detail about the types of practices and approaches to learning that are conducive to EfS. Here, he outlines approaches to teaching and learning that seem strongly aligned with many of the modern, progressive, student-centered models of education that are being adopted by many schools throughout the world, thanks in large part to international bodies such as the OECD. More recently, guidance from UNESCO (2021) has also suggested pedagogy that could be considered as in line with ESD. The "Reimagining our futures together: A new social contract for education" document (UNESCO, 2021) specifically outlines teaching for conceptual understanding, problem-based and project-based learning, and student agency as examples of practice that supports students to realize their sustainable futures (Lucas, 1979, p. 51). We argue that this is taking learning into the phase of education *as* sustainability.

Student-centered approaches to teaching and learning provide opportunities for students to develop the necessary skills and dispositions required to educate *for* sustainability. US based website www.edutopia.org, part of the George Lucas Foundation, for example provides teachers with short articles and guidance for teaching and learning that support student-centered pedagogy including project-based learning, diversity, equity, and inclusion, social, and emotional learning. This is one example of how student-centered pedagogy is becoming more and more prominent, even in mainstream western education systems. This moves us away from what Sterling (2001) would consider mechanistic pedagogies, and toward more progressive ecological approaches to education. Essentially, combining pedagogical approaches that emphasize critical thought, empathy, and equity, with teaching *about* sustainability, we can begin to deliver the necessary skills and dispositions *for* sustainability.

Although many advocates of student-centered education are not necessarily based in ESD, there are some that provide teaching and learning tools specifically designed to support critical thinking and ESD. Compass Education (compasseducation.org) for example is a not-for-profit educational organization that provides courses and training based on systems thinking and ESD. Unlike many other ESD-based organizations, Compass Education does not provide content, but is based on approaches to teaching and learning, providing tools that support pedagogy around ESD. The Compass tools (www.compasseducation.org/the-compass-education-toolkit/) are in use in schools worldwide, although they are predominantly used in private international schools, where their tools complement the International Baccalaureate (2022), with its strong emphasis on inquiry, international awareness, service learning, and student agency.

As

The development of sustainability related content and the student-centered pedagogy required for ESD are perhaps more prominent than ever before. And yet, the impact of ESD at a regional level remains limited (Sterling, 2021). Education *as* sustainability is alluded to by authors such as Scott and Vare's (2007), but this transformative phase of learning leading to an ontological shift as described by O'Neil (2018) requires greater exploration in its practical application for schools.

The *as* phase of learning involves the application and embedding of the knowledge, skills, and dispositions that have

been established during the *about* and *for* phases of learning. This is where students are supported through third order change and develop the ability for the continuous re-assessment of values and worldview in relation to sustainability. However, this all important *as* phase cannot take place without the establishment of the knowledge and skills (*about* and *for*). For example, this might be the difference between students participating in a one-off beach clean-up, as part of a compulsory "service" activity, or instigating and developing regular beach clean-up operations, based on their understanding of the impact of plastic pollution on marine life in their region. There is an acknowledgment of this need to move beyond knowledge and skills in guiding documents produced by influential intergovernmental organizations such as the Organization for Economic Cooperation and Development (OECD). In their 2018 position paper *The future of education and skills Education 2030* they highlight the need for young people to be educated beyond just knowledge and skills and toward what they refer to as competencies.

"The concept of competency implies more than just the acquisition of knowledge and skills; it involves the mobilisation of knowledge, skills, attitudes and values to meet complex demands" (OECD, 2018).

The OECD identifies how this is important in overcoming the environmental, economic, and social challenges of the future. In addition to the acknowledgment of competencies in the mainstream, there have also been numerous attempts to articulate sustainability specific competencies and what this could mean in ESD. Wiek et al. (2011) and Rieckmann (2018) for example, provide in depth analysis of sustainability competencies and how this relates to ESD. This could be seen as complimentary to education *as* sustainability, where sustainability competencies, agency, and values can be developed and applied, in addition to the knowledge and skills developed through the *about* and *for* phases.

Although we feel that the *as* phase requires more attention, it is important to note that the education *as* sustainability is being achieved in some cases. Many international schools place a strong emphasis on service learning as part of their compulsory educational programme, for example. However, the same expectations are less prominent in state run education, where national curricula and standardized testing takes priority. Despite this, there are several extracurricular programmes and initiatives that have been successful in involving state schools in educating *about, for,* and even *as* sustainability, perhaps most notably the Eco Schools programme. This model operates in addition to a school's curriculum and is often made up of smaller groups of children who carry out school-wide activities and campaigns to transform their school into a more sustainable community. The Eco Schools programme encourages student-led projects and is based on action rather than content-based learning. As such, Eco Schools, and similar action-oriented programmes, such as Healthy Schools, Rights Respecting Schools, and so on, offer a potential steppingstone from education *about* and *for*, to education *as* sustainability.

However, due to the extracurricular nature of these programmes, there are some clear limitations as to their potential impact on a regional scale. Firstly, the number of students taking an active part in an Eco Schools programme (or similar) is often only a fraction of the overall student body and limited to those willing to give up lunchtime or break times, or to stay after school. Secondly, these programmes are usually run by one or two enthusiastic teachers, rather than operating at a systemic level or as a compulsory part of a school's learning programme. As such, once these individuals move on from a particular school, their Eco Schools efforts may move with them.

The Eco Schools programme, and similar initiatives, could also be examples of where schools might attempt to deliver the *as* phase of learning without the necessary depth of knowledge, skills, and perspectives provided by thorough *about* and *for* learning. Whilst action-oriented groups such as this could be examples of education *as* sustainability, all three phases must be in place as an ongoing process for the learning to be transformative. To do this, we argue that schools must prioritize sustainability as a context and a driving motivation behind their learning and pedagogy. Rich sustainability-oriented content and progressive pedagogy must be in place, in addition extracurricular programmes, such as Eco Schools, can provide opportunities for student led initiatives and learner agency.

What we also see as we reach the education *as* sustainability phase of learning is the potential for education *as* sustainability to feedback into the *about* and *as* phases of learning. This can happen where learners approach new areas and aspects of sustainability and therefore need to build new knowledge and skills before they return to the education *as* sustainability phase, where action is taken. The *as* may also feed into *about* and *for* as learners become educators, share their learning and act toward influencing their peers or community. The process of learning *about* an issue, developing critical thinking and different perspectives, and then teaching and raising further awareness of an issue, can be seen as an important aspect of education *as* sustainability. While education *as* sustainability can be seen as a desired state, it is not a stand-alone phase of learning. Rather, education *as* sustainability is dependent on, and contributing to, the *about* and *for* phases of learning.

The International Baccalaureate (2022) is an additional factor that many International Schools can use to support education *as* sustainability. The International Baccalaureate, a not-for-profit organization provides curriculum and pedagogical guidance for more than 5,000 schools worldwide. Its driving purpose is "Education for a Better World," and service learning is a compulsory element (www.ibo.org/programmes/diploma-programme/curriculum/creativity-activity-and-service/cas-projects/). The combination of progressive pedagogy and service-oriented curriculum provides

an established base for the development for all three phases of education *as* sustainability.

Singapore provides an example of a state government that has issued guidance that prioritizes sustainability in a way that could promote education *as* sustainability. For example, the main "aim and outcome" of the lower secondary geography curriculum for Singapore is to, "promote students' growth as informed and concerned citizens who are able to use geographical knowledge and skills to show care and concern for the world they live in and actively contribute toward a sustainable future" (Ministry of Education for Singapore, 2021). From here, content, resources, and pedagogy can be clearly established within the context of the explicitly sustainability-oriented purpose of learning. Essentially, by providing a clear "why," the education *about* and *for* can more easily be supported, and the likelihood of reaching a state of *as* is significantly increased. This could go some way toward explaining why Singapore is quickly becoming something of a hub for innovation for sustainability in the region, as demonstrated by the Sustainable Singapore Blueprint (Sustainable Singapore, 2021; https://www.clc.gov.sg/docs/default-source/books/ssbcombined-cover-text.pdf).

Illustrative examples of what education *as* sustainability might look like

The examples are drawn from private international schools in Southeast Asia, which belong to organizations that have global networks of schools, where limiting factors such as national curricular and a lack of funding are less of a restriction compared to state run systems. One school is part of the UWC movement (www.uwc.org/schools) and one is part of the Green Schools group (https://www.greenschool.org/about-us/). Both schools have been recognized for their work in sustainability education and have notable alumni working in the field of sustainable development, who could be considered products of effective education *as* sustainability (www.uwcsea.edu.sg/mystory). The UWC movement has been nominated for a Noble Peace Prize (https://uwcisak.jp/news-events/uwc-movement-nominated-for-the-nobel-peace-prize/), and Green School Bali has been named in the top 10 shortlist for the World's Best School Prize 2022, for Environmental Action (http://www.greenschool.org/insights/best-school-prize/).

United World College Singapore and the Green School Bali are overtly mission driven including a strong focus on sustainability. In each case there is a clear sustainability oriented "why" behind their education programme and pedagogy. This paper argues that this clear "why" behind education is necessary for education *as* sustainability in schools, because it provides clear direction and motivation for action and the application of skills and qualities instilled during the *about* and *for* phases of education *as* sustainability.

The UWC's nomination for a Nobel Peace Prize is based on their work in sustainability and peace-based education. The school's mission is to make "education as a force to unite people, places, and culture, for peace and sustainable future," which leaves no doubt as to the purpose of their educational programme, and the school's systems and structure reflect this (www.uwc.org/educationalmodel). The school provides a holistic learning programme focused on addressing its mission and invests significant efforts in embedding ESD into its curriculum. United World College schools are International Baccalaureate world schools and the UWC organization played a significant part in the development of the International Baccalaureate (2022), where, as mentioned previously, "service learning" plays a large part. Furthermore, the southeast Asian branch of UWC (UWCSEA) has developed its own curriculum for primary and middle years, which goes beyond the guidance offered by the International Baccalaureate organization, embedding ESD and its related pedagogy deeper into the learning programme. The bespoke curriculum emphasizes skills such as systems thinking and environmental stewardships, for students as young as 5, and includes this as part of the compulsory learning programme. UWCSEA also includes "mission competencies" as part of its desired outcomes for graduates, in addition to the academic success that the school is known for (www.uwcsea.edu.sg/). In his recent book *The Future of Education*, Claxton (2021) lists UWCSEA as an example of a school that offers a rich progressive education, in conjunction with academic rigor and attainment.

The defining mission of UWC schools means that pedagogical practices are also in place to support the development of skills and understandings as outlined in the curriculum. Concept-based teaching and learning, inquiry based practices and interdisciplinary teaching and learning are present in the schools, as are more specific teaching and learning tools, such as those provided by Compass Education and the Ellen Macarthur Foundation (www.uwc.org/educationalmodel). The school not only provides education *about* and *for*, through academic study, but also supports the development of education *as* sustainability, through action and application. The East campus, which is home to around 2,500 students, has a department of nine staff devoted to "Service and Sustainable Development," where students are supported through service and action projects as a compulsory part of their learning. These service programmes start for students at the age of five, where they are guided through work with local and international service partnerships as well as schoolwide environmental initiatives, such as Eco Schools. Eventually students follow their own areas of interest, with each taking part in student-led action groups, such as "marine conservation," "rainforest restoration," and "initiatives for peace." Furthermore, the East Campus is an award-winning eco-campus, with a facilities team that

includes a "head of sustainability." As such it provides a learning environment that demonstrates the values being taught. This explicit guidance at mission level acts as something of a cascade throughout the school, informing the written curriculum, pedagogy, practice, and eventually behaviors. Education *for* Sustainable Development at any level in the school is not based on individuals driving things or resorting to a "bolt-on" style approach to ESD. The school has systems that support *about* and *for* phases of ESD and advances toward the education *as* sustainability phase.

The Green School in Bali demonstrates similar mission driven, ESD and education *as* sustainability practices to UWCSEA. Green School is another high-profile group, with schools in Bali, New Zealand, South Africa, and Mexico, offering high levels of transformative learning, according to a 2020 report by the World Economic Forum (WEF, 2020). Green School's stated mission is to "create a global community of learners making our world sustainable." The original Bali school is perhaps best known for its impressive bamboo structure, and has also received praise for its students Melati and Isabel Wijsen, who managed to successfully advocate for the removal of all plastic bags on the island of Bali, whilst studying at the Green school (https://www.greenschool.org/bali/bnmag/life-at-gs/bye-bye-plastic-bags/). The actions and commitment of Melati and Isabel Wijsen could certainly fit with our definition of education *as* sustainability. However, this success may be based on the fact that the school provides familiar and more replicable examples of education *about* and *for* sustainability. The school has significant outdoor learning spaces, where study of nature forms a strong part of their bespoke curriculum. They also use pedagogical approaches, such as inquiry-based learning, project-based learning, and interdisciplinary learning, that support development toward education *as* sustainability. On a recent visit to the Green School Bali, one of the authors saw several environmental projects that had been initiated by students of all ages including a chicken coup project, pond project, ocean advocate organization, and a fair-trade coffee company. Despite being an international school, the school remains connected to the local culture, and indigenous learning is evident throughout their programme, as are modern approaches such as the integration of the Sustainable Development Goals and systems thinking tools. Pedagogical approaches outlined by Sterling in his model of ecological education, and more recently highlighted by UNESCO (2021) in their Reimagined Futures documentation, can be seen in both the United World College Schools and Green Schools.

A strong mission alignment in these two schools means that sustainable development as a context for learning is clear and explicit to all. Essentially, the mission and structure of a school cascades down to inform the delivery of education *about* and *for* sustainability, which in turn feeds into the *as* phase, where students begin to experience what it means to be agents of change. Considering the availability of content, pedagogy, and models of action that are available to all schools, it seems as though a lack of clarity on the "why" behind education is one of the reasons for less examples of education *as* sustainability in mainstream education.

However, as noted earlier both UWC and Green School are private education establishments, and most students are paying significant fees to attend. With this comes autonomy for the schools to establish their own mission and ethos and adopt practices that fulfill the phases of education *about*, *for,* and *as* sustainability, with strong mission alignments, and systems, facilities, and structures in place to support such learning. When schools have more freedom to select or create their own curriculum it seems as though there is greater potential for education *as* sustainability to take place. The written curriculum that a school adopts can have a direct influence, at least in terms of content, on education *about* sustainability, which delivered in the context of the school's ethos, can then lead to the development of education *for* and to education *as* sustainability. By following the International Baccalaureate curriculum, as many international schools do, there are explicit requirements for Learning *about* Sustainability in the written curriculum (*about*), guidance on the types of student-centered pedagogy being used (*for*), and expectations around student-led service and actions (*as*). Of course, not all schools following the International Baccalaureate are models of education *as* sustainability but compared to the majority on non-International Baccalaureate schools, the structures are in place to support the three phases of education in relation to sustainability. While our examples are focused on Southeast Asia, we recognize that there is a diversity of cultural, geographical, political, and economic contexts that may influence the practical application of the model put forward in this paper. The next phase of the research would be to test the model in different contexts.

Conclusion

The concept of a fully integrated education *as* sustainability, encompasses education *about* and *for* sustainability, which stretch back further than the emergence of ESD, and have a particular indebtedness to pedagogical approaches rooted in environmental education and development education. To address the lack of progress in mainstream education toward transformative learning and third order change associated with education *as* sustainability, there needs to be greater focus on the practical application of education *as* sustainability, beyond the current practice associated with ESD. By looking at examples from international schools, where some of the barriers that exist in mainstream state schools have been removed, it can provide indications of the changes that are needed in national systems or at a regional level.

We have considered how similar mission style approaches to education in international schools following the International Baccalaureate might be applied on a broader scale. In some instances, we see that attaching a clear, sustainability focused, mission underpinning written curricula can work at both state and national levels, as in the case of Singapore. If other state mandated curricula carried a similar driving mission, or "why," behind the learning, the potential for education *as* sustainability to take place on a regional scale would be greatly increased. However, this message cannot come from individual teachers, or even school leaders, if there is to be impact at a regional level. As Claxton (2021) explains, society doesn't reflect education, as one might hope, rather education reflects society. As such, the importance of a guiding "why," which reflects a societal inclination for sustainable futures, cannot be overstated. International schools have the freedom to establish their own mission and to determine their content, pedagogy, and the application of resources to achieve that mission. Where schools such as UWC and Green School have aligned their missions to sustainability, they have provided a clear "why" for developing content, resources, and pedagogies that support education *about* and *for* sustainability. Leading to a significant likelihood of reaching a state of education *as* sustainability.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

JG, GS, and KL contributed to the conceptual, theoretical, and drafting of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Altering regional development for sustainability: Lessons learned from strategic communications of RCE Saskatchewan (Canada) with government

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An important part of successful strategies for sustainable development involves altering (or, in some cases, preventing) proposals for development that are unsustainable or have significant opportunity costs relative to more sustainable alternatives. In modern democracies, development proposals normally require formal public approvals (whether at the municipal, provincial/state, or national level) with opportunities for public and specialist input and oversight as well as legal remedies where due processes are not followed. This creates an important locus for ESD, specifically educational interventions by Regional Centers of Expertise on education for sustainable development (RCEs). RCEs are able to rapidly mobilize local, regional, and global expertise to engage such processes, frequently where there are narrow time frames and complex mechanisms for public input. The paper will use a case studies approach examining strategic communications of RCE Saskatchewan with various levels of government in proposed developments within its region in Western Canada. Despite a primary commitment of governments in the RCE Saskatchewan region to economic growth with a more limited role for sustainable development, the RCE has successfully contributed to substantially altering unsustainable development proposals in a range of areas since its acknowledgment in 2007. These proposals have included forest clear-cutting, large-scale water diversions, agricultural drainage, nuclear power, road construction, and potash mining. The RCE's interventions have been modest, involving letters and formal submissions through existing government channels aimed at public officials or elected representatives involved in key stages of decision making. This paper will document some of the main elements of the formal RCE correspondence that has lead to its strategic effectiveness including the RCE's ability to draw upon independent scholarly knowledge (including expertise about governmental processes) and legitimization of local sustainability expertise. These interventions have enabled local learning, modifications of specific development proposals, and, in some cases, system-wide transformations. Importantly, however, it highlights how an older form of university scholarship associated with

the rise of the humanities, namely the art of formal correspondence or letter writing, can be customized to the goal of regional education for sustainable development.

KEYWORDS

development proposals, education for sustainable development, government correspondence, letter-writing, Regional Center of Expertise Saskatchewan, sustainable development, sustainable development policy, strategic communications

1. Introduction

Regional Centers of Expertise (RCEs) on education *for* sustainable development (ESD) are meant to be practical and have impact, intervening strategically in their regions *through* education to transform their development patterns. As an initiative of the United Nations University, RCEs too act in service of the UN's sustainable development agenda, currently expressed in the 17 UN Sustainable Development Goals (SDGs) directing global development from 2015 to 2030 (United Nations Department of Economic Social Affairs., 2022). UNESCO as a specialized agency of the UN with a focus on education has set out 5 priority action areas. Given their regional focus, priority action area 5 "accelerating local level actions" is central for RCE activity (UNESCO., 2021). However, the question arises: what type of educational interventions can efficiently and effectively transform one's region for sustainable development? Most RCEs have limited resources so this efficiency question is important. As important, however, is the question of effectiveness. An RCE can focus on educational approaches that build sustainable development activities within a new or existing organizational structure (for example, developing a new enterprise to manage waste more sustainably within a community). However, such approaches, while laudable, are at risk if these are overwhelmed either by other organizations within their region that continue on unsustainable paths or new developments with long-term adverse or sub-optimal sustainability impacts (e.g., approval of new carbon intensive forms of production). Unsustainable market enterprises may competitively outperform new sustainable enterprises if the full costs of their activities are not internalized in their pricing. As a result, just as schools, universities, and other organizations have sought to advance "whole-institution" approaches (see McMillan and Dyball, 2009: p. 56; UNESCO, 2014: p. 30), RCEs practically need to advance "whole-region" approaches to development that place sustainable organizations and organizational practices at least on a level playing field with other developments. At the same time, a shared citizen identity suggests that the ethical norms of sustainable development should reasonably apply to all development activities and, hence, the processes that govern these developments.

The need for a whole-region approach brings to the fore a need to focus on education that reforms and strengthens those processes regulation existing developments and especially approvals of new developments in a region. This emphasizes, then, a key role for governments, whether municipal/local, state/provincial, national, or international authorities, that provide approvals, licenses/permits, monitoring, and regulatory enforcement. A second priority action area of UNESCO, namely the need for advancing policy, takes center stage as it is governmental policies that regulate these developments. According to UNESCO: "Policy-makers have a special responsibility in bringing about the massive global transformation needed to engender sustainable development today. They are instrumental in creating the enabling environment for the successful scaling up of ESD in education institutions, communities and other settings where learning takes place" (UNESCO., 2021). Again, however, given the labyrinth of policies and regulations of multiple levels of government impacting a region, where is an RCE to start in its educational role with policy makers and how can it be effective? Since its acknowledgment in 2007, RCE Saskatchewan, an RCE in western Canada, has engaged in strategic correspondence with various levels of government related to a range of development approvals in areas such as forestry, agriculture, mining, road construction, and energy. Each letter the RCE has directed to a particular government ministry in relation to a proposed development or policy serves as its own case study having responses from specific levels of government and both short and longer term impacts. As this correspondence has seemingly had, in most cases, surprising effectiveness in altering development proposals for greater sustainability the paper will explore key dimensions of these letters. This analysis can, in turn, serve as a practical guide to RCEs pursuing a "whole-region" transformative approach for sustainable development. Further, this paper will explore how a scholarly focus on letter writing reaffirms an older part of scholarship within universities associated with the earlier rise of the humanities. This has important implications for the role of the ESD scholar in targetted letter writing and the evaluation of this form of scholarship within universities. Finally, some conceptual limitations of this analysis will also be discussed.

2. Context

In order to situate the strategic value of the letter writing RCE Saskatchewan has engaged in, it is first important to understand the policy context of development more generally as it relates to all RCEs. RCEs need to understand the *systems* governing existing and new developments in their territory if they are to engage in this whole-region approach. For newly acknowledged and even well-established RCEs, the development context in one's own region will be substantially unknown and, hence, the context for RCE action is characterized by uncertainty (see Scoones and Stirling, 2020, Ch. 1). While one could explore general theories of policies related to development, actual development is always situated. With any new development specific resources (or capitals) are proposed to be mobilized in specific contexts using industrial or other processes, for specific goals or ends (e.g., the production of a particular good or service). This localization of development strategies and regulatory approvals and oversight makes strategic educational interventions for a whole-region approach by RCEs challenging. How does development happen here? What are the existing policies and regulations that apply and under whose jurisdiction(s) does a particular development proposal fall? RCEs must gather knowledge of codified policies and jurisdictional responsibilities that apply to different kinds of situated development.

A further uncertainty relates to how (and whether) development policies are implemented in specific cases. The extent of regulatory implementation may be affected by conflicts in policy directions within a government agency, personal conflicts of interest, or a lack of resources for evaluation, monitoring, and/or enforcement. This suggests RCEs must also acquire tacit, non-codified knowledge (the "know-who" and "know-how") about proposed developments and those bodies providing regulatory approval and oversight. This "know-who" can include familiarity with specific individuals involved along with their knowledge, values, interests, and motives. This "know-how" can include production technologies and market strategies of particular firms, local land uses by landowners, or even how firms and individuals are subcontracted in a development process (e.g., consultants contracted to write environmental impact assessments for resource companies or farmers renting land from out-of-province landowners). The latter might, in turn, have a quite different set of motives and interests, especially as it relates to sustainable development.

To be effective, then, an RCE must somehow acquire localized knowledge, both codified and non-codified, about these development processes. Specific interventions that can bring to light these policies, individual decision makers, and organizational roles, can, in turn, enable subsequent educational strategies within these localized contexts that bring about needed change. Modified educational strategies can also be applied to developments within the same sector (such as mining, or agriculture) or those regulated by the same legislation or government department.

This process of corresponding can be understood in terms of a traditional program logic model. The collaborative letter writing itself by the RCE is the *activity* with the letter generated as the *output*. The *immediate outcome* is normally a formal acknowledgment by the government department of the letter's receipt. There is then a more formal governmental reply (an *intermediate outcome*) to the queries in the original RCE letter along with an outline of the current state of deliberations within the department and the process that will be followed in reaching a final decision. Finally the RCE receives notification of whatever changes was finally adopted along with a rationale (a *long-term* outcome). The government decision will then *impact* the community (for better or worse) and frequently the government will set out some *impact indicators* that will be reported on at a later date so it, in turn, can assess the success of its decision. These measures are often included in the final notification of decision so there is public transparency as to what follow-up will occur.

Formal correspondence to specific orders of government about particular development proposals is an important vehicle for RCEs to acquire this knowledge. Letter writing and other submissions reflect a traditional method for engaging governments built on their core functions and ways of governing. Just as ancient rulers were petitioned by their subjects to undertake particular actions, so too do citizens in modern democracies have the right to make formal requests of government. This is reflected in how such correspondence is treated. In the case of RCE Saskatchewan, letters received were formally acknowledged by government departments with, typically, numbered departmental responses made available on the public record. Ancient monarchs also employed various advisors within their court to aid in decision making which nowadays is reflected not only in governments with specialized research offices but also in governments commissions to which scholars might be appointed and other public processes within which academic experts can participate. As RCEs are scholarly networks, RCE letters fulfill this advisorial role (and just like ancient rulers, political decision makers and civil servants can always choose to follow or not follow particular advice). Modern democracies also require that policies have a rationale that is articulated and justifiable in the public (vs. private) interest. This legal requirement of public policy provides a structured receptivity of government for RCE submissions that advance sustainable development (which articulates a long-term citizen interest). Lastly, a core value of government is maintaining order. This involves establishing due processes for contentious matters to be considered, avenues for expert and public input toward such deliberations, and mechanisms for impartial settlement of disputes. Proposed developments of significance frequently are contentious given the resources involved and the competing interests of diverse stakeholders

and, hence, fall in this category. Importantly, the sustainable development perspective advanced by RCEs reinforces an interest in maintaining order and stability over the long term.

2.1. A case studies approach

Since its acknowledgment as an RCE by the UN University in 2007, RCE Saskatchewan has intentionally made submissions to various levels of government on major development proposals. Table 1 sets out nine different developments listed chronologically on which the RCE has made submissions. These include one related to energy (#1), two on forestry (#2, #7), one on mining (#3 a, b), one on agricultural water diversion (#4), two on road construction (#5, #6), one on suicide prevention (#8), and one on SDG reporting by government (#9) (Table 1, col. 1). Governments necessarily have been involved with these developments given their legal obligation to review private development proposals within their own jurisdictional responsibilities. Actions undertaken include requiring specialist studies, preparing and/or reviewing environmental impact assessments, and public hearings. Analogous to government, RCE Saskatchewan has been triggered to act based on its own educational mandate as it relates to the proposed developments. The RCE has also responded to direct petitioning by members of the RCE or the broader community (these "triggers" are found in Table 1, col. 2). These members may include formal organizational partners of the RCE (such as universities, NGOs, or community associations), the RCE's own working groups and flagship projects, or individual RCE members that bring a matter to the attention of the RCE. Eact, in turn, may act on behalf of other groups or individuals who have heard about the RCE's work and seek its help but are not formal RCE members. That RCE Saskatchewan is often structurally mandated to respond is tied to the substantive impact of all the developments on the SDGs (Table 1, col. 3 shows all of the developments impacting at least 3 SDGs if not more). The table then documents the nature of the RCE submission (normally a letter; see col. 4), followed by the formal governmental response (col. 5), and the final resolution of the situation (col. 6).

Each RCE letter in Table 1, along with what has occasioned the letter and its resulting governmental responses and impacts, can be seen as its own distinct case study. Methodologically, the paper employs a qualitative, case studies approach to draw out key features of the letters themselves along with features of the resulting processes of which they were a part and helped shaped. Best case examples are then highlighted throughout the remaining paper to illustrate the dynamics of specific RCE interventions. A comparison of individual cases has, in turn, allowed common elements to emerge both in the letters themselves but also the dynamics at play, to enable strategic reflection on how this letter writing strategy can be employed by RCEs. This qualitative method produces a kind of "grounded theory" vs. the "general theory" generated by quantitative scientific methods (see Strauss and Corbin, 1994; Charmaz, 2004). This means the results will have more direct relevance to the situation in Saskatchewan as well as other RCEs that share its structural features, mandates, resources. Similarly the findings will have more relevance to the kinds of development proposals found in Saskatchewan, many of which involve extractive industries (such as mining) and primary production (such as agriculture), rather than other types of development (such as value-added manufacturing or ICT). Some of the limits related to generalizability of the findings are discussed in the concluding section including the inability to determine direct causal linkages between specific RCE letters and resulting outcomes. Ultimately the case studies also serve as a kind of storytelling that hopefully can both motivate and inspire action by those seeking to advance sustainable development within their regions.

3. Key elements of RCE correspondence

This collection of nine case studies have been used to identify common features shared by many (if not all) of the cases and deemed as potentially having been important to their strategic effectiveness. Here the strategic effectiveness of a letter is understood in terms of (1) whether some (or all) of the objectives stated in a letter's request have been achieved and (2) whether the letter can reasonably be seen to have contributed to the achievement (that is, did the governing authority likely act differently than it otherwise would have based on the formal requests made in the correspondence). With each of the features discussed, specific case studies are highlighted that seem to best illustrate the element under discussion. The elements include: (1) issue identification and framing, (2) background on RCE SK and global RCE network, (3) acknowledgment of government authority and constructive critique, (4) highlighting other sustainability options, (5) RCE recommendations for action, and (6) inclusion of additional appropriate stakeholders. Each will be discussed in turn.

3.1. Issue identification and framing

Any letter to government would reasonably begin by identifying the issue occasioning the correspondence. RCE SK has typically mentioned some version of the "triggering events" listed in Table 1, col. 2 in its letters (whether responding to a formal invitation for public input, expressions of expert or public concern about a development proposal in the media, or the decision of one government enabling another level of government to act). However, the RCE also indicates it is acting according to its own regional mandate in service to the particular

TABLE 1 Select RCE Saskatchewan government correspondence (2009–2022).

Proposed development	Triggering event for RCE	Related SDGs	RCE contribution	Response	Resolution
1. Nuclear Reactor(s) Generating 3,000 MW for Province of Saskatchewan	Gov't of SK *Uranium Development Partnership* (UDP) public consultation	3, 6, 7, 9, 12, 13, 14, 15, 16	Letter to UDP Chair with RCE analysis through regional SD lens (June 18, 2009)	Consultation final report: "Future of uranium public consultation process" (2009)	Gov't of SK convenes inquiry into all energy types for province (2010); nuclear power rejected
2. Clear cutting of Torch River Forest near Nipawin, SK	Meeting with friends of the torch river forest following RCE recognition event (May 2013)	3, 4, 8, 11, 15	Letter to friends of the torch river forest and "To whom it may concern" (July 4, 2013)	Follow-up discussion to create an Eco-museum (EM) in Nipawin; development of EM course at Luther College	Clear cutting of Torch River forest averted with broader understanding of forest benefits
3a. Yancoal Southey Potash Mine near Southey, SK	Provincial invitation for comment on Yancoal environmental impact statement and concerns of local farmers	3, 6, 8, 11, 12, 14, 15, 16, 17	RCE submission to Saskatchewan environment (June 6, 2016) and follow-up (June 29 and August 10)	SK Gov't rejection of need for further inquiry but with conditional approval of project	Provincial requirement for a *community involvement plan*; mine development delayed until completed
3b. Yancoal Southey Potash Mine near Southey, SK	Provincial rejection of RCE request for further SK Ministry of Environment inquiry	3, 6, 8, 11, 12, 14, 15, 16, 17	RCE request to canada ministry of Env. and climate change for federal Env. impact assessment (July 20, 2016)	Gov't of Canada rejects need for federal environmental impact assessment (Nov. 10, 2016)	Local community engages prime minister with video of concerns re. mine development (Sept 9, 2016)
4. Water diversion from Quill Lakes watershed to Last Mountain Lake	Decision of SK environment to not require an environmental impact assessment of QLWA *common ground drainage diversion* (Sept. 8, 2017)	2, 6, 9, 12, 14, 15, 16, 17	RCE request to canada ministry of Env. and climate change for federal Env. impact assessment (Nov. 19, 2017)	Gathering of data by Canadian Ministry from diverse stakeholders for deliberation by federal Minister on request for env. assessment	Withdrawal of proposal by Quill Lakes watershed association; Canadian government suspends deliberation on environmental assessment (Jan. 23, 2018)
5. Gravel road construction by Rural Municipality (RM) of Winslow	Article by CBC (June 5, 2019) indicating rare artifact discovery and lack of community notification	3, 4, 8, 10, 11, 12, 16, 17	RCE letter to RM of Winslow seeking broader public consultation and revised location of road construction (June 6, 2019)	Response from SK Minister of Parks, Culture and Sport indicating existing rules followed but openness to their review	Postponement of road construction providing opportunity for RM Council to review decision
6. City of Saskatoon freeway through Northeast Swale Conservation Zone	Request by RCE member for support for Northeast Swale Watchers citizen advocacy group (Aug. 15, 2019)	13, 14, 15	RCE letter to SK Ministry of Environment and Mayor of Saskatoon requesting comprehensive ecological assessment	Responses from SK ministry of highways and infrastructure (Oct. 1, 2019) and from Mayor of Saskatoon (Oct. 10, 2019)	Provincial commitment to consultation and detailed analysis; City of Saskatoon commitment to follow-up report on Swale conservation
7. 20 year logging plan using modified clear-cutting of northern SK boreal forest near Prince Albert, SK	CBC News article (Aug. 29, 2019) followed by request from RCE member at University of Saskatchewan	12, 13, 15	Request for comprehensive ecological assessment and examination of alternatives to clear-cuts prior to approval of 20 year plan (Dec. 18, 2019)	Response from SK Ministry of Environment outlining existing regulatory and consultation requirements (Mar. 6, 2020)	Comprehensive ecological assessment not undertaken; requirement for replanting following tree harvest
8. Release of Sask. Suicide Prevention Plan	Ceremonial walk from northern SK to Regina and hunger strike by Métis Tristen Durocher protesting v. high suicide rates	3, 4, 10, 16, 17	Request for dedicated resourcing to meet SDG 3.4.2 on suicide reduction and implementation of earlier provincial studies (Sept. 15, 2020)	Response from SK Ministry of Health outlining current investments in mental health and reiterating existing plan (Nov. 19, 2020)	Existing plan not revised but $1.2 million invested in plan and further investment in Roots of Hope community suicide prevention initiative
9. Release of UNESCO ESD 2030 roadmap and question of role of Province of SK in reporting and advancing SDG targets within its jurisdiction	Review of Government of Saskatchewan website on UN sustainable development goals and noticeable lack of content	4, 16, 17 (and need to report on all 17 SDGs)	Request to Provincial Auditor to report on strategies and indicators for SDG targets in provincial jurisdiction (Dec. 31, 2021)	Response from Provincial Auditor indicating no formal commitments of SK Gov't to SDGs restricting auditor's work (Feb. 2, 2022)	Auditors work in certain areas of the SDGs to date detailed (specifically SDGs 3, 6 and 13) and commitment to future work on SDGs 4, 7, 13, and 15

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government. To the extent both major cities (Regina and Saskatoon), the province of Saskatchewan, and the Government of Canada participated in the formation of RCE Saskatchewan this underlies the credibility of this service role to government. The citizen service role of the RCE's higher education partners (that include the University of Saskatchewan, University of Regina, and Saskatchewan Polytechnic) also affirm this.

While the RCE is also often responding to development proposals in the face of a negative community or grassroots reaction, it often reframes the situation as a positive educational opportunity. A good example of this positive reframing of a development dispute is a letter sent by RCE Saskatchewan to the Rural Municipality (RM) of Winslow following the discovery of rare artifacts (up to 10,000 years old) in a section of proposed gravel road construction by the RM (Warick, 2019a). While the site was professionally excavated according to the terms of the Saskatchewan *Heritage Property Act*, the Act did not require notification of Indigenous groups, the local community, or other provincial bodies (only in the event human remains were discovered would there be such notification; Saskatchewan Parks, 2019). The community was only made aware of the find by a local farmer who alerted First Nations in the area (Warick, 2019a). As the Province's Heritage Conservation Branch had already allowed the project to proceed, the RCE communicated directly with the RM of Winslow, specifically its Reeve and Councilors. The letter began highlighting the RCE's excitement about the artifacts discovery and its significance as a part of the Province's tangible cultural heritage; it affirmed the site's potential for sustainable development: the educational value for local schools and researchers, social and cultural value for local residents, and economic value from tourism (RCE Saskatchewan, 2019b: p. 1–2). The letter also addressed the connection between culture and development citing UNESCO: "[c]ulture contributes to poverty reduction and paves the way for a human-centered, inclusive and equitable development" (RCE Saskatchewan, 2019b: p. 2). This positive reframing of the find as a resource for the community helped highlight a wider vision of what constitutes development over the more traditional development reflected in the road construction. The RM chose to halt the road construction shortly thereafter for further consultation (Warick, 2019b).

3.2. Background on RCE SK and global RCE network

A key component of all letters authored by the RCE has been to provide adequate background on the structure and purpose of RCE Saskatchewan and the global RCE network. The following is a sample paragraph from a letter requesting further provincial government action on suicide prevention (Saskatchewan has the highest rate of suicide of any province in Canada, especially among Indigenous youth; RCE Saskatchewan, 2020: p. 2; see also Saskatchewan Health., 2020, for the Government of Saskatchewan's reply):

> As background, RCE Saskatchewan is a *Regional Center of Expertise (RCE) on Education for Sustainable Development (ESD)* acknowledged by the UN University in 2007. Our RCE brings together scholars and community practitioners dedicated to researching and advancing ESD from Saskatchewan's Higher Education and other local institutions. These activities are the result of our dedicated volunteer base. This mobilization of regions by the UN University was initially in support of the *UN Decade on Education for Sustainable Development* (2005–2014) and the *UNESCO Global Action Programme on ESD* (2015–2019). We now see education for sustainable development as essential in achieving the 17 UN *Sustainable Development Goals* (SDGs) meant to guide the global development agenda until 2030. ESD includes, but is not restricted to, Goal 4 on education. As one of over 175 RCEs now acknowledged globally, RCE Saskatchewan is excited about any opportunities for advancing education within our communities that reduces suicide rates and increases mental health and general wellbeing in the province but especially among the most vulnerable citizens of our society (RCE Saskatchewan, 2020).

It is worth noting the importance of key elements of this RCE background as those who work with the RCE are often surprised that it receives specific (vs. generic) replies from governmental authorities in response to RCEs correspondence. First, the RCE is working under the auspices of the UN University in service to the United Nations. The Government of Canada has made a formal commitment to the UN Sustainable Development Goals so the RCE is affirming a shared governmental commitment through the UN. Secondly, within a Canadian context, education is a provincial responsibility. By citing the RCE's focus on education and formal role in supporting UNESCO this directly connects to the jurisdictional responsibilities of the Province of Saskatchewan. Third, the RCE is acting as an autonomous Higher Education Institution, an autonomy shared with the United Nations University and its Higher Education partners whose members enjoy academic freedom. Further, the scholarly work of the RCE also incorporates community expertise including local sustainability practitioners. As it is universities that train experts who put together or evaluate development proposals, the RCE serves as an expert authority on regional sustainable development. This means that its input is taken seriously by professional organizations and governments regulating professions and evaluating their proposals. The RCE is also a qualified expert in legal settings; should the issue in question come before the courts the documentation of the RCE can play a substantive role in a legal ruling. Fourth, in the case of RCE Saskatchewan, the RCE is purely voluntary with a

structural commitment to advancing education for sustainable development (ESD). As ESD reflects the long-term interests of citizens it carries both moral and legal weight for government officials and political leaders as it tends to align with citizen normative expectations and state legal accountabilities. Lastly, the RCE has both a broad regional and global connectivity. This means that political reputations are potentially affected by governmental responses, as is the global reputation of Saskatchewan and Canada.

3.3. Acknowledgment of government authority and constructive critique

In its correspondence with government the RCE has sought to ensure that the dignity of the office with which it is corresponding is maintained. This is done, in part, by recognizing the authority of a given department to act with respect to a particular matter and employ its own best judgment in relation to all information it receives (including that from the RCE). The RCE strives, on the one hand, for a formal, neutral tone so as not to distract from the evidence and lines of argument it provides, in line with the RCE's educational mandate. Where praise for existing government actions is warranted, this is included. So, for example, in 2021, RCE Saskatchewan wrote a letter to the Provincial Auditor of Saskatchewan seeking the Auditor's assistance in having the province report on those UN SDG targets falling within provincial jurisdiction along with supporting strategies (RCE Saskatchewan, 2021; Provincial Auditor of Saskatchewan, 2022). While the letter was sent due to a noticeable absence of references to sustainable development and the UN SDGs on the provincial government website, the RCE did note positive exceptions including reference to the SDGs as part of the Province's *International Education Strategy* (RCE Saskatchewan, 2021: p. 2).

The RCE also tries to strike a positive tone, seeking to be upbeat about the opportunities a more sustainable path of development can provide. This positivity mirrors the ancient letter writing strategy of the Christian missionary Paul of Tarsus, who in his epistles to various churches begins with a positive greetings, praise, and thanks and ends on similar words of encouragement. These words bookend often quite difficult content for the community he is addressing (see, for example, Romans 1: 7–15; 16: 19–27). This positive approach is supplemented, more generally, by a positive relationship cultivated between the RCE and government through routinely celebrating a range of ESD projects, including municipal, provincial, and federal government supported initiatives through its annual *Education for Sustainable Development Recognition Event* (RCE Saskatchewan, 2022).

Alongside this acknowledgment of authority and good practice to date, the RCE also sets out a constructive critique of the proposed development in terms of: (1) standard principles of good governance, (2) general principles of sustainable development, and (3) relevant UN Sustainable development goals and other UN commitments. Each will be examine in turn.

3.3.1. Critique using standard principles of good governance

A good example of a critique of a development process using standard principles of good governance is found in a submission by RCE Saskatchewan to its Uranium Development Partnership (UDP) public consultation in 2009 (RCE Saskatchewan, 2009; Perrins, 2009). In that year the Government of Saskatchewan was considering the development of a 3,000 MW nuclear reactor for the province (Uranium Development Partnership., 2009). At the time such a reactor was too large for Saskatchewan's needs, especially if it was to be only part of a mix of energy types (the province had a generating capacity of 3,641 MW). The RCE's key criticism of the UDP study, however, was the process that had been used, specifically the composition and mandate of the UDP Committee that had prepared the report. The RCE noted the lack of diversity of the committee including a lack of women and lack of expertise in the areas of health and the environment (Uranium Development Partnership., 2009). Further, the committee's composition appeared not to be impartial but rather as having a likely vested interest in securing a nuclear reactor creating a perceived conflict of interest and consensus bias. Lastly, the committee's focus on nuclear power to the exclusion of other energy types prevented useful comparisons related to the opportunity costs associated with a nuclear reactor. The RCE recommended an independent review panel be struck exploring all energy options for the province; this subsequently occurred and the RCE was invited to present (RCE Saskatchewan, 2010).

A second example where RCE Saskatchewan's critique was tied to appropriate governance was in response to the proposed construction of a water diversion channel from the Quill Lakes Watershed (a closed watershed that drains into salt water lakes) into the north end of Last Mountain Lake. The latter is the site of the *Last Mountain Lake Migratory Bird Sanctuary*; the sanctuary was legally set aside for this purpose in 1887 and is one of the oldest in North America (Canada Ministry of Environment Climate Change., 2022). Due to several years of high levels of precipitation and extensive illegal/non-permitted drainage by upstream farmers in the Quill Lakes watershed (see RCE Saskatchewan, 2017a: p. 6), the Quill Lakes had risen extensively thereby flooding land of farmers adjacent to the Quill Lakes. The RCE requested a federal environmental assessment of the project in part due to a number of ecological concerns including issues with diverting water that had a much higher salt content and total count of total dissolved solids (TDS) into Last Mountain Lake (RCE Saskatchewan, 2017a: p. 2; RCE Saskatchewan, 2017b). However, despite these ecological concerns, a primary set of governance issues were raised related to the Quill Lakes Watershed Association (QLWA), the project's proponent, and the Government of

Saskatchewan. The QLWA is meant to manage water within its own watershed and, as such, is structurally governed by representatives within that watershed. The proposal, however, would have diverted water into a different watershed potentially imposing substantial harms on those without representation in its governance structure and beyond its jurisdictional mandate (RCE Saskatchewan, 2017a: p. 3–4). If the project were approved, the RCE noted there would also be an ongoing conflict of interest for the QLWA in monitoring and controlling the water flow given the QLWA's structural interest in diverting water into the neighboring watershed (RCE Saskatchewan, 2017a: p. 4). A second concern, however, was with the framing of the project in relation to its overall purpose, namely a lowering the Quill Lakes by 0.6 meters (RCE Saskatchewan, 2017a). The RCE noted that the proposed water diversion of 7 million m^3/year was well below what was needed to actually achieve this goal; instead the diversion amount had presumably been chosen to be beneath the 10 million m^3/year that would have triggered a federal environmental assessment (RCE Saskatchewan, 2017a: p. 4–5; RCE Saskatchewan, 2017b: p. 2). In light of this low volume, the negligible contribution of the project toward its stated goal of flood mitigation was a further reason from a basic governance perspective to reject the proposal (RCE Saskatchewan, 2017a: p. 5).

A second major governance issue, however, was the Government of Saskatchewan's rejection of the need for a provincial environment impact assessment (EIA) of the QLWA proposal on September 8, 2017 (Saskatchewan Environment., 2017). This determination was based, according to the provincial ministry, on the project's not meeting any of 6 criteria specified under the Saskatchewan *Environmental Assessment Act,* sec. 2(d) needed to trigger an EIA (SK Environment, 2017, "Reasons for Determination" 1–3). Based on the RCE's own analysis of the three criteria, 3 of the criteria were found to directly apply. These included the use (and likely degradation) of a provincial resource (in this case surface water), documented public concern about the proposal, and the project's potential for substantial environmental impacts (RCE Saskatchewan, 2017a: p. 2–3). As such, the provincial government had, on the surface, made an improper determination of the legal need for a provincial EIA. Good governance also requires considering the opportunity cost of a particular action relative to other possible courses of action (those that might cost less and potentially have a greater impact and hence be better solutions). The RCE noted that a provincial environmental assessment would have required the drainage proposal be compared against all other options (RCE Saskatchewan, 2017a: p. 4, note 10). Other options might include closing of illegal drains and wetland restoration (RCE Saskatchewan, 2017b: p. 3–4). Importantly, the lack of an EIA meant the inability of the local communities affected (including Indigenous/First Nations communities), the academic community nor other appropriate experts a formal mechanism for providing input (RCE Saskatchewan, 2017a: p. 7). In the end the QLWA withdrew its project application in January of 2018 so that the Government of Canada's Environmental Assessment Agency (CEAA) no longer had to decide whether an environmental assessment was needed (Canadian Environmental Assessment Agency, 2018).

3.3.2. Critique using general principles of sustainable development

A second avenue of constructive critique by RCE SK of development proposals has involved highlighting the additional expectations that a sustainable development approach requires that are not part of traditional development approval processes. Rather than assuming a necessary tradeoff between economic development and the natural environment in development proposals, instead the long-term, multi-generational focus of sustainability should select for developments that strengthen the capabilities of individuals and their communities, including both human and non-human species, which entails building up the underlying resources on which these depend. An increasing disconnect between communities that have expectations for sustainable development and outdated development approval processes means growing tensions with communities that, in turn, delay or prevent developments altogether due to a lack of social license. A particular case illustrates this point. In 2016, Yancoal Canada Resources Co. Ltd., a state owned Chinese enterprise, proposed to develop a potash mine (used for fertilizer) in rural Saskatchewan near the town of Southey (Yancoal Golder Associates., 2016). In responding to the Government of Saskatchewan's public call for feedback on the potash mine's Environmental Impact Statement (EIS), RCE Saskatchewan noted key areas where the EIS was inadequate due to a process that failed to incorporate current scholarly research on sustainable development (coupled with even diminished regulatory standards with the legal loss of federal government oversight for such large scale projects; RCE Saskatchewan, 2016a: p. 2). This lack of sustainable development dimensions included the neglect of the *precautionary principle*, particularly given the large volume of fresh water that would be used at mine's full production; this volume of water amounted to 1,450 m^3/h taken from the City of Regina's water supply at Buffalo Pound, which, in turn, is located in a semi-arid region with substantive projected impacts of climate change (RCE Saskatchewan, 2016a: p. 2; Petry et al., 2018: p. 25). A further sustainability dimension of the EIS that was missing was the lack of analysis of the social impacts of the proposed mine on the local farming community, including potential loss of social and cultural capital, especially in light of the divisions that had already occurred in the local community up to that point (RCE Saskatchewan, 2016a: p. 2–3). Given these and other lacks, the RCE recommended that the Minister of the Environment call an independent inquiry, a power available under the *Saskatchewan Environmental Assessment Act*, to remedy these deficiencies and to also include a socio-cultural impact study to understand the agricultural livelihoods being impacted (RCE Saskatchewan, 2016a: p. 3, 9).

Initially the Ministry did not respond to the primary concerns raised by the RCE (Saskatchewan Environment., 2016a) but following further correspondence from RCE Saskatchewan, 2016b, the Ministry indicated it would not undertake such an inquiry (SK Environment 2016b). However, when it issued its conditional approval of the mine, it did stipulate the need for Yancoal to create a community involvement plan including establishing a community advisory committee—presumably to address some of these concerns about inadequate social license (Saskatchewan Environment., 2016c: 2, sec. 7). The RCE, however, cited reservations about the approval in a subsequent media release analyzing the decision, including concerns about the terms for the community involvement plan being designed by the mining company (RCE Saskatchewan, 2016d, p. 1–2, sec. 2). The remedy of a community involvement plan proved inadequate with continued tensions and delays that followed the initial approval (Petry et al., 2018); regrettably with a more rigorous environmental assessment process framed around sustainable development principles and an additional supplementary inquiry as recommended by the RCE these delays could potentially have been avoided.

3.3.3. Critique using relevant UN Sustainable Development Goals and other UN commitments

A third form of constructive critique employed by the RCE has involved appeals to specific UN SDGs and other UN commitments by the Government of Canada. Prior to the adoption of the 17 UN SDGs in 2015, RCE Saskatchewan framed its analysis in light of the local sustainable development issues that had been identified in putting together its formal application to the UN University. So in critiquing the Uranium Development Partnership proposal in 2009, RCE SK used its regional thematic areas of climate change, health and healthy lifestyles, farming and local food production, reconnecting to natural prairie ecosystems, supporting and bridging cultures for sustainable living, and sustainable infrastructure, along with one of its two cross-cutting themes of sustaining rural communities (RCE Saskatchewan, 2009: p. 6–15). The use of these themeatic areas grounded in local citizen realities helped create a compelling regional case for the RCE's recommendations to the UDP.

With the approval of the 17 UN Sustainable Development Goals (SDGs) in 2015, the RCE shifted to referencing those SDGs relevant to the development issue at hand in framing its letters to different levels of government. In 2019, for example, an RCE member requested the RCE send a letter in support of the Northeast Swale, a sensitive ecological region that would be impacted by the construction of a freeway around the perimeter of Saskatoon, Saskatchewan's largest city. As both the City of Saskatoon and the Province of Saskatchewan were funding the initiative and involved in the planning, the RCE sent a request to both levels of government asking for a comprehensive ecological assessment of the impacts of the proposed route (RCE Saskatchewan, 2019c; Saskatchewan Environment., 2020). In support of this request, the RCE cited 3 specific UN SDGs, in this case goal 13 on climate action (given the role wetlands and grasslands play in carbon sequestration), goals 14 (life below water), and goal 15 (life below land) given the habitats for specific rare and endangered species found in the Northeast Swale; RCE Saskatchewan, 2019c: p. 2). A further example employing the UN SDGs, was the RCE's response to a 20 year forestry plan proposal seeking a modified clear-cutting of the boreal forest in Northern Saskatchewan near the city of Prince Albert (Latimer, 2019). A "modified" clear cut according to Saskatchewan Environment seeks "to emulate natural disturbances caused by severe wind or fire"; however, only 9% of trees are left within the area that is clear cut (Latimer, 2019). Viewing this clear-cutting approach as inadequate, RCE Saskatchewan specifically cited Goal 15, "Life on Land" and its commitment to sustainable forestry management practices (RCE Saskatchewan, 2019d: p. 1). The RCE also pointed out a false analogy between clear-cutting and forest fires citing the much greater loss of organic material in soils following logging vs. natural fires (RCE Saskatchewan, 2019d: p. 2). RCE Saskatchewan also cited the key role of Canada's boreal forests in addressing climate change (SDG 13) as well as the need to focus on responsible consumption and production (SDG 12). In the latter case, the RCE cited Natural Resources Canada and the diversity of non-timber products and services that a natural forest provides vs. one that is clear-cut—even if it is replanted (RCE Saskatchewan, 2019d: p. 2).

The RCE also takes the opportunity to cite relevant commitments Canada has made to various UN Conventions. In the case of the proposed highway construction through the Northeast Swale in Saskatoon, the RCE identified the UN World Heritage Convention *Concerning the Protection of World Cultural and Natural Heritage*, specifically article 5.4 where Canada is committed "to take appropriate, legal, scientific, technical, administrative and financial measures necessary for the identification, preservation, conservation, presentation and rehabilitation of this [cultural and natural] heritage" (RCE Saskatchewan, 2019c: p. 1–2). In the case of the proposed modified clear-cutting of the boreal forest near Prince Albert, the RCE cited Canada's commitment to the *UN Decade for Biodiversity* (which includes target 6 on sustainable forestry management) as well as Canada's own reporting to the UN on the Decade that emphasizes the major role Canada has to play in this regard due to its forest cover (RCE Saskatchewan, 2019d: p. 3).

3.4. Highlighting other sustainability options

In order to point out the opportunity costs associated with proposed developments, the RCE has frequently highlighted

alternative sustainability options that might be pursued having lower resource costs and/or greater sustainability impacts. A good example of this strategy was an RCE letter composed in support of creating a living laboratory for ESD in the Torch River Forest located in the North East part of Saskatchewan near the town of Nipawin. This was *in lieu* of a proposed clear cutting of the forest. Following the RCEs *ESD Recognition Event* held in Nipawin on May 8, 2013, the RCE had a hastily called meeting with two concerned members of the *Friends of the Torch River Forest* (FTRF). Deeply concerned about a looming clear cut of this old growth provincial forest, they asked what the RCE might do. On July 3, the RCE met with FTRF and interested local stakeholders from the Nipawin Region with additional faculty from the city of Regina using a virtual connection. Drawing on the local knowledge and academic expertise gathered at the meeting, the RCE composed a letter addressed to the FTRF, local stakeholders, and "To Whom it May Concern" (RCE Saskatchewan, 2013). To show the opportunity cost of the clear cut (which would have provided only a one time economic benefit to one or a few companies with relatively low quality timber), the letter documented the loss of the existing economic uses of the forest as well its non-market livelihood benefits should the clear-cut proceed. These included the high value of annual mushrooms harvested and sold to Canadian restaurants, berry picking by local residents, the value of the forest as a recreational area for existing tourism (and future opportunities for eco-tourism), a rich cultural history based on the diversity of Indigenous peoples and early European settlement in the area, and the forest's role as a source of traditional medicinal plants and site of healing (RCE Saskatchewan, 2013: p. 1–2). The letter then highlighted the potential value of the forest as an "educational forest" or "teaching forest" noting opportunities for study of its distinctive biology and for improved forest management including alternative logging practices (RCE Saskatchewan, 2013). The proposed development model, specifically the creation of an Eco-museum in the area, could advance all of these additional benefits while preserving the many livelihood opportunities already offered by the forest. By documenting the existing and potential forms of sustainable development possible with the forest, the marginal economic benefits of a clear cut for a few logging companies, and the harms to the forest's many users, the opportunity costs of the logging became readily apparent and the clear cut did not proceed.

3.5. RCE recommendations for action

Where possible, the RCE sets out recommended courses of action based on feedback from local community members, sustainability practitioners, and academic input. These recommendations are important both to provide directions that are workable with those who are being affected by a given development (thereby acquiring social license from the community) as well as enabling formal deliberation by a government body in relation to the request. It also helps ensure a formal governmental reply to the RCE regarding the recommendation with supporting rationale (whether or not the specific request is being followed). In the case of the RCE's response to the proposed development of a nuclear reactor in 2009, 5 recommendations were presented, each following detailed analysis justifying the recommendation; many of these were subsequently enacted (RCE Saskatchewan, 2009). In the case of the proposed highway development through the Northeast Swale conservation area in the city of Saskatoon, a specific recommendation was made for a comprehensive ecological assessment of the impacts of the development (RCE Saskatchewan, 2019c). In this case the Province of Saskatchewan committed to extensive consultation (naming specific groups to be consulted) along with setting out when a detailed analysis of the ecological impacts would take place (Saskatchewan Highways Infrastructure., 2019). The City of Saskatoon in its own letter also detailed its efforts for stewardship of the Swale including the commitment for the City administration to do a follow-up report on the Northeast Swale's conservation (City of Saskatoon, 2019).

In recommending alternative courses of action, the RCE also offers to provide assistance or educational supports based on its ability to draw upon the expertise of its individual members and partner organizations as well as the global RCE community. For example, in the case of the Torch River Forest, the RCE indicated the potential to make the community's progress in creating a living laboratory for sustainability visible at the next RCE Saskatchewan *ESD Recognition Event* the following year as well as presenting on its progress to the other 116 RCEs in 2013 at the UN University's 8^{th} *Global RCE Conference* in Nairobi, Kenya (RCE Saskatchewan, 2013: p. 2).

3.6. Inclusion of additional appropriate stakeholders

While RCE letters are directed at a particular level of government for action, the RCE is always very mindful and deliberate in what individuals and organizations are cc'd on the correspondence. One reason is that multiple jurisdictions might have authority in relation to how a development project proceeds. Keeping these other jurisdictions included in correspondence from the start can be useful, especially if a later appeal is made to a different jurisdiction for action. So, for example, in the case of Yancoal Southey Potash Mine proposal, the Canadian Minister of Environment and Climate Change as well a Member of the Canadian Parliament from the Saskatchewan region who was sitting in the governing party at the time were included on the correspondence

(RCE Saskatchewan, 2016a: p. 3). When the Government of Saskatchewan indicated it would not be proceeding with an independent inquiry to supplement its initial environmental assessment (Saskatchewan Environment., 2016b), RCE SK requested a cumulative environmental assessment by done by the Government of Canada (RCE Saskatchewan, 2016c). In this case the federal ministry was already well aware of the issues at stake. While it declined to conduct its own assessment, citing, in part, the province's having already conducted its own study (Canada Ministry of Environment Climate Change., 2016) this reason for the decline was later important in subsequent interactions with the federal ministry. When the Government of Saskatchewan decided in 2017 that an environmental assessment was not needed for a water diversion proposal from the Quill Lakes basin into Last Mountain Lake (Saskatchewan Environment., 2017), RCE Saskatchewan made use of this fact to argue a federal environmental assessment was warranted (RCE Saskatchewan, 2017a).

In cc'ing frequently a large number of individuals and organizations, the RCE is able to clarify and broaden who it views as stakeholders to a development that might otherwise not be included. So, for example, in most correspondence the RCE has included its own regional partners and members (given its regional accountability) as well as the United Nations University in Japan in light of the RCE network operating under the auspices of the UNU's Institute for the Advanced Study of Sustainability (United Nations University, 2022). In addition, the RCEs are a global learning space for sustainable development so the RCE also includes the Regional Advisor for RCEs in the Americas as well as indicating that it will keep other RCEs informed of developments in Saskatchewan (whether through reports at annual Americas meetings of RCEs or Global RCE Conferences). As the RCE serves citizens in general within the region, it will normally include both government and opposition members of the legislative assembly (i.e., the government ministers of relevant ministries as well as the opposition critics associated with the ministry) as well as related federal ministries. In addition, the intentional inclusion of other provincial or regional organizations helps make them aware of issues that fall within their organizational mandates (even if, to date, they may not have considered it as such). So, for example, in the case of the artifact discovery of the RM of Winslow, the RCE included various municipal, Indigenous, and cultural organizations, specifically the Saskatchewan Association of Rural Municipalities, the Federation of Sovereign Indigenous Nations, and Multi-Faith Saskatchewan (RCE Saskatchewan, 2019b).

This breadth of inclusion is appropriate from a governance perspective where multiple parties have direct or indirect responsibilities related to a particular development or managing and influencing that kind of development. However, as importantly, it reflects an acknowledgment by an RCE of the significant unknowns in moving to more sustainable paths. Who has jurisdiction? In the case of the RM of Winslow, for example, a provincial government reply was received by the RCE from the Ministry of Parks, Culture, and Sport rather than Ministry of Government Relations based on their interdepartmental discussions (of which the RCE was notified on June 11, 2019). There are also other unknowns. What legislation and regulations might need to be modified or might a new authority need to be created? What interests and resources might proponents of specific kinds of development (whether mining, agricultural developments, or forestry) have for advancing more sustainable development including ESD within their own organizations? What organizations might be able to use their various forms of influence (such as public and private advocacy) to advance change? The breadth of inclusion of those cc'd on a letter also creates a platform for conversation among organizations that may not have been in communication due to differences in geographic scale, organizational silos, or past inter-organizational tensions. In this case, not only do recipients of communications frequently cc other organizations initially included in their replies, but the resulting correspondence is usefully framed around the concept of sustainable development and relevant sustainable development goals. As formal conversations evolve into future meetings, scholarly panels, or community events an avenue is created for a broadening of invitations to the stakeholders initially identified.

A final reason for the breadth of inclusion of organizational stakeholders cc'd on correspondence is the role they play as gatekeepers to enabling a broad public awareness of substantial development initiatives whose approval will have long-term impacts, for better or worse, on regional sustainability. In many cases, the RCE has been contacted precisely because developments have been perceived to be undertaken without effective public consultation (even though this is frequently a mandatory requirement). In the case of the proposed modified clear-cutting of the boreal forest near Prince Albert, a member of the Fish Lake Métis sought to have a meeting with the provincial government on the proposal only to find that the meeting would not be public; nor were further public meetings scheduled by the government (Latimer, 2019). A similar concern was raised about earlier consultations on the logging proposal; rather than being arranged by the Province these were arranged by the proponent of the logging development itself and were noted for their poor attendance (Latimer, 2019). As mentioned earlier, in the case of the proposed water diversion from the Quill Lakes watershed to Last Mountain Lake, the choice not to have an environmental assessment eliminated a key opportunity for public input (SK Environment, 2017).

A key issue here is how public consultation is viewed in the development process. Developers often view consultation as simply a hurdle to be overcome as do government's that see economic growth from new developments as the primary vehicle to livelihood improvements and quality of

life (see *Saskatchewan's Growth Plan: 2020-2030;* Government of Saskatchewan, 2019). Rather than a hurdle or barrier, however, public participation in the approval of specific projects plays a vital role in education for sustainable development. Transforming the perception of these consultations from an obstacle to an asset (namely as an opportunity to acquire invaluable local expertise, scholarly and other organizational input) is vital to ensuring locally appropriate, sustainable development. This also avoids a "cookie cutter," one-size-fits-all model of development by large economic players. RCE SK interventions in these public processes can be key to turning them from routine procedures into learning spaces, especially where local expertise is validated by an RCE that might otherwise be dismissed.

4. Discussion

4.1. Efficiency and effectiveness of RCE letter writing

An RCE's letter writing in response to proposed development initiatives deemed unsustainable or suboptimal within its region might be viewed as overly reactive. However, there are a number of reasons why such a strategy is both efficient and effective. It should be initially noted that in some ways it is an ancient strategy, mirroring the method of the ancient philosopher Socrates who always began his reflection by examining the merits of the ideas put forward by others rather than his own (see Plato, 1999). Here the RCE is also not putting forward its own sustainable development proposal but rather examining the merits of a development proposal put forward by another in its region. This merit is assessed based on formal academic expertise supplemented by the input of community members while employing the normative lens of sustainable development to which the RCE is committed. In terms of resource efficiency, the RCE feeds into already existing government processes that accompany new developments, whether it be a public hearing or consultation, governmental study, or commentary on an environmental assessment. In this case formal mechanisms are already in place to gather and assess the input received without an RCE having to set up its own hearings or methods for data gathering and evaluation. From an educational perspective this approach is also likely to be more effective since one already has the ear of a government needing to decide upon a particular proposal. Similarly, when a local community has mobilized to seek out an RCE to intervene, there is at least part of the local community wanting and ready to learn about possible, more sustainable alternatives to the development (whether by modifying an existing proposal or seeking alternative forms of development altogether). In this case the proposed development that is deemed to be unsustainable is like a grain of sand or other irritant around which a mollusk develops a pearl. An RCE's response to a local community's development concerns also allows an immediate avenue for identification of local expertise related to the issue at hand or, at least, local connections to relevant sustainability experts and practitioners. These would otherwise be difficult to find.

The reactive process of an RCE to write letters in response to notably unsustainable development processes is also efficient in terms of policy reform. It is not easy for most RCEs to be aware of the wide range of government development policies that might apply to particular developments within an RCE region. As mentioned earlier, such development policies are frequently opaque or applied in unusual ways with peculiar interpretations. However, these development processes are processes that already exist and are a form of social capital that govern the breadth of development types in one's region. Analogous to ESD efforts that seek to embed sustainable development into existing educational processes in schools (rather than adding on separate sustainability courses and programs), it is more efficient to reform existing development approval processes rather than adding new development streams exclusively for developments deemed sustainable. The basic strategy here, however, is to use an unsustainable project proposal as a basis for reform of existing policies. Where existing policies allow for the approval of projects with high opportunity costs that are not sustainable against relevant criteria (including the SDGs) this shows existing development policies are problematic and needing revisions. Otherwise the given project would not have been approved.

An RCE's documenting the failure of an existing development policy and approval process is normally sufficient to bring about needed reforms. Governments themselves can work out how they need to amend their policies to prevent such happenings in the future in the same way that proponents of unsustainable developments can propose more sustainable projects in the future without the help of an RCE. Should the RCE be invited, it can always participate in amending legislation or helping revise project applications. However, the RCE does not need to spend excessive time lobbying for particular policy changes but merely documents how specific cases that are being approved under current policies fail to meet standards for sustainable development.

This is not to say that the knowledge gained of policies governing existing developments is not of benefit to an RCE. As an RCE engages iteratively with specific economic and other sectors it gains further expertise and can more effectively and efficiently respond to specific issues as they arise. So, for example, in 2019, the Smith Creek Watershed Association threatened to expropriate land owned by a local farmer to facilitate the private drainage interests of upstream agricultural producers. Having already explored substantial governance and other structural issues with watershed associations in its previous experience with the Quill Lakes Watershed Association, the RCE was rapidly able to draft a letter of support for the

farm couple (RCE Saskatchewan, 2019a). It was reported shortly thereafter that an agreement was being reached between the two parties (Briere, 2019). As RCE Saskatchewan is an association of volunteers the knowledge needed to draft such letters is not tied to specific employees but rather can be obtained by following up with those who have participated in the past. Repeated engagement with a single sector by an RCE can help illustrate the structural flaws in existing regulatory bodies. These could include embedded conflicts of interest, too narrow mandates, lack of public or long-term sustainability objectives, inadequate monitoring or enforcement, the need for broadened representation and/or expertise, or the need for additional resources to carry out legislated responsibilities, among others. The case for reform of these of bodies (whether through education of existing members, new membership, and/or legislative changes) is substantially enhanced by RCE documentation of repeated problematic cases as well as citing support by other bodies. So, for example, in the case of the Smith Creek Watershed Association the RCE was able to cite substantial work from a 2018 report of the Provincial Auditor critiquing limited provincial policies around water quality and wetland retention that had enabled excessive drainage (RCE Saskatchewan, 2019a: p. 2).

4.2. Direction of appeals between levels of government

It might be thought that jurisdictional appeals would proceed geographically from smaller to larger scales (e.g., municipal governments to state/provincial governments to national governments). The RCE has in specific instances appealed cases from the provincial government to the federal government when provincial responses have been inadequate (see, for example, RCE Saskatchewan, 2016c, 2017a). However, as frequently, RCE SK appeals have moved in the opposite direction, moving from a provincial jurisdiction to the municipal level. In the Yancoal potash mine case, for example, following the province's approval of the project, the Government of Saskatchewan made it clear that the project would not proceed without a satisfactory Development Agreement being negotiated between the local rural municipality (RM) of Longlaketon and the mining company (Petry et al., 2018: p. 36). In this case all of the voluntary research hours done by the local community and academics associated with the RCE (encapsulated in the RCEs correspondence with the Government of Saskatchewan and Government of Canada) put the RM in a more informed position for negotiation.

A further example of an appeal to a more local authority occurred In the case of the proposed gravel road development by the RM of Winslow in an area where artifacts had been found. The RCE chose to communicate directly with the RM since the provincial ministry of Parks, Culture and Sport had already decided that its own rules had been followed and the development could proceed (Warick, 2019a). In this case, however, the RCE cc'd the province's Ministry of Government Relations on the correspondence to the RM as municipal governments fall under this department of the provincial government (RCE Saskatchewan, 2019b: p. 4). It was felt that if ultimately rural municipalities became responsible for the final say in preserving artifact sites that the Ministry of Government Relations ought to be aware of the kinds of deliberations RMs are being asked to make and support them accordingly.

4.3. The role of public education and the media

It should be noted that unlike general public education that occurs through the media or educational activities open to the public (for example, organized by non-governmental organizations or companies in person or online), the RCE's correspondence is always intentionally directed to particular agents, both the immediate recipients and those that are cc'd on the correspondence. This is, in part, because the correspondence is normally directive with specific requests being made of particular organizations (see, for example, RCE Saskatchewan, 2009, 2016a,c) or meant to strengthen the stance of a community or individual agent in their calls for greater sustainability of a development proposal (e.g., RCE Saskatchewan, 2013, 2019a). However, because RCEs normally operate under high levels of regional transparency and communications to governments are typically on the public record, it has happened, on occasion that the media does report on particular RCE correspondence (as occurred in the case of the RM of Winslow; Warick, 2019c). In this case, the RCE's correspondence serves as a resource for the media that is engaged in standard investigative journalism using rules for access to information. While some RCE members may inform the media, it is not standard practice for the RCE to directly send correspondence to the media but only to those cc'd on the correspondence. On occasions that the RCE has contacted the media, it creates a formal media release formatted for this audience and sent to all relevant media outlets.

4.4. Innovation in university scholarship

It might be thought that letter writing as a form of scholarly output is something new. However, letter writing was central to the earlier rise of humanism in the academy in the 15th and 16th centuries. This is readily exemplified in the life and writings of the famous humanist Desiderius Erasmus who in 1,522 wrote his own manual on letter-writing entitled *De Epistolis*

Conscribendis (Rummel and MacPhail, 2021). That the humanist focus on letter writing (an older mode of scholarship within the university) could be creatively re-purposed to advance sustainable development in government policies should perhaps not be a surprise. As I have documented elsewhere, the older parts of universities are central to the rise of newer forms of scholarship; the older language scholars were central to the development of humanism and older craft knowledge in the university was central to the design of the instrumentation needed for the rise of science (see Petry, 2012). Given the central role humanist scholars played in filling administrative offices of European towns and cities in their day as secretaries and state advisors (Petry, 2012: p. 120), we could also expect an organizational effectiveness of the tools of humanists, including letter writing, in reforming government regulatory processes for sustainable development.

The letters of RCE Saskatchewan parallel core humanist concerns. As trained humanists applied a skeptical eye in evaluating traditional biblical and classical texts in their day (to detect errors in translation and forgeries), so too does an RCE apply a critical eye to development proposals they are asked to evaluate. The humanist concern with ethical development is also reflected in the RCE evaluation of proposals against the normative lenses of sustainable development. Humanists also concerned themselves with accurately understanding historical contexts in which texts were written. RCE Saskatchewan in evaluating development proposals has also, on occasion, actively examined the history of those entities advancing a proposal, whether a nuclear power or mining company, to understand their track record with previous developments, whether positive or negative (see, for example, RCE Saskatchewan, 2009: p. 14; RCE Saskatchewan, 2016a: p. 8–9). The humanist concern with elegance in writing is equally valuable in constructing a persuasive letter for a government official or community group.

However, a substantive difference with humanist letter writing is the shift from the single author of a piece of correspondence by an independent scholar to the collective efforts of academics and community practitioners in crafting each RCE letter. Only this collective effort has enabled the breadth of knowledge needed to evaluate a particular development proposal and craft a useful set of recommendations. Similarly while the humanists aimed at enabling more accurate scholarly texts in the service of better theorizing in areas such as theology, philosophy, medicine, or law, or in the moral development of the individual, RCE letters are in the practical service of advancing more sustainable developments within their region for the benefit of entire communities. Finally, while humanist scholarship relied on the mastery of specific subject areas, such as mastery of the ancient languages of Greek, Hebrew, and Latin, and history, RCE letters necessarily draw upon a much broader interdisciplinary context determined by the development under consideration.

Given the scholarly effort to compose each RCE letter in Table 1, yet coupled with their substantive impacts, the question arises how such efforts should be evaluated in universities, especially in the context of education for sustainable development. While authoring a book was the traditional mark of a humanist scholar, since the rise of science, journal articles have been viewed as the primary scholarly output. However, a book or journal article, even on the topic of sustainable development, may have little immediate impact on a particular development proposal, especially within a given community where contextual knowledge is required. The substantial and positive impact of scholarly books and journals lies elsewhere. This raises the important question whether scholarly letter writing to governments for ESD should play a much greater role in the overall evaluation of a scholar's work (vs. seeing it merely as a kind of community service that in many universities has only a marginal value). Evaluating such letters as scholarly works in their own right could have profound impacts on the research focus of scholars. Perhaps there will come a day where a scholarly letter that preserves a forest or a wetland in the long-term public interest has as much scholarly worth as an empirical study that modifies an important theory within a discipline.

5. Acknowledgment of conceptual constraints and concluding reflections

This paper has explored the role of strategic letter writing by RCE Saskatchewan since 2009 to help inform governmental decisions for specific developments (including mining, agriculture, and forestry, among others). The goal of this correspondence has been to shift the RCE's region to more sustainable paths in these particular instances but also to strengthen the policies governing new developments. RCE efforts constructively critiquing proposals with substantial opportunity costs or lacking important sustainability dimensions serves as an indirect method for reforming existing government development policies. Where such developments are allowed to proceed without substantive revisions this points to inadequacies in existing policies. An overview of six key components drawn from past RCE letters was presented. The strategic value of each component was illustrated by best case examples. It was *conjectured* that letters with most or all of these components are an efficient and effective strategy for RCEs seeking a "whole-region" approach to sustainable development. It was noted that this approach is also prudent in the context of substantive levels of uncertainty on how development occurs within regional contexts faced by RCEs along with the value of strengthening existing government policies regulating entire classes of development using the principles of

sustainable development embedded in the 17 UN Sustainable Development Goals.

The reason the impact of RCE letters is qualified above as only a "conjecture" is due to some significant conceptual limits to this evaluation. RCE Saskatchewan's letter writing to various levels of government is likely not a *sufficient* causal factor, in itself, in relation to any one government decision. Government ministers and other officials have substantial political pressures along with legal and ethical commitments that shape their decisions. This is coupled with the need to navigate the power dynamics within bureaucracies, at the cabinet table, within legislative assemblies, and the general public. At best, letters from an RCE should be seen as *contributing* causes to the outcomes listed in Table 1 and explored within this paper. This is not to diminish what seems to have been substantive changes in development paths that have aligned with the recommendations provided by RCE Saskatchewan to government. It may be that RCE letters have acted as tipping points for government decisions, especially where there has been substantive political pressure from development proponents and the local communities affected with no obvious political gain one way or the other. Just as the political theorist Machiavelli argued that when faced with a no-win political dilemma between rival factions, decision makers will tend to choose the ethical option, it could be, all other things being equal, that government decision makers will follow those recommendations supported by the best evidence (including university scholarship and local expertise), and that follow transparent and inclusive processes, employ good governance, and support the long-term sustainability interests of citizens. In this case RCE letters would play a key role.

All the case studies explored are from a Saskatchewan context. This too presents limitations to the generalizability of these findings for other RCEs. RCEs with universities operating in contexts with more limited academic freedoms or within non-democratic countries that lack opportunities for citizen participation in evaluating major developments might find this strategy unworkable. On the other hand such RCE interventions might enable the kinds of community conversations and structural deliberations within government and the private sector that build more robust development processes in line with the sustainable development goals, especially Goal 16 on peace, justice, and strong institutions. It may be, as well, that RCE letter writing can be scaled up geographically where there are multiple RCEs within a country or continent who make strategic interventions with governmental (or other structures) operating at that scale. For example, RCEs in the United States or Canada might choose to correspond with their respective national ministries, while RCEs in the Americas could correspond with pan-American organizations (such as the Organization of American States). Finally, it should be noted that even if such RCE strategies are not generally useful nor causally effective in their own right, they may be quite important in reducing the unknowns in regional development needed for successful RCE educational strategies employed in other areas.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material; further inquiries can be directed to the corresponding author.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The future starts in the past: embedding learning for sustainability through culture and community in Scotland

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Introduction: If sustainability is about imagining and pursuing desired futures, our past history, heritage, and culture will influence the kind of futures we seek and our chosen routes towards them. In Scotland, there is a strong connection between culture, land, and identity; a sense of community; and a perception of work ethic that derive from our biogeography and socio-political journey. Concepts and practises of education have been influenced by the ideas of key thinkers such as the Scot Sir Patrick Geddes, who introduced approaches to education and community through concepts such as "heart, hand, and head", "think global, act local," and "place, work, and folk". This background influenced us in establishing Scotland's United Nations University-recognised Regional Centre of Expertise (RCE) in Education for Sustainable Development (ESD), known locally as "Learning for Sustainability Scotland". Its initial development ten years ago and subsequent evolution have been built on engaging collaboratively across Scotland and linking formal, non-formal, and informal modes of learning for sustainability. In this paper, we explore how culture and context have influenced the emergence, governance, and activities of RCE Scotland over the past decade.

Methods: We developed an analytical framework of possible cultural and contextual influences on Scottish education. We used a Delphi approach to develop a novel and locally relevant definition of ESD when the RCE was established.

Results: Analysis of purposively selected RCE Scotland activities against our cultural framework illustrated how they had been influenced by culture or context. We propose that democratic intellect, local and global, and nature-culture connections have informed our initiative.

Discussion: We conclude that connection to people, place, and nature influences engagement and action on sustainability, and we suggest that additional sustainability competencies should include physical, emotional, and spiritual aspects of nature connection.

KEYWORDS

Education for Sustainable Development, Patrick Geddes, heritage, nature-culture, sustainability competencies, partnership

1. Introduction

If sustainability is about imagining and pursuing desired futures (White, 2013), our heritage, natural environment and culture will influence the kind of futures we seek and our chosen routes towards these. Scotland is a small nation, inhabited for millennia by people who lived off the land and long connected to other parts of the globe through emigration

and immigration. Although people were historically close to the land, socio-cultural relationships with nature have differed (Brennan, 2018), including perspectives between "crofter" or "laird"[1] (Hunter, 1979). Education has always been a Scottish strength, helping to drive the Enlightenment and casting Scots and Scottish influence wide around the globe (Davie, 1961). The need for education in relation to sustainable development was eloquently defended by Sterling (2002), who argued for a holistic, ecological, "whole person" approach to learning. This paper investigates a subsequent vision of "learning for sustainability" that is inter-sectoral, interdisciplinary and inter-generational. It incorporates formal, informal and non-formal modes of learning across Public, Private and Third Sectors, throughout a lifespan and in different contexts. This vision was articulated and has been supported through the launch and activities of Scotland's United Nations University recognised Regional Centre of Expertise in Education for Sustainable Development (hereafter "RCE Scotland"), locally named "Learning for Sustainability Scotland." In this paper, we explain why and how RCE Scotland was launched, and we describe its intentions, ethos, governance, and some activities. We critically analyse how this network organisation has drawn on place, nature and culture to offer a locally contextualised but globally relevant framework for learning for sustainability embedded in the Geddesian educational approach of "heart, hand and head" (Geddes, 1919, 1949; Higgins and Nicol, 2010; Ivanaj et al., 2014), with lessons for other such initiatives.

Sustainable development can be considered a process that facilitates the pursuit of sustainability. This is, at first, an aspiration; a vision of the future and articulation of possibilities (Ferraro et al., 2011; White, 2013; UN, 2015). Secondly, it is a journey, with different routes towards sustainability (UN, 2015). This journey requires maps and goals, technology and innovation, tools and navigation, and travelling together despite our different travel agendas. Sustainable development thus requires a form of knowledge production, exchange and implementation that is both collective and deeply individual (White, 2013). Future possibilities are human desires, influenced by region, values, status and knowledge. However, future possibilities are dependent on us living within our planetary boundaries (Rockström et al., 2009), understanding the values of ecosystem services whilst reconnecting with nature (Barragan-Jason et al., 2022).

Imagining visions of the future is a positive and empowering process, but it is now essential to enable a transition to sustainability and tackle multiple and interlinked contemporary crises (Davies et al., 2012; UN, 2015). Climate change, biodiversity loss, pollution and the interlinked globalisation and neoliberalism have caused great environmental damage and exacerbated social inequalities (Rockström et al., 2009). These global challenges manifest in local places, and their solutions will require international collaboration and charismatic leadership, but also grass-roots, locally contextualised responses (Meyerricks and White, 2021). Actors across all sectors and in all places—politicians and policymakers, practitioners and professionals, local communities, and indigenous peoples—will need to engage in ongoing dialogical processes and co-production to enable sustainability transitions (Chambers et al., 2022). Integrating different perspectives and experiences is not easy. It requires respect for ontological plurality and the epistemological spectrum, transdisciplinarity, and collaboration. We also need different skill sets and excellent facilitation to navigate and negotiate our goals and strategies (Brand and Karvonen, 2007). In this, academia will play only a part. Whilst the sciences, the social sciences and the humanities have much to offer, practitioner, local, indigenous, and traditional knowledges will all be required to co-design visions of and solutions for the future (White, 2013; Vaughter et al., 2022; Mardero et al., 2023). Linking theory to practise is essential, and holistic outlooks are required to address the systemic aspects of these crises (Voulvoulis et al., 2022).

Education is an essential aspect of this *imagining*—creating visions of the future—and *enacting*—journeying towards these futures. Learning is required to raise awareness and develop understanding of the challenges we face, to develop specific knowledge of our society and natural environment, to appreciate nature and culture and to innovate solutions for a sustainable future for the planet. Education can promote citizenship, train people for particular roles, enable individuals to develop to their potential, and encourage transformative learning for the change to a better society and fairer world (Sterling, 2002). Education can even be a power to enable freedom and self-discovery, and revolutionary educational approaches that move beyond "banking" of information can enable recognition of alternative paradigms (Freire, 1970). Education for Sustainable Development (ESD) is now seen to underpin our efforts towards a sustainable world. Definitions of ESD are often contested, however, the UNESCO approach is relevant here: "*Education for Sustainable Development is a lifelong learning process and an integral part of quality education. It enhances the cognitive, social and emotional and behavioural dimensions of learning. It is holistic and transformational, and encompasses learning content and outcomes, pedagogy and the learning environment itself.*" (UNESCO, 2021). Education for Sustainable Development requires innovative pedagogies, real-world examples, interdisciplinary approaches and an exciting, inspiring mode of learning that is relevant to all disciplines (Price et al., 2021; QAA/Advance HE, 2021). Such education is not merely the absorption of information but is also the acquisition of skills and capacities to equip learners to tackle the uncertain and complex world (Sterling, 2010). A competence can be seen as "a functionally linked complex of knowledge, skills, and attitudes that enable successful task performance and problem solving" (Wiek et al., 2011), but it can also include the capacity to value and understand. Hence, "a competence is defined as the ability to successfully meet complex demands in a particular context" through the mobilisation of psychosocial prerequisites (including cognitive and non-cognitive aspects; Rychen, 2009). Sustainability competencies include future, critical and systems thinking, and inter-personal, intra-personal, interdisciplinary, strategic, and normative/cultural competencies (UNECE, 2012; Giangrande et al., 2019).

1 Crofter and laird are terms respectively for small scale farmer who has tenancy in a community land area and for a large scale landowner who was often the "lord" and is informally known as the laird. These terms thus represent opposite ends of the social spectrum with regards to living and farming in the Highlands and Islands of Scotland.

It has always been recognised that we needed to strengthen education to enable sustainable development, but this recognition was strongly formalised when in 2002, from the World Summit in South Africa and the Johannesburg Plan of Implementation, the UN General Assembly adopted a resolution for the Decade of Education for Sustainable Development (UNESCO, 2014). This decade, led by UNESCO, sought to strengthen the principles, values and practises of sustainable development in educational contexts around the world. In response, in 2003 the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), with funding support from the Ministry of the Environment, Japan, launched a multi-stakeholder global network of Regional Centres of Expertise on ESD (RCEs), along with other initiatives (United Nations University, 2012). RCEs originally were designed to provide "an institutional mechanism to facilitate shared learning for sustainable development" (Fadeeva et al., 2014, p. 22). Delivering a scaled and multi-sectoral response, they "aspire to translate global objectives into the context of the local communities in which they operate. Upon the completion of the DESD in 2014, RCEs committed to further generating, accelerating and mainstreaming ESD by implementing the Global Action Programme (GAP) on ESD and contributing to the realisation of the Sustainable Development" (United Nations University, 2012). RCEs played a key role in facilitating the GAP on ESD (Vaughter et al., 2022) and now play a role in pursuing the UNESCO ESD for 2030 Roadmap with its five priority areas of action: advancing policy, transforming learning environments, building capacities of educators, empowering and mobilising youth, and accelerating local level actions (UNESCO, 2021). However, they also engage critically with globalising narratives whilst supporting local projects (Lotz-Sisitka et al., 2010). There are currently over 170 RCEs around the world, forming the Global Network of RCEs. Each RCE is tasked to consider governance, collaboration, research, and development and support of transformative education (RCE Network, 2022; Vaughter et al., 2022). In this way, the Global Network of RCEs attempts to cascade the global agenda into local places and processes through an emergent, self-declared, dynamic constitution of different actors, enabling the capture of interest, and ability within a loosely-coupled framework.

The governance structure of an RCE is key to outputs and impacts (Ng'ang'a et al., 2021). Successful RCEs often have a light institutional administration with active working groups, such as RCE Saskatchewan (Dahms et al., 2008). The oversight (effective director) on a RCE may rotate among key personnel, leading to shared workload but collaborative challenges (Fadeeva et al., 2014). In Japan, RCEs differ in focus and structure, but several have successfully established consortia for ESD and offer a collaborative platform with some national coordination that collectively model the kind of multi-scale, polycentric governance style required for sustainable development (Ofei-Manu and Shimano, 2012). Collectively, RCEs significantly support learning to underpin the UN Sustainable Development Goals (SDGs) across formal and non-formal contexts (Vaughter et al., 2022).

Most RCEs are hosted by universities, with the intention of enabling engagement with additional actors and strengthening the focus of universities on ESD. Universities that lead in sustainability are places of transformation and possibility (Sterling et al., 2013). They can support learners to become change agents (White, 2015), consider their operations, nurture university community (White and Harder, 2013), engage with their external communities (Mosier and Ruxton, 2018), and undertake sustainability research which is holistic, participatory, reflexive, innovative, and links theory and practise (White, 2013). Sustainable universities thus contribute to the transition to sustainability and are well-placed to host networks for scholarship and learning for sustainability. Some RCEs are firmly embedded in relevant university departments, such as RCE Makana in South Africa, whilst others represent adjacent interests or are championed by individuals (Ng'ang'a et al., 2021). Whilst many RCEs receive in-kind donations from host universities such as time, office resources and meeting spaces, these authors found that funding for staff and project activities can be difficult to acquire. RCE income sometimes included partial funding from host universities or private sector and occasionally membership fees, and some RCEs did not even have an office or core staff support. They suggested that more transparent governance models, appointment of RCE coordinators by RCE member panels and greater synergy between RCEs could enhance impact. Limited diversity and communication issues can also limit efficacy (Ofei-Manu and Shimano, 2012).

These analyses demonstrate that RCEs offer an institutional framework that can be adapted to context and location, and in response to resource opportunities or scarcities. Much of the critical reflection focuses on cross-sectoral (formal, informal, and non-formal) or scalar (global to local) interactions between stakeholders. However, there is evidence that RCEs can support learning in and with communities, with Indigenous Peoples and in relation to local environments (Fadeeva et al., 2014; Vaughter et al., 2022). Korean RCEs "value the specific cultural, historic and natural background of their communities" (Fadeeva et al., 2014, p. 63) and RCE Guatemala was able to integrate Mayan worldviews (Fadeeva et al., 2014, p. 93). Ontological plurality, local pragmatism, critical selection of methods and partnerships and the bringing in of nature are essential in RCE function (Lotz-Sisitka, 2009). However, there is little information available on *how* different RCEs bring in nature and *how* nature-culture interactions influence and are influenced by RCEs. This paper helps to address this gap.

RCE Scotland was formally launched in 2013, but evolved from previous networks. It has successfully undertaken many activities with diverse groups of stakeholders. This paper is a reflection by key individuals involved in this process over the past 10 years, and an exploration of how this local initiative connects to global efforts for a transition to sustainability. We ask, firstly, how Scotland's history, culture, and context have informed and facilitated our approach to ESD and the establishment of our RCE. Secondly, we ask how our goals and activities link to culture and context, and thirdly, what lessons are learnt and what recommendations can be made for ESD and RCEs. We do this by synthesising our history and educational principles, then describing and analysing how we established RCE Scotland, including dialogical processes, governance structures and a Delphi process to define our vision and mission, map opportunities, and inform a strategic plan. We then analyse and evaluate selected activities, with interrogation of how these link to our culture and context. Finally, we critically reflect on how our approach enables

us and our RCE to be embedded in place, nature and culture whilst linking to global processes and pursuits. We argue for locally contextualised approaches to ESD that draw on intellectual competencies (head) and action-based approaches (hands) whilst acknowledging the need for motivation grounded in the earth, enlivened by the arts, held by heritage and inspired by cross cultural debate (heart).

2. Materials and methods

2.1. Scotland's culture and context

We firstly briefly synthesise aspects of Scotland's history and culture to frame the establishment of RCE Scotland and the context within which we work. In so doing, we draw on key philosophers and planners, in particular Sir Patrick Geddes, whose ideas still underpin some educational principles in Scotland today. From this synthesis, we identified several key issues, which could potentially have shaped the emergence and practise of ESD in Scotland today.

2.2. Focus and governance structure for RCE Scotland

As we established RCE Scotland, we pursued a dialogical process. We describe this process and critically analyse the governance structures and strategic priorities that emerged. In 2013, the scope of learning for sustainability, gaps, opportunities and resources in Scotland and potential partnerships were explored in Workshop 1 through plenary debates and focus groups each with 6–8 participants. Invitations were sent to RCE members (∼600 individuals) and 45 participants attended, from school, university, college, NGO, community and local and, national government sectors. Ages ranged from ∼19 to 67 years old. In 2014, Workshop 2 enabled us to assess Delphi results, comment on initial strategic plans and highlight priorities, with many of the same participants and using the same methods.

2.3. Key informant Delphi process

In order to develop deeper understanding and inform our strategy, we conducted a Delphi process in 2013-4 (Table 1). A Delphi process consists of rounds of questions in which informed respondents offer their perspectives, usually enabling both qualitative and quantitative assessment of an issue and convergence to a consensus situation (Devaney and Henchion, 2018). In our process, three rounds of questions and two scoping phases were undertaken with the 12 RCE Scotland Steering Group members plus 2 additional key informants who were selected to ensure coverage across the Further Education (FE; college) sector and to offer experience from the last 30 years of ESD. Fourteen participants responded to the Round 1 Delphi questions, 11 to Round 2, and 11 to Round 3. Some respondents described their experience as sectoral and others as task related; a few articulated diverse interests. Most respondents had multi-sectoral experience and some indicated long-term involvement in LfS (since its emergence). All respondents cited local and national level experience, with 10 also citing international experience. Respondents identified with NGOs (seven respondents); Higher Education (HE) (7); School (5); community (5); Government (3) and Local Authority (3) with some experience across FE and Early Years also noted.

TABLE 1 Delphi and scoping activities undertaken with RCE Scotland Steering Group and members during the inaugural year of RCE Scotland in 2013.

	Activity	Purpose
1	Initial scoping (Workshop 1)	To frame the scope and questions for Delphi with RCE Scotland members
2	Delphi Round 1	To define an "ideal state" of learning for sustainability in Scottish sectors, Scotland as a whole and globally; assessment of the UN Decade of ESD and targets for sectors, Scotland as a whole and globally
3	Delphi Round 2	To consolidate mutual targets and assessment of progress made to date against targets defined in Round 1; whilst identifying and explaining different views
4	Intermediate scoping (Workshop 2)	To test initial results with RCE Scotland members
5	Delphi Round 3	To reach consensus on definitions, strategic goals; and on action points to take forward

2.4. RCE Scotland strategic goals and activities

The processes above and subsequent member engagement informed our initial RCE Strategy by emphasising the cross sectoral approach, nature and culture. The Strategy has since been updated on a 3 or 5 year cycle, and our Action Plan is updated annually through prioritisation with the Steering Group, detailing with Secretariat and Chair of the Steering Group and final approval with Steering Group. In this paper, we assessed if and how RCE activities aligned with the key aspects of culture and context identified above, and responses from RCE Members. We identified indicative activities across the spread of our five strategic goals that represented a range of forms and important contributions to ESD in Scotland. We analysed their topical focus, form, target audience, impacts and ways in which they linked to culture and context. We drew on activity plans and invitations, individual event feedback forms, workshop reports, reflections from the Steering Group Executive, Member surveys and social media responses to illustrate purpose, form and responses.

3. Results

3.1. Scotland: culture and context

The Scottish landscape is considered to be iconic, with hills and lochs to west and north romanticised in historic visions of Victorian Scotland and in contemporary film (e.g., *Outlander*). There is a rugged shoreline and regions that are agriculturally rich. Most of Scotland's population of 5.48 million (2021 Census) lives in the "Central Belt." Scotland has been in a political union with England since 1707, but has retained distinctive legal, educational, and religious institutions. While this has enabled it to maintain aspects of a separate cultural identity within the union, there have been pressures for more powers to be devolved, if not indeed returned to Scotland. A Scottish Parliament was re-established in 1999. In 2014, the first referendum on independence was held, and although independence was not achieved, Scotland has seen the continued resurgence of a European small-state political nationalism (Mackie, 2022) rooted in a cultural renaissance (Kockel, 2021).

3.1.1. The first Scottish Renaissance

Patrick Geddes (1854–1932) was and is an influential thinker and actor in education and in precursors to "sustainability" in Scotland, with ideas that have permeated much further, as detailed below. The cultural "rebirth" of Scotland towards the end of the nineteenth century (Geddes, 1895) affected all areas of the arts, although the prime genre of the Renaissance was the novel. Nan Shepherd wrote eloquently of her surrounding landscape (Shepherd, 1977). For her, "the parish was not a perimeter, but an aperture: a space through which the world could be seen" (MacFarlane, 2016, p. 62). This global perspective, grounded in the local, was an intuition shared by the parallel revival of Gaelic poetry, led by Skye-born Sorley Maclean.

The writers of the Scottish Renaissance challenged established ways of seeing the world; uncovering the hidden ideological nature of dominant representations of Scottish life and its environment. A tension arose that is often referred to as "antisyzygy"—a characteristically Scottish ability, exemplified by many protagonists of the Scottish Renaissance, not least Patrick Geddes, to hold together seemingly contradictory traditions in creative confluence. The concept of a Caledonian antisyzygy,[2] introduced by Smith (1919), was elaborated further within a generalist approach that was at once philosophical, scientific, humanistic, and democratic (Davie, 1961—see below).

The peculiarly internationalist nationalism associated with ethnological thinking in Scotland has been highlighted with reference to both the influence of Hamish Henderson on cultural practise and its study in the Scottish context (Kockel and McFadyen, 2019), and the prevalence of such a perspective among the leading protagonists of the Renaissance (Kockel, 2021). Henderson made a case for "the continuity of a distinctive Scottish tradition," placed within "a wider European cultural setting, with Scotland absorbing and assimilating ideas and practises from the latter context in its own specific and peculiar way" (Burnett, 2014, p. 224), by virtue of the fact that Scots have always been travelers and linked to other cultures (White, 1998; Harvie, 1999). One of the most famous exemplars of Scotland's unique contribution to the world was the aforementioned Patrick Geddes.

3.1.2. Think global—act local

Whilst Geddes is widely credited with the concept of "*think global—act local*," the precise term does not appear in his writings (Higgins and Nicol, 2010). Nonetheless, its conceptual and practical development runs through his work, particularly in *Cities in Evolution* (Geddes, 1915); and, given the period of context and date of his work, represents one clear way of expressing the Caledonian antisyzygy of an internationalist nationalism. Geddes also introduced the triad *Place—Work—Folk* as an innovative way of thinking about and communicating the interrelationships of people with their localities, and applied this approach in his work in town and regional planning (Meller, 1990, p. 45–52). His "thinking machines" have subsequently been applied by ethnologists, geographers, and planners to explore the connections between culture and nature through the prism of "place" (see e.g., Kockel, 2008). Further, his triad *Heart-Hand-Head* (Geddes, 1919, 1949) has emerged as something of a rallying call for those arguing for a more experiential and practical approach to education (Higgins and Nicol, 2010). This approach resonates with the work of earlier European educational philosophers such as Comenius (1592–1670) and Pestalozzi (1746–1827), and specifically relates to the developmental "stages" of affective, physical and intellectual development of children, which Geddes argued should be emphasised in that order of priority, "for in that order they develop" (Geddes, 1949, p. 228).

Geddes drew deeply on cultural traditions and history, believing that art, drawing on folklore and tradition, creatively expressed a society's collective memory, thereby manifesting place. Geddes was, in some ways, very much a modernist; at the same time, he was an enthusiastic cultural revivalist (see Boardman, 1978; Meller, 1990). This antisyzygy is resolved, because for Geddes, "a sustainable future required an understanding of the past … and his modernism did not simply learn from the past, it depended on it" (Macdonald, 2020, p. 146). Cultural revivalism and modernism are so profoundly intertwined that "one can see them as two sides of the same early twentieth-century coin" (Macdonald, 2020, p. 146).

3.1.3. Generalism and the democratic intellect

Holding antisyzygies such as this in a kind of creative confluence of perspective has been described as characteristic of a "democratic intellect" (Davie, 1961) that is both foundation and expression of a distinct political culture. McFadyen and Nic Craith (2019) argue that this democratic narrative has been influenced by Europe's intellectual heritage. Their analysis concentrates on Scotland's intellectual and ideological heritage, with its roots in the concept of a "democratic intellect" in *education* (our emphasis) as well as in Continental European political thought. Scotland has long been associated with an egalitarian ethos. The Declaration of Arbroath (1320)—described as "Europe's earliest nationalist manifesto" (Ascherson, 2003, p. 18)—argued that a king owed his position to his peers rather than to God and linked to the notion

2 Derived in part from the astronomical term "syzygy," which is the alignment of three celestial bodies.

of the "lad o' pairts," which emphasises an individual's potential to rise into good fortune from humble beginnings—a potential often attributed to Scotland's distinctive education system.

Guided by a philosophy of common sense that was both socially responsible and epistemological, Scottish students were encouraged to investigate connections between subjects, their ethical and intellectual relationships, and the functional application of their knowledge in the community. From this generalist foundation, specialised skills could be developed within a philosophical perspective that would enable the student always to refer their expertise back to its position and significance in the generalist context. This Scottish ideal of generalism was eroded by wider UK and global trends (Davie, 1986) but persists in aspects of school and university education policy in Scotland.

3.1.4. The new Scotland

Connection with the land, landscape, and nature through working class roles such as crofter, fisherman and farmer, and later more recreational activities such as walking, mountaineering, and canoeing, created the basis of support for a strong outdoor learning educational approach (Higgins, 2002), which has become a key feature of the Scottish concept of Learning for Sustainability.

Contemporary Scotland integrates "New Scots" into a complex shared cultural identity with an associated heritage and future, rather than via some "shallow essentialist" identikit (Kockel, 2017). Applied initially to migrants arriving during the 1960's, mainly from Commonwealth countries, the term "New Scots" today extends to comprise migrants from other origins.

Following the internationalist-nationalist vision championed first by the Scottish Renaissance, and supported by the concept of a democratic intellect, twenty-first century Scotland is emerging as a small but globally well-connected nation (Mackie, 2022) where belonging has largely become a matter of inclusion. A Scottish identity is emerging that is built less on a (Romantic) ethnic or (Enlightened) civic vision of its nation, but instead on what one might call a "community of spirit" defined by particular shared political concerns, together with a collective commitment to stewardship of place in all its aspects. The concept of "community" persists in Scotland, partly in relation to activism for land rights, environment and self-determination (McIntosh, 2004; Wightman, 2010; Meyerricks and White, 2021), although also through deep connection with land, culture and place (McIntosh, 2004).

In this cultural climate, it is becoming necessary and more possible to confront the darker sides of heritage while navigating sustainable futures. Racism, Scotland's complicity in the imperial project of British colonialism and some powers of the Kirk (Church) are being addressed, and this is allowing traditional ecological knowledge and indigenous cultural cosmovisions gradually to reassert themselves (see contributions to *Scottish Affairs* 2021/22).

3.1.5. Synthesis of cultural influences on ESD in Scotland

The history above provides cultural context for ESD in Scotland. We provide here a synthesis of the main factors identified (Table 2). Whilst these aspects are not exhaustive, they overlap, and they are not exclusive to Scotland; they do illustrate identity, relationship with nature and place, educational principles, a framing for local yet internationalised action and some influences on sustainable development. Common threads weaving throughout include the relationships between local and global, people and place, and educational plurality.

TABLE 2 Synthesis of key cultural and context issues for education in Scotland.

Cultural or context issue	Relevance to ESD
The Caledonian antsyzygy	Simultaneously holding contrasting notions in tension, such as cultural revivalism and modernism
The democratic intellect	Egalitarianism and the belief that an individual can further themselves through education
Generalism	Specialised skills embedded within wider philosophical debates; respect for multiple skills
Ethnocentric traditions and arts	Importance of music, language and other arts in traditional and contemporary contexts, and reclaimed but modified ontologies to express memory and thus place
Geddesian influence 1: think global, act local	A recognition of simultaneous connection to local place and influence of global processes
Geddesian influence 2: Place—Work—Folk	Respecting that people have complex relationships with place that are informed by identity and culture but also work practises
Geddesian influence 3: Heart—Hand—Head	Emotional connection and experiential learning are important, as well as intellectual understanding
Community and internationalism	Sense of community experienced and sought, whilst relationships with other nations welcomed
Connection to nature, land and place	This complex notion is represented variously through national and local identities, romanticising of land/water based employment, arts and the Geddesian influences

Having explored the culture and context of Scotland in relation to sustainable development, education, and Education for Sustainable Development, we now turn to the emergence of Scotland's RCE.

3.2. History, governance, and framing of RCE Scotland

3.2.1. Policy context during emergence of Scotland's RCE

Scotland's RCE was formally recognised by the United Nations University in 2012, and was launched in 2013. Its emergence resulted from Scotland's longstanding commitment to education, with growing interests in environmental and then sustainability education, outdoor learning, and critical pedagogies aligned with

culture and context as described above. There was also a favourable policy context immediately prior to the RCE application. The UN Decade of Education for Sustainable Development (DESD; 2005–2014) had stimulated coordinated activity and catalysed some policy and practise progress in Scotland and elsewhere (Martin et al., 2013; UK National Commission for UNESCO, 2013). The Scottish Government maintained a commitment to ESD through strategies and Action Plans setting out expectations for schools, universities and colleges and lifelong learning (community learning and development, workplace, and public awareness; Scottish Government, 2010; Scottish Executive, 2016).

In parallel, a significant discussion on formal education policy took place in Scotland (Sustainable Development Commission., 2010; Learning Teaching Scotland, 2011). One Planet Schools (Education Scotland, 2012) included a values-focussed definition of a re-conceptualised approach called "Learning for Sustainability" (LfS)—a whole school approach to sustainability, integrating Education for Sustainable Development, Global Citizenship and Outdoor Learning. It also included LfS as an entitlement for all learners, and a requirement of all teachers (Education Scotland, 2012). Scotland's "Curriculum for Excellence" (CfE) offered "project based, holistic education" and "provided the overarching philosophical, pedagogical, and practical framework and context in which ESD ought to be applied" (UK National Commission for UNESCO, 2013). A strong Third Sector contribution to early-years and schools promoted outdoor nurseries and global citizenship education, but there remained the need for curriculum integration and for stronger CfE implementation at secondary school level (UK National Commission for UNESCO, 2013). In Universities (HE) and Colleges (FE), guidance from the Scottish Funding Council focused almost solely on operational campus sustainability (Sustainable Development Commission., 2010). Whilst Scotland had made great progress at school level, the notion of education as empowerment was, at the same time, being eroded in universities (Doring, 2002; Higgins and Lavery, 2013).

It was recognised that lifelong learning needed further support, with the Action Plans not recognising or deepening community action such as that provided by Transition Towns groups, Development Trusts and eco-congregations (Sustainable Development Commission., 2010). During this period, Scottish Parliament (2003) and the emerging Scottish Parliament (2015) were further strengthening potential for community learning and action. There was less progress on ESD in relation to business, agriculture, forestry, marine management, and other sectors.

3.2.2. History of Scotland's RCE

The desire to maintain and build momentum across the broad area of ESD (Lavery and Smyth, 2003) prompted a cross sectoral group of educators to develop and submit an application for a RCE for Scotland. The application insisted, firstly, that we wished to retain the community of practise pre-existing across all areas of Scotland, and that the partnership between the more urbanised "Central Belt" and the more rural western and northern regions was essential to link culture and resource and ensure that ESD could be supported across all sectors. Secondly, the application was framed as "Learning for Sustainability" (LfS) to reflect the education policy development at the time, bringing together the different communities of interest supporting the interconnected concepts of global citizenship, outdoor learning and ESD, and emphasising the intention to go beyond formal education. All the universities in Scotland submitted letters of support, as did the Scottish Government and school education and higher education agencies. It was approved by the United Nations University in December 2012.

3.2.3. Framing the scope of "learning for sustainability"

To include learning in formal, informal and non-formal contexts, we brought together stakeholders from different sectors and built from existing networks (White and King, 2015). Workshop 1 focus group discussions elicited diverse and ambitious views on LfS, including that it represented "*a personal journey*," and a "*pedagogy for life*." Participants suggested that LfS "*addresses nature deficit disorder and symptoms*" and empowers people to ask difficult questions about their own and societal assumptions. They proposed that perhaps excellent learning for sustainability merely promotes excellent education; *all* education should provoke reflection and action, combine different forms of learning, empower individuals and build society. It was stated that such concepts can and must be understood differently by different actors, and sustainability to some extent is about respecting and working with diversity.

Participants proposed how such concepts need to be put into practise in accessible and often simple ways; getting children outside, helping communities celebrate together, promoting organisational change, embedding care. The groups explored what the relative roles of formal, informal and non-formal educational experiences were in LfS. It was noted how an individual may experience forms of LfS in different ways at different stages of their life, and this experience will be individualistic. Participants also identified potential challenges with the transitions from one learning stage to another; for example, from schools with good LfS into Universities. The lack of political literacy in young people and possible reasons for this were lamented as being a barrier in promoting civic engagement and reinforcement of a set of values beyond the individual. As well as topics related to sustainable development, pedagogy was agreed by all participants to be critical. There was strong support for approaches such as outdoor, place based or experiential learning, for example, to lead to transformative learning; and learning practises such as reflexivity, participatory engagement, shared, and embodied experiences to deepen the potential for learning for sustainability. Important ESD topics included not only environmental issues but also issues around, for example, global citizenship, social justice, development, ethics and values, and behaviours.

It was considered that learning can occur through formal teaching or through experience and practise; and that research, teaching and practise feed back into each other and are interlinked. Participants identified attributes and strategies to pursue LfS and concluded that RCE Scotland should: (a) share good practise across sectors and organisations; (b) develop a "pan sectoral" approach to actively share experiences and ideas; (c) leverage partnership

working; (d) enable HE and FE to promote leaders' and vocational input; (e) form practical networks; (f) pursue advocacy for sector and policy leadership and (g) undertake research in key areas.

As a "network organisation," the RCE needed to support a network of individuals, organisations and institutions. It was discussed that there was a difficult balance between collaborative and competitive working strategies. The focus groups suggested that we should seek funding for projects whilst remembering our main priorities as an internationally acknowledged RCE in ESD; we should pursue policy as well as practise; and we should address the needs and requests of RCE members. Suggestions for thematic strategic aims were developed that still underpin our current strategy (2018–2022) and action plan.

3.2.4. RCE Scotland governance structures

During and informed by the dialogical process, a governance structure was established for RCE Scotland (Figure 1). A Director was appointed at the hosting institution, the University of Edinburgh, which agreed to provide office, Human Resources and technical support. In addition to the Director, the Secretariat also included a development manager and administrative officer. A constitution was drafted and adopted. The inaugural Steering Group was elected through an open nomination and electoral process, and a Steering Group Chair was elected. It was planned that activities be undertaken either through member Task Groups with clearly defined and time limited aims, or through funded and resourced projects that draw in employed and volunteer resource. Events were to be run by the Secretariat, Task Groups or collaborative groups. Communication and practise sharing developed mainly through a monthly eBulletin, an Annual General Meeting and events plus occasional briefing papers, research and other activities.

3.3. Delphi survey results and additional member input

3.3.1. Summary of Round 1: the ideal state of LfS

This round began by addressing what "the ideal state of LfS" should be at different scales, firstly within different sectors in Scotland, then across Scotland and finally globally. This question offered participants the opportunity to develop a vision and articulate aspirations combining the form, extent, framing, and initial consequences of LfS before considering appropriate targets.

Participants suggested that LfS should be embedded in all sectors, permeating all sectors and integrated into systems or learning (10 respondents). It was stated that LfS should be woven across all subjects—"*not an add-on*." More strongly, one participant suggested that LfS should be "*at the core of each sector's work, training and strategy*." Secondly, participants proposed that in an ideal situation, all Scottish sectors would have understanding and respect for the principles and ethos of LfS (six respondents). A strong, well-supported network of people ($N = 2$) and statutory framework ($N = 2$) were proposed. It was suggested that LfS enable freedom from binary thinking, a state of mind, an ethos of responsibility, fostering of sense of community, (re)connection to place, and embodiment in institutions. Many participants also made sector specific comments. Our policy makers need to be "*sensible, sensitive and brave*" and be held to account; we need political leadership and commitment. LfS should enable a fair and just/flourishing society ($N = 3$) and offer empowerment ($N = 2$) and wellbeing ($N = 1$) whilst ensuring that we live within ecological limits ($N = 4$). There was recognition of scale with people tackling issues as individuals, in communities and in work places ($N = 2$); and working with local heritage and sense of place whilst engaging with those beyond Scotland ($N = 2$). One participant reminded us that a community can be both inclusive and exclusive; and definition of a national boundary is both useful and problematic as it cuts across communities of practise. It was suggested that a culture of tolerance and diversity be encouraged. Tensions with the market driven state were noted. Participants were asked to comment on UN and Scottish targets for LfS. It was reported that sectoral division of goals was necessary to enable sector specific progress but this may have meant that the focus on "*structural change within society promoted by UNESCO was lost*," limiting the capacity for sustainability transformation (Voulvoulis et al., 2022).

The next Delphi round sought consensus on a definition and framing for LfS and more specific perspectives on the extent to which progress has been made in LfS at different scales. Finally, Delphi respondents were asked to focus on the opportunities for the RCE, given the preceding reflection and analysis. They were asked to rank opportunities for suggested actions that had previously been identified by members at the Workshop 1 and by the Steering Group in relation to overall importance, prioritisation and applicability (Table 3). Each suggested action was scored by each individual and scores were added together to give ranked prioritisation across all Delphi participants.

3.3.2. Input from RCE members to Delphi process

In line with the participatory ethos of sustainability, we sought the opinions of a wider group of people after Round 2. Participants at Workshop 2 also ranked future priorities. Ranking broadly mirrored that of the Delphi participants (data not shown). In addition, they wanted to see a focus on areas other than formal education moving forward, especially in communities ($N = 4$). Other comments included need for wider public debate and the value of interdisciplinary working.

3.3.3. Delphi round 3

The framing of LfS was further modified in Round 3, with sustainability being explicitly introduced as being more than about environmental concerns, and a more radical framing, "*challenging the accepted worldview*." It was suggested that we need to focus more on "*personal sustainability*," particularly "*through pedagogical interventions such as outdoor learning and …… mindfulness*." It was also proposed that we unpack the types of learning included in the term, acknowledging "everything from information and awareness to capacity building to community empowerment to formal education at all levels; a recognition of different kinds and levels of learning, each appropriate for context." One participant

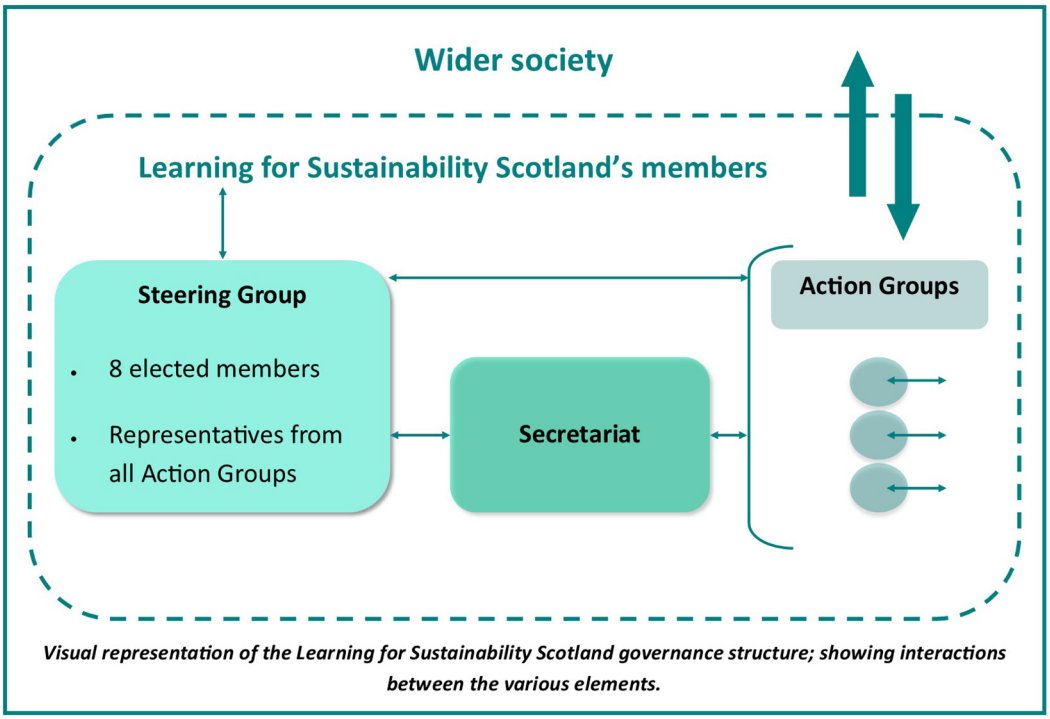

FIGURE 1
Governance structure developed for RCE Scotland in 2013 (adapted from the RCE Scotland strategic and work plan).

commented that learning for sustainability can be framed as an on-going process of people learning and reflecting, being "*empowered and equipped to deal with the uncertainty and change which are a result of all the complex challenges that the world faces*," capturing a sense of resilience. It was said that "*The collaborative culture of [RCE Scotland] ensures a 'non-partisan,' unbiased, and truly independent model for the development and dissemination of learning, teaching, and 'good practise.'*" One participant warned that there was a need for constant vigilance to ensure the conversation was opened up to members and sectors of society currently less involved, both home and abroad. Paradoxically, individuals wanted both more detail and yet greater simplicity in defining the ideal state of learning for sustainability.

A synthesis of member focus groups, three Delphi rounds and sense checking with members again led us to develop a full (see Supplementary material 1) and an abridged definition of LfS below, which served as the framing of ESD for RCE Scotland.

> *Learning for sustainability enables visioning of culturally and place-specific futures and contributes to the creation of a fair and flourishing society and empowerment, particularly of the currently disempowered, whilst ensuring we live within ecological limits. Such learning uses innovative, reflexive, and potentially transformative pedagogies and curricula to enable skills development and resilience and encourage people to explore value based worldviews. Learning promoted action requires a systems based, interdisciplinary, partnership approach with strong leadership and integration across formal education and informal (such as community, business) and non-formal (such as media, culture) sectors. The role of LfS Scotland is to support networking and collaboration, releasing the potential of individuals, communities and sectors to create human and planetary wellbeing within local, national, and global contexts.*

3.4. RCE Scotland contemporary strategy, goals, and selected activities

Strategic goals were identified through the extensive period of consultation described above, with further strategies and action plans being developed by the Steering Group each 3–5 year period. Our 2020–25 strategic goals are explained in Table 4.

In order to evaluate how our approach and activities link to culture and context, we analysed 8 indicative activities (Table 5, Supplementary Table S1). Four of the activities are illustrated here in more detail through vignettes to illustrate a range of activities, forms of successful initiatives and different ways of engaging with culture and context.

3.4.1. Monthly e-Bulletin

A free monthly e-Bulletin shares Learning for Sustainability news, events, resources, policies and images for and from all sectors in Scotland. It has a distribution list to over 1,000 members of Scotland's ESD community and is accessed by a wider audience via our social media and website channels. This activity maintains a regular sharing of practise and conversation, enhancing the sense of a community of practise. A key feature is the nature-grounded, values-based, monthly message from the Steering Group; drawing

TABLE 3 Ranked prioritisation of suggested actions for the new RCE (ranking from 1 most important/urgent/relevant to 11 least so).

	Importance	Urgency	Relevance
Develop and take forward a new post UNDESD action plan	1	1	1
Work closely with government to influence policy development and implementation	2	2	2
Develop closer links with business	3	3	3
Continue the role of the previous ESD Network, with a new approach catalysing deeper engagement, sharing resources and good practise	4=	4=	4
Run events for members both within and across sectors, for example, from school to FE or HE; across formal education and community ventures	4=	4=	5
Build on community development and in particular sustainable business models for communities	4=	6	6=
Work with local authorities to influence sustainability action; a critical intersection between national government and community	7	7	6=
Develop and disseminate teacher education at all stages in response to the new (2013) GTCS Professional Standards for teachers	8=	8	8
Develop closer links with mainstream media	8=	9	9
Focus on areas with less progress, for example, early years and HE	10	10	10

Where two or more categories share the same number and = sign, it is because they obtained the same score and were thus assigned the same rank.

TABLE 4 Strategic goals and key aspects for the RCE Scotland Strategic plan 2020–2025.

Goal	Theme	Key aspects
1	We weave connections across sectors within Scotland and with our international partners	Communication, enabling pan- sectoral approach, and collaboration
2	We co-produce, pioneer and practise new knowledge and approaches and curate materials and resources with and for educators, organisations and communities	Research, briefing papers, resources, and website
3	We advocate and provide strategic advice for effective policy on Learning for Sustainability and other related areas	Policy consultations, advocacy, committee representation, and expert advice
4	We lead, monitor and evaluate projects and programmes locally and internationally	Professional learning for educators, evaluation of programmes
5	We work in partnership to achieve our vision	Collaborative ventures and projects

on seasonal aspects of Scotland's natural and cultural heritage and often featuring photographs of Scottish landscapes or quotes from Scots or other writers. Feedback drawn from the bi-annual member survey 2020 suggested that "*There is a sense of a positive supportive community*," "*such a good variety across a broad range.*" It demonstrated shared practise since "*I have also posted articles to share what we are doing*" and it includes "*up to date resources and relevant news which I can use to adapt my practice*" (see Supplementary Table S1 for evaluation feedback for all activities).

3.4.2. 2021 Annual Gathering and AGM

The Annual Gathering is linked to the AGM for RCE Scotland members: individuals and organisations from across formal, informal and non-formal education sectors, as well as policy- and decision-makers in Scotland; plus invited speakers and others according to the particular theme. We have now transitioned to two annual sessions with an in-person, festive, networking meeting (speaker plus creative activity) plus an online collaborative workshop. The 2021 Gathering focused on "*Stories for Sustainability: transformational learning through the personal and political.*" Nearly 100 members engaged with inspiring stories from the school, community and Further Education sectors, before sharing and celebrating their own stories of transformational learning in breakout sessions. Video interludes showed Scottish landscapes and places and learning in action, set to Scottish music. There were traditional stories from a professional Scottish storyteller. The meeting concluded with an invitation to "Dream Forward:" imagining and connecting with each other to co-create a sustainable future.

3.4.3. Global RCE conference 2021

RCE Scotland co-created events with United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) and hosted two Global RCE webinars (February and June 2021) during the COVID-19 pandemic, and then an online Global RCE Conference (November 2021) on the theme of "*Achieving the Sustainable Development Goals: action through learning in a time of global crises.*" This complex, online, 3 day event registered over 300 delegates from 170 RCEs from across 61 member countries; as well as RCE Scotland members, policy and decision-makers in Scotland, and others. Government Ministers in Japan and Scotland, international and national NGOs, youth activists and others from across the RCE Network contributed. The event enabled networking and sharing good practise aligned to the five strategic aims of the UN 2030 ESD Action Plan. Outputs and outcomes were disseminated by UNU-IAS and RCE Scotland across the whole Global RCE Network and to a wider audience via our combined social media/website channels. These events were

TABLE 5 Attributes of activities conducted by RCE Scotland and relevance to cultural context for ESD.

	RCE activities							
Cultural or context issue	Learning for Sustainability E-Bulletin	RCE Scotland Annual Gathering 2021	Global RCE Conference 2021	Making connections through LfS online courses	EAUC Scotland/RCE Scotland partnership	Collaborative research project *SCALE*	GTC Scotland Learning for Sustainability Hub	Connecting Classrooms through Global Learning
The Caledonian antsyzygy	Links to traditional practises and knowledge in Scotland and internationally whilst celebrating innovative, contemporary examples of ESD	Drawing on stories from the past and example of recent, innovative ESD	Traditional activities modified for contemporary audience e.g., online ceilidh	Holding ontological plurality	Working with Scottish context whilst drawing in innovative practises from Scotland and elsewhere	Embracing and integrating traditional with latest scientific knowledge and ontologies	Rooted in values such as social justice, and celebrating innovative, contemporary examples of LfS	Unearthing and supporting multiple perspectives on SD themes
The democratic intellect	Widely disseminated, free of charge, relevant to daily practise, empowering through knowledge	Speakers often leading academics in a field of ESD to provoke debate	Speakers from around the world on leading ESD topics	Rigorous, theoretically led content	Theory led workshops	Developing new theory; across Latin American and western ways of knowing	Connecting and supporting the sharing of educational practises across sectors	Enabling partnership development which support ownership of place -specific response to SD issues
Generalism	Audience cross sectoral	Participants from across sectors, discussion topics often designed to be relevant across sectors	Across sectors and nations	Range of topics, SDGs used as a frame	Work across all topics; some sessions focus on links with other sectors e.g., community or school	Explicitly linking across sectors	Developed for a cross-sectoral audience of educators	Enhancing skills, values and knowledges to enable action on SDGs
Ethnocentric traditions and arts	The foreword often links to poetry, art, music or local festivals	Scottish music and storytelling and myths included	Video interlude with traditional music; online ceilidh	Encouraging participants to engage with their local culture	Less explicit; although encourage examples from Glasgow School of Art, Music	Respects traditional knowledge and practises	Promoting LfS as an underpinning theme connecting all dimensions of learning	Enabling the sharing and celebration of cultural tradition and arts through an ESD lens
Geddesian influence 1: think global, act local	Combination of international news and events (e.g., UNESCO, RCE Network) and local stories, resources and events	Local examples and international framing	Local examples and flavour with global participant and audience	Encouraging local activities through global community of practise	Less explicit; encourage institutions to function in local context and provide updates on global context	Explicitly scales from individual through local to regional and international	Supports practitioners to enact a local and global LfS ethos as a key element of Scotland's professional standards for teachers	Enabling awareness of and action on the SDGs at a local and global level
Geddesian influence 2: Place—Work—Folk	Sector specific sections designed to support work in practise, stories celebrate examples of LfS in place and of people or groups	Shared examples from members emphasise work in place such as school projects	Trying to go beyond work to emphasise place and individuals	Strengthening the capacity of educators to develop people and place aspects of their work	Highlight the need for educators to self-care and to engage with operational, place based activities in a whole institution approach	Uses place to locate discussion of work and people in a relational way	Provides LfS support for educators that is rooted in local needs, challenges and opportunities.	Provides LfS support for learners and educators that is rooted in local needs, challenges and opportunities.
Geddesian influence 3: Heart—Hand—Head	Includes positive stories, practical examples and resources and academic resources and events	Heart—warm welcome, asking people to reflect personally, capturing feelings in word cloud. Hand—skills workshop. Head—intellectual exchange and theory talk	Conference organised around themes of heart, hand, head		Heart—recognise stresses and emotional strain on staff. Hand—practice resources shared and trialed. Head—theory	Heart—builds on people's enthusiasms. Hand—engages with practises around agriculture, forestry and conservation. Head—theory led research.	Key Guidance and support for educators framed around the "heart-hand-head" concept	Inspiring a holistic approach to the SDGs that includes values and skills as well as knowledge

(Continued)

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TABLE 5 (Continued)

	RCE activities							
Community and internationalism	EBulletin tries to create sense of community through foreword and introduction, shared stories from members. Member feedback "*There is a sense of a positive supportive community*"	Waterfall introduction, breakout group discussion to strengthen community of practise	Community through sharing and interactive sessions but representation of global community	Embedding awareness of and action on the SDGs at local and global levels	Supporting a UK wide ESD community of practise through quarterly forum events	Works with communities with an international team of researchers	Building a community of practise through monthly "Connect" sessions for educators, and signposting to the global community	Embedding awareness of and action on the SDGs at local and global levels
Connection to nature, land, and place	Bulletin foreword celebrates nature, seasons, place	Nature pictures and videos, example of outdoor learning	Nature pictures, video and nature connection video	Focus on place-based learning (including natural and built environments) and "outdoor learning" pedagogies	Supporting FE/HE educators to enhance the place-based learning aspects of LfS in their practise	Celebrates local nature and attempts to integrate local ontologies with science	Supporting educators to enhance the place-based learning aspects of LfS in their practise	Supporting an understanding of and connection with place-based learning

the first to bring the entire Global RCE Network together in a digital space.

The 2021 Global Conference used a "*Hearts, Hands, and Heads*" approach to enable exploration of affective, behavioural and cognitive approaches to ESD. Delegates shared culture, practise and initiatives and participated in diverse workshops. An online ceilidh at the end of the 2nd day provided delegates with an insight into Scottish culture, video interludes of Scotland were shown and a poetic narrative of seasonal change was read to accompaniment of a slideshow of Scottish nature images. Post-event evaluation was extremely positive.

3.4.4. Connecting Classrooms through Global Learning

Connecting Classrooms through Global Learning (CCGL) was a programme that supported educators, learners and their communities across the early learning and childcare, primary, secondary, additional support needs (ASN) and college sectors from 33 participating countries in the UK, Middle East, Africa and South Asia. Managed by a Consortium of partners, led by RCE Scotland, on behalf of the British Council and UK Foreign, Commonwealth and Development Office (FCDO), the programme ran from 2018 to 2021. It supported educators and learners to take collaborative action on the UN SDGs through partnerships on either a 1:1 or "cluster" basis with other settings across Scotland, the UK and overseas. CCGL aimed to create an integrated offer of support for partnership work and fully-funded professional learning.

After 3 years, 234 (9%) of Scottish settings were engaging in funded or facilitated collaborative partnerships, 900 educational practitioners from 451 settings had engaged in professional learning activity across Scotland, and a further 318 settings had engaged in webinars and other activities offered by the programme. Partnerships have, in many cases, evolved into long-lasting friendships between educators and learners and a desire to engage in future collaborations on sustainability topics; such as the "*1.5MAX*" initiative, connecting schools in Scotland, Malawi, Mozambique, and Nepal to take action on climate change. Feedback from teachers and learners elucidated positive outcomes and impacts.

3.4.5. Activity attributes in relation to Scotland's cultural context

All activities were analysed for evidence of attributes reflecting the aspects of Scotland's cultural context that might be relevant to ESD (Table 3). A summary is presented in Table 4. It can be seen that the activities are rooted in Scotland's culture and context.

4. Discussion

4.1. Cultural context and activities

We have provided a cultural context for Scotland, with an analysis of key aspects of relevance for ESD, and we analysed the emergence of the governance structure, definitions, and scope of

RCE Scotland. We also investigated activities in relation to strategic goals and our cultural context.

RCE Scotland's purpose was developed through an intentional dialogical approach, including a Delphi process, which led to its establishment, governance and strategic goals. The Delphi process allowed us to draw on the expertise of key informants (Devaney and Henchion, 2018) whilst wider member engagement empowered members to determine the future and shape of RCE Scotland. We thus redefined our field of theory and practise in a manner that was inclusive yet boundaried, generalist yet with specific inputs, and that encouraged reflection by and between practitioners and academics. This transparent, dialogical process and the democratic election of a Steering Group illustrate successful governance features identified by Fadeeva et al. (2014), Ng'ang'a et al. (2021), and Vaughter et al. (2022). Our indicative activities demonstrated how we have been successful in meeting our strategic goals whilst drawing on culture and context to provide a flourishing environment for ESD in Scotland. We begin to answer how to "bring in nature" to RCEs (Lotz-Sisitka, 2009).

We now address our research questions. We critically discuss, firstly, how Scotland's history, culture and context have informed and facilitated the establishment of our RCE and our overall approach to ESD, and, secondly, ways by which many of our activities have been influenced by culture and context. In so doing, we do not argue that culture and context is the only influence, but rather that they are present, relevant and a part of the success to date of RCE Scotland. From our analysis of culture and context, we demonstrate how attributes are reflected in RCE Scotland.

4.2. Scottish identity and the Caledonian antsyzygy

We argued successfully for the creation of one RCE across Scotland, thus allowing us to link rural areas and groups living in iconic "wild" landscapes, maintaining traditional creative arts and practises, together with urban organisations and groups that tackle social inequalities and work with elite, prosperous institutions. The Scottish population is dispersed, but is sufficiently small and connected to feel like one population and is connected by difficult as well as positive aspects of history. RCE Scotland is thus a whole nation RCE that represents a coherent (yet diverse) community and that functions at its given scale. The focus is on strengthening the "network organisation." Rather than competing with other bodies, it works in collaboration. It has offered a model for some other RCEs, such as Belarus and Wales, to retain their national focus. The scale, coherence and intention are important and early discussions highlighted that a single RCE would not work at UK level, for example; the devolved nations have specific characteristics (Martin et al., 2013).

Whilst there is much debate on a Scottish identity (McDermid and Sharp, 2020), the identity as expressed in RCE Scotland is linked to the Scotland of place and nature (see McIntosh, 2004). Remote rural communities retaining and reviving some regenerative land practises are recognised, but also the vibrant, more urban "Central Belt," from which people connect to rural and natural settings and cultures through recreation, history, and the creative arts. Connection to nature reinforces the sense of community in RCE Scotland; resonating with members; for example, through seasonal, specific and often culturally-linked monthly eBulletin messages and in short video pieces in the AGM. This identity is also communicated to the wider RCE Network; for example, in film and poetry in the Global RCE Conference. A Scottish identity is thus visible in our communications, such as the eBulletin, and our gatherings, such as the Annual General Meeting. At the same time, the Caledonian antsyzygy—"the presence of duelling polarities within one entity, thought of as typical for the Scottish psyche and literature" (Smith, 1919), is present. In RCE Scotland, we embrace our distinctive Scottish traditions whilst welcoming people and customs from elsewhere, as shown in the Global RCE conference. We are passionate about our local places and diverse landscapes, as shown in our eBulletin and Global RCE conference creative arts pieces, whilst entering vigorously into global debates, as demonstrated in Connecting Classrooms through Global Learning, our Global RCE engagement and our international research collaborations. We celebrate both cultural revivalism, demonstrated in our use of traditional practises such as ceilidh and music in events, and modernism, for example, in a recent exhibition with Climate Sisters.[3] We honour the wild, whilst addressing impacts of modification by sporting estate, agricultural, and other human practices (Wightman, 1996, 2010).

4.3. Geddesian triads

The Geddesian triads *Place-Folk-Work* and *Heart-Hand-Head*, are key threads running through the process of establishing and conducting the work of RCE Scotland. The former resonates with contemporary linkages made across community, government and professional arenas, such as in recent events and the portfolio of members contributing to the Annual Gathering, as well as connection to place (see section below). The latter concept of *Heart-Hand-Head* can be interpreted broadly as an original version of sustainability competencies in that it accommodates intellectual learning and knowledge whilst celebrating development of capacities for emotional engagement and action (see UNECE, 2012; Giangrande et al., 2019 for competencies descriptions). RCEs, being based in Universities, often have a focus on intellectual ("Head") activities, and RCE Scotland manifests this through research, evidence based consulting, research briefings and more. The "Hand" is also very present in ESD in Scotland through work, food growing, experiential and outdoor learning, and the persistence of traditional practises and crafts, often in a contemporary mode (Ferraro et al., 2011). RCE Scotland engages with the "Heart" through connection with self (expressed through creative arts and emotion as seen in Supplementary Table S1), connection with others (through the warm, friendly tone of communications, networking events and shared activities such as photo of the month; and intergenerational connection through, for example, traditional Storytelling) and connection with nature and place (see below). All professional learning offered connects with heart, hand and head, starting from the "heart." Whilst

3 https://www.wen.org.uk/2021/10/19/climate-sisters

self-awareness and normative/cultural awareness are included in sustainability competencies, nature connection is missing from the generally accepted competency framework (UNECE, 2012; Fadeeva et al., 2014; Giangrande et al., 2019) and we propose that it should be included in future iterations.

4.4. Generalist and democratic intellect

The generalist, holistic, systems-thinking approach is evident throughout RCE Scotland's emergence and current focus on and action as a network organisation, and thus, despite its small Secretariat, it is able to bring together individuals, organisations, and institutions with a common interest in ESD. The Steering Group intentionally includes pan-sectoral representation; with additional representation co-opted if it is felt lacking (e.g., youth representation). This ensures a diverse reach across early years, primary and secondary education, college, university, continued professional development, lifelong learning, and community. In this way, learning from one sector is transferred more easily to another (e.g., school to college). This approach thus also includes linkages across formal (e.g., schools and universities), non-formal (e.g., community), and informal arenas (e.g., culture and media), as promoted for ESD (UNESCO, 2021).

The generalist approach continues across sectors; with projects and member examples spanning food, creative arts, energy, transport, land management, agriculture and forestry, and amongst other topics. Intergenerational crossover is also seen in efforts to engage youth and elders in different projects, with one research project explicitly addressing this (see Supplementary Table S1). This enacts the need for joined up thinking and action identified in the Delphi approach. Finally, the network organisation structure creates a system with a network of networks, human, and organisational. Principles, policies, and practices of ESD are shared and grown across interconnected aspects of society, yet embedded in nature connection, creating an ecosystem of education unique to the Scottish context.

4.5. Egalitarianism and citizenship

Key aspects of our culture noted above are the "lad o' pairts" influence (see above), which implies that social mobility and an egalitarian society are possible; "civics," which includes citizenship for community; and wellbeing and community. An egalitarian society is less hierarchical, with horizontal connections, appropriate for networks. RCE Scotland developed from a prior network, but both expanded and strengthened this. A continued effort to listen to members and to create friendly spaces for frank exchanges and sharing of ideas was demonstrated by participant feedback after online events such as the Annual Gathering and online webinars. Such events and frequent feedback processes create a feeling of belonging, of civic agency, of social connection and of shared context—a sense of community (McMillan and Chavis, 1986) as well as a community of practise (Fadeeva et al., 2014). Many events and communications have a professional external face but a warm, down to earth, personal tone (see feedback comment—"*I felt welcome and valued*"). This collective, conversational, non-hierarchical process helps to develop a positive community of practice.

At the same time, RCE Scotland recognises innovation and excellence, such that the possibility to be different within community is also acknowledged. We hold visions of both universality and diversity. This tone is not only determined by culture but is also enhanced by the personalities of the leadership and staff within the network organisation, who deliberately promote the funny and the dour, collective and individual, traditional, and innovative. For example, many meetings begin with a moment of nature connection, such as sharing of recent harvesting or foraging. Rather than fostering a competitive environment, RCE Scotland promotes and facilitates collaboration and partnership. Through partnership, for example with EAUC, Scotland's SDG Network and Youthlink Scotland, the RCE has achieved a lot with very little in the way of specific resourcing.

4.6. Critical thinking

Intellectual vibrancy was identified above as key in the Enlightenment and in subsequent scholarship in Scotland. This transfers into rigorous critical thinking and innovation, as highlighted in the second goal of RCE Scotland. Whilst all university groups might promote critical thinking, this insistence on "sound science" (DEFRA, 2005) has led to RCE Scotland being considered a reliable partner to undertake Research In Action Briefings, implement reviews and do research, for Scottish Government and a range of other partners and clients. This is evident, for example, in the intention to not "deliver the SDGs" but rather support action towards them whilst constructively critiquing them. Critical and reflective thinking was also evident in the time spent collating and synthesising member voices to frame and articulate ESD as "Learning for Sustainability" for the context of RCE Scotland.

4.7. Nature and community

Analysis of culture and context revealed a longstanding connection and identification with nature that was enforced through political reverence for "traditional" Scottish roles (e.g., crofter, fisherman, and gamekeeper) around the time of devolution, by the rural context of much of Scotland and by contemporary recreational and cultural activities. Such nature connection led to a strong custom for outdoor learning which is evident in the work of RCE Scotland and members. More than this, the support of community land ownership, and a preference for "stewardship" and regenerative practises rather than extractive approaches, were evidenced in the work of RCE Scotland. For example, the initial discussions emphasised the importance of non-formal ESD, especially community learning, and the annual gatherings include examples of community-based learning projects. This emphasis on "nature as land" underpinning the work of RCE Scotland is typical of a strong sustainability approach (Dietz and Neumayer, 2007)

rather than a more capitalist view of education as existing merely to enhance employability and feed economic growth (see Sterling, 2010 for critique). There are places in Scotland rendered iconic through history that enter into the discussions and activities of RCE Scotland and infuse activities with a sense of shared place even in communities of practice. For example, the Isle of Eigg was the first location of community buy-out under recent legislation, and represents a return of the land to the people (McIntosh, 2004). Such perspectives see land not only as a property asset, managed and controlled as an economic entity, possibly even with an onus on equality in ownership patterns and property rights; but also as an important part of people's lives, worldviews and belief systems (Wightman, 1996; McIntosh, 2004). It has socio-cultural resonance. The Cairngorm mountains are places to go into (not merely walk on; Shepherd, 1977) and are represented frequently in image and poetry in eBulletins and videos. Some of the stories and myths of nature and place tell of climate change and consequences of overutilisation of resources in the past (e.g., the dunes at Culbin) and resonate with contemporary debates. A New Materialist perspective erodes the binary of humans and nature and views people, places and materials as assemblages of interrelated human and more-than-human actors that can be influenced by innovative pedagogies in ESD (Mannion, 2020).

Nature and culture are often interrelated in RCE Scotland activities; music reflects landscape, language draws on climate, film combines visual of nature with traditional music. The strong tradition of hospitality to one's community and visitors from elsewhere still prevalent today in the Highlands and Islands informed the online ceilidh held as part of the Global RCE Conference in 2021. In practices recounted by educators in teacher training sessions, a relationship with land and art is illustrated through emphasis on outdoors learning and creative place making—arts, music, poetry, literature, and craft are created in many educational settings.

Although community often has a warm, utopian connotation, it is a contested and potentially slippery concept (Meyerricks and White, 2021). Community can be exclusive as well as inclusive (Hayes-Conroy, 2008). However, in Scotland, this tendency can be limited through connection with the diaspora, a long term interest in global citizenship as part of ESD and a strong sense of justice. The mantra "think local, act global" is illustrated in the debates amongst members and Steering Group around the framing and purpose of ESD. Although there was an initial focus on ESD in Scotland, members highlighted the need to address concerns and context in the Global South, and to highlight and call out neoliberal, globalised context. Rather than imposing one set of values, they called for a diversity of perspectives and active debate over values. This plurality of perspective emerges through attempts to incorporate different voices from different immigration cohorts, from a range of socio-economic points, from different sectors and from different debates within Scotland (see eBulletin, website and Annual Gathering contributions for examples). Devolution enhanced discussions over Indigeneity—about being connected with a particular place, and not necessarily being born in that place. Gaelic references to ways of being in nature and place (such as Dauth and tuach) offer new/old insights (see debate in Scottish Affairs). Our contributions in global debates are evident through the RCE Network, international research, raising awareness and analysis of the SDGs and through making personal connections across borders (as in the Connecting Classrooms through Global Learning project).

There are many definitions of sustainable development and sustainability, and RCE Scotland spent time developing a broad definition of ESD for our context; it "*enables visioning of culturally and place-specific futures*." If we see sustainability about being primarily about human generations living within "the life supporting capacity of ecosystems" (Fadeeva et al., 2014, p. 208) we neglect the needs of the more-than-human world and we diminish the importance of the relationships between humans and nature. Some RCEs do engage, for example, with Indigenous ontologies (Lotz-Sisitka, 2009; Fadeeva et al., 2014; Vaughter et al., 2022) and through programmes supporting nature connection (Vaughter et al., 2022). The celebration of "cultural plurality" by UNESCO and many RCEs (Fadeeva et al., 2014, p. 209) can evidence and encourage many forms of human-nature relationships. In this paper, we call for more emphasis on these relational aspects, to allow people to connect emotionally with ideas and practices of sustainability and to call to the heart, as proposed by Geddes. In this way we can celebrate intrinsic values of nature and go beyond the utilitarian framing that is often found in RCE activities linked to non-marginal ecosystems (Vaughter et al., 2022). "Heart" approaches are often supported especially through non-formal learning and enhance potential for transformative learning.

4.8. Coming to terms with historical exploitation

As noted briefly above, not all of Scotland's history and culture is positive. There is a dark side to most national histories, and Scotland is beginning to recognise and address past roles in colonialism, persistent racism and sectarianism, elitism, sexism, and Christian suppression of Indigenous cosmovisions. RCE Scotland tries to ensure representivity in gatherings, to promote decolonising curriculum material and case studies and to respect different worldviews in teacher training and research activities (see eBulletin). Such processes align with future thinking and normative competencies (Giangrande et al., 2019). On the other hand, perceived oppression, and marginalisation of Scots themselves in the past have provoked a reclaiming of language, music and cultural concepts along with discussions of diverse and contemporary indigeneity (Wightman, 2010; McIntosh, 2018).

4.9. Recommendations for RCEs and wider ESD

RCE Scotland can be seen as a "success" by some measures—its persistence over 10 years, the large membership, many activities, the Global RCE conference, impacts, and feedback. Such "success," however, has been won in a particular context and socio-political structure and with the efforts of key individuals. Education, ESD and RCEs need to be aligned with culture and context in other regions; but we should seek equivalence rather than sameness.

We now ask what lessons are learnt and what recommendations can be made for ESD more widely, for RCEs elsewhere and for our own further development. Firstly, a dialogical process engaged members and opened rather than closed definitions of ESD. These conversations continue today and maintain a dynamic process and potential for inclusivity. Secondly, the governance structure, with a small core directorate, a diverse and expert steering group, and flexible task groups and projects has enabled consistency but also opportunistic responses to context or resource. The structure as a network organisation has enabled cross-sectoral engagement and may serve as a useful model for other RCEs. Thirdly, we recommend embedding processes and practices in nature, culture and context, whilst also celebrating diversity. However, we recommend being sensitive to issues of heritage and sustainability; lessons from the past are not always easy to absorb. Understanding and critically interrogating the present and using such lessons to inform aspirations for the future can be beneficial, as we have demonstrated here.

This analysis has enabled us to critically reflect and to develop recommendations for this and other RCEs and for ESD more widely. However, the analysis was constrained by limited data on long term impacts of RCE activities. We suggest that future research explores outcomes and impacts of ESD initiatives using empirical methods. In addition, there is a need to further investigate the possibility of a nature connection competency.

5. Conclusions

Sustainability has been a thread throughout Scotland's history; at times stronger than others and varying in colour and weft. It has manifested particularly in connection to land; linking to the past whilst looking forward; rights and democracy; and education and enquiry. Education in Scotland has been used both as socialisation and as nationalism; both as a mechanism of creative and radical dissent and for conforming; both as grounding in place and nature and justification of destructive capitalist assault on the earth for resources; both for freedom from oppression through, for example, teaching Scots texts and Gaelic and traditional music, and for controlling overseas entities and peoples.

It follows that ESD is embedded in culture and context in Scotland and that this has shaped the emergence, structure and practises of RCE Scotland, along with other internal and external influences; such as the personalities of staff and members, policy changes, funding opportunities and wider global events. This study has demonstrated the importance of critically analysing historical framings and of acknowledging the diverse ways in which ESD can manifest.

ESD is needed to imagine and enable sustainability transformations in local contexts as well as at a global scale. We recommend that developed and emerging RCEs explore these aspects and intentionally develop dialogical processes to engage potential members in ongoing discussion about these aspects. The case of RCE Scotland demonstrated how powerful connection to local nature and place can be. We thus also call for a widening of the UNESCO ESD competencies to include physical, mental and emotional connection to nature and place, by enhancing pedagogical approaches that provide experiential and relational opportunities to engage the heart. As more RCEs develop, we hope they can support ESD in locally-relevant ways; drawing on cultures and contexts and on complex relationships between humans and more-than-humans to widen debates on what kind of futures we want and how to pursue these.

Data availability statement

They relate to other case studies. Requests to access these datasets should be directed to rehema.white@st-andrews.ac.uk.

Ethics statement

The studies involving humans were approved by University of St Andrews Teaching and Research Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. No potentially identifiable images or data are presented in this study.

Author contributions

RMW, UK, BK, KL, and AS contributed to conceptualisation and design of the study. The section on culture was led by UK, with contributions from AS, PH, and RMW. BK and KL led on organisation of Supplementary material. RMW led on article structure, introduction, other results, and discussion. All authors contributed to manuscript development.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frsus.2023.1128620/full#supplementary-material

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