

Article

Levels of Transformation in Sustainable Curricula: The Case of Geography Education

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Abstract: The 17 United Nations Sustainable Development Goals (SDGs) adopted in 2015 have created renewed interest in sustainability in education. Geography education is a discipline that studies most of the issues related to the SDGs and has a significant role to play in the Anthropocene. Current debates on curricular sustainability and geography education suggest that geography educators are integrating sustainability in different ways but not all approaches have the same transformative impact. The aim of this study is to provide a theoretical model that determines different levels of transformation that could be helpful for advancing in curricular sustainability in geography education. The proposed model is called *The Transformative Sustainable Curricula (TSC) model*. Its development has relied on two processes that have involved, at the same time, two different methodologies: the creation of the model through documentary analysis, and its validation from interviews with experts in education for sustainability and geography education. The model is structured in three levels or stages: adaptation, reform and transformation. Each level has been characterized according to the following elements: the perspectives of sustainable development; the type of sustainable education; transformative learning; ecology of knowledge; institutional integration; context, change and community. The proposal makes teachers aware of where their teaching practice is located and how to move forward. It is also useful to determine what elements constitute a prop for sustainability and how these can guide educators and scholars in scaling vertically and horizontally their contribution towards a geographic education that is more sustainable and transformative, should they wish to do so.

Keywords: geography education; education for sustainability; curricular sustainability; curriculum reorientation; transformative learning; sustainable development goals; levels of implementation



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1. Introduction: The Anthropocene, Sustainable Development and Geographical Education

The COVID-19 pandemic has shown people that all of humanity is interrelated and fragile. The climate emergency experienced in recent decades is one of the visible signs of the socio-ecological crisis generated by the model of socio-economic development that governs the world. It is a model that does not seem to be the right one, since it degrades the environment and the natural functions on which humans depend, while generating inequalities and conflicts between people and nations. The Anthropocene, or human era, is a proposition still in debate as a geological epoch characterized by the change in the conditions of the Earth's surface due to human activities [1]. The Anthropocene is a holistic concept that supersedes the nature-humanity dualism, transmitting the notion of co-evolving socio-ecological systems, where the sum of the set of environmental impacts generated by humankind transcends climate change and poses a serious danger to humanity and the future of the planet [2].

The new report on human development [3] argues that people can no longer continue to do things as done before, and that the very concept of development has to be reformulated to provide an answer to the challenges faced. Humans should reinvent themselves

as a species and be capable of transformation in order to navigate the complexities of the Anthropocene. The solutions to this crisis have to be sought from different approaches and points of view from those that created it and, therefore, there is a need to learn to observe and be in the world from a perspective that allows sustainability. In the last three decades, sustainable development has been promoted by the United Nations through international summits and global actions such as Agenda 21 [4], the Millennium Development Goals [5] and Agenda 2030 [6], which established the current seventeen Sustainable Development Goals (SDGs) [7]. Most of the world's governments have begun to include important measures in their policies, although they are not enough. The 2020 and 2021 Reports on Sustainable Development Goals [8,9] brings together the latest data available before and during the COVID-19 pandemic and shows it has halted or reversed decades of progress. The pandemic has exposed and intensified inequalities within and among countries and progress continues to be uneven. Although in the last two years people's resilience, adaptability and innovation have brought some optimism, the conclusions of these reports are that people are not making enough changes or transformations to meet the objectives set for the year 2030.

1.1. Education, Curriculum Reform and Sustainability

Several authors [10–13] and reports [14] agree that the evolution in the integration of socio-environmental and sustainable values in education can be summarized in three major moments or stages: an initial stage during the 1970s and 1980s; a second stage of expansion during the 1990s; and a third, from the year 2000 and that continues to this day. During these three stages, the process of reform of the curricula with the socio-environmental and sustainable lenses has evolved and has been conceptualized and labelled in different ways and with different implications. In the initial stage, “environmental education” came to occupy a prominent position in education policy and curriculum reform. In the case of geography, Morgan [15] termed this influence “environmental geography”. “Greening” was also a term used in English-speaking countries for those actions linked to the incorporation of the environmental dimension to all studies and subjects [16,17]. In the Spanish-speaking countries and Brazil, the equivalent term was “ambientalización” [18,19], what Kitzmann et al. [10] have translated as “environmentalization”. This term is still used today for those who support environmental education and that place the main emphasis on protecting the environment. In the second stage, education for sustainable development (ESD) appeared as a new paradigm, with the aim of reforming education and its institutions and as an essential tool for the formation of the new sustainable global citizenship [20]. ESD was first described in Chapter 36 of Agenda 21 [4]. This chapter identified the need to redirect the educational systems towards sustainability, and one of the key areas was the reform of curricula. In this moment, international organizations such as UNESCO [21,22] started using the terms “curricula reorientation”, “implementing ESD” and “embedding sustainability” when referring to the processes of integrating aspects of sustainable development in curricula. Since then, educational institutions, and especially universities, have undertaken both top-down and/or bottom-up processes to implement sustainability [22], resulting in whole institutional approaches, sectorial initiatives, or individual actions [11,23]. Environmental education and ESD have evolved and changed over the last thirty years or so, and at the same time some views, traditions, and practices are still used. However worthy, they are not sufficient in the quest for a “sustainable education” [24]. For this reason, in the last stage, educators and scholars are facing an ESD that goes beyond educating about and for sustainable development; it is an education as living sustainably (or sustainable education) that is transformative. This new type of “ESD” seeks structural transformations in education [25] that offers new ways of seeing the world, and involves the development of systemic, critical, and creative thinking and the empowerment of citizens to make individual and collective decisions in the construction of alternative futures. At university level, some institutions have integrated the concept of “universities in transition” following the idea of Hopkins [26] of creating communities

in transition towards sustainability, particularly focused on avoiding climate change and being energy resilient and focusing on the transition to a carbon-free society; “low-carbon curriculum” initiatives have emerged [27]. At the same time, other academics [28] and organizations [29] with a more holistic vision prefer to talk about “sustainable curricula” or “curricular sustainability” to transmit the idea that sustainability is a frame of mind [30] that involves a new model of being. Therefore, curricular sustainability transcends the curricula because what is taught and learned should be connected and in tune with the context and all areas of the educational institution (including management, research and knowledge creation, and community engagement). UNESCO, through initiatives such as the Decade of ESD (2005–2014) [31], the Global Action Programme on ESD (2015–2019) [32] and the ESD Roadmap for 2030 (2020–2030) [33], has led to changes in the educational systems of different countries. The ESD 2030 Roadmap [33] aims to build a fairer world and emphasizes the necessary contribution of ESD to the achievement of the 17 SDGs. Making ESD a learning process for social change, helping people to continue learning how to live prosperously as they move into the Anthropocene, is not an easy task for teachers because it requires that the teaching and learning processes be transformative [34].

1.2. Sustainable Education and Transformative Learning

The concept of transformative learning was formulated by Mezirow [35] and has evolved from an alternative perspective of learning to a learning theory characterized by its diversity of perspectives and discourses [36].

Transformative learning focuses on how people learn (the learning processes), what they learn (the outcomes, that in many cases are difficult to be determined), and how the learning could be best supported (the conditions for learning). Its main purpose is to challenge learners and educators to critically reflect and question their assumptions and beliefs, and act on new transformed perspectives. Transformative learning helps learners to be more open, inclusive, reflective, and emotionally able to change [37].

Transformative learning is applied in a diversity of contexts, ranging from personal transformation to organizational change, and social and community transformation [38]. The broad understanding and general aims of transformative learning are to contribute to a more significant social change (or transformation) through education, which makes it suitable for ESD.

Transformative learning theory has become an emergent field of interest and inquiry in ESD. In terms of publications, it has played a major role from 2008 onwards, reaching its peak popularity in 2019 [36]. According to Rodríguez-Aboytes and Barth [36], “*the field of ESD has embraced transformative learning to overcome a conventional approach of ESD and to support learning that leads to the transformation of unsustainable mindsets and the adoption of a paradigm towards sustainability*” (p. 2). Transformative learning theory provides the learning process underlying the journey towards sustainable living [39]. At the same time, ESD has a considerable transformative approach as it prepares and enables individuals and groups to critique current unsustainable social values, and norms, and to adopt sustainable principles and ethics by addressing unsustainable practices and contributing to the SDGs.

The implementation of transformative teaching in ESD is challenging [40]. For Taylor [41], transformative learning in ESD entails a transformation of the three dimensions of knowing: the epistemological (how we know, produce knowledge, and make meaning), the ontological (what we know and define as reality), and the normative (how we value knowledge). Learners and educators need to be able and willing to question whether their epistemic, ontological, and normative premises are in tune with sustainability or must be transformed. This means a deep structural shift in the basic premises of thought, feelings, actions, and self-consciousness. From a didactic perspective this implies engaging with the cognitive, physical, emotional, and social domains of learning.

The core elements of transformative learning [42] are critical reflection, dialogue, and the individual experience. Schnepfleitner and Ferreira [43] suggest also including the context, because “*each contextual culture enables, inhibits, and dictates who learns what, how*

and when" (p. 45). For Mezirow [42], transformative learning is structured in three main elements: learning processes, outcomes, and conditions. Learning processes include prior learning, which could be challenged by disorienting dilemmas and followed by critical reflection, the stage of discourse, and the experiences of action engagement. The learning outcomes are what learners are capable of thinking and doing by the end of the transformative learning experience. Learning outcomes include the increase of new knowledge, practical skills and sense of agency and empowerment, as well as the reconstruction of values and perspectives. Learning conditions are the set of external and internal factors that influence and determine the learner's capacity to engage and succeed in a transformative learning situation.

The ESD 2030 Roadmap [33] states that it is necessary to prioritize action in strengthening the abilities of educators to introduce transformative learning in ESD. This would transform learning environments and, thus, empower and mobilize youth to accelerate change. The ESD 2030 Roadmap also stresses the necessity for students to learn how to develop themselves in a sustainable way by acquiring competences and skills to make proposals for the present and the future, change their lifestyles and be able to create and/or be part of partnerships or alliances with other social agents, with the aim of carrying out joint actions for sustainability. These actions need to be debated, agreed upon and thoroughly reflected on, so they are sure to be valid for a transformation or reorganization of the current social structures.

1.3. Geography Education for the Anthropocene

Geography is a subject with a great tradition in the study of interactions between human beings and the environment. This allows the development of critical thinking in relation to how to live sustainably and act accordingly [44]. Geography finds itself in a privileged position regarding the study of sustainable development because it is one of the few subjects that has the potential to bring together a large body of knowledge to understand the complexity of this interdependent, global world [45]. Geography as a subject has the characteristics of being broad, having a globalizing and holistic approach, being contextual and presenting synthesis in relation to space, places, regions and the planet as a whole. All these properties are important dimensions for the study of sustainability and have led Meadows [46] to state that geography could be considered as the science of sustainability. Geography has an advantage over the rest of scientific subjects because it has the ability to integrate the natural, social and human sciences under an interdisciplinary approach. It also has the advantage of allowing the study of sustainability from a transdisciplinary point of view [47]. Transdisciplinarity is a scientific approach and practice that transcends disciplinary boundaries, which includes political views [48] and that integrates the ecology of knowledge [49] or epistemological pluralism. Its main aim is to produce new knowledge to contribute to both scientific and societal progress. Transdisciplinarity is a deliberative approach where different actors participate in the definition and solution of problems.

Learning about geography, in addition to providing a holistic understanding of the interactions and processes that take place on the planet [50], allows for the development of critical and creative thinking so as to build "geographical imaginations" [51] that make it possible to discover new ways of thinking and go beyond one's own personal experiences and to envision and create alternative futures [52]. Geographical thinking is important for all citizens to be able understand the complexity of achieving sustainability and to consider what can and should be done to achieve a more sustainable future [46]. This contributes to the formation of a sustainable global citizenship [20] through the development of multiple identity and the sense of belonging based on territorial and scalar aspects, but also through non-territorial aspects such as affiliation to networks and interest groups with which each citizen feels connected.

The Lucerne Declaration on Geographical Education for Sustainable Development [53] proposed that the paradigm of sustainable development should be integrated into the teaching of Geography at all educational levels and in all regions of the world. The declaration was a

very valuable instrument for curricular sustainability, as it defined concepts and content and provided strategies to implement ESD in the teaching and learning of geography. Smith [54] affirms that geography occupies a privileged place in the educational system to teach and learn about sustainable development and Westaway [55] considers that it should be the subject that leads ESD in educational institutions. Even so, the educational reality is quite different in most countries around the world and the relevance of the role of geography in ESD is less than would be desired. Sustainable development is forming part of the study programs of geography at different educational levels, from primary education to secondary education and university, but as Nölting et al. [56] say, it only constitutes a small part of all teaching and learning activities and a complete systematization has not been carried out. Although geography shares content and learning methodologies with ESD, progress in curricular sustainability is far from complete [54]. For this reason, it would seem that now is the right moment to rethink geography education to enhance its transformative capacity towards sustainability, because as Skarstein and Wolff [57] (p. 1) state:

The field of geography has a significant role to play in the Anthropocene and needs to develop and reshape sustainability education that meets the needs of both the present and an unknown future.

2. Aim of the Study

The motivation for this study arises from the necessity to scale up the curricular sustainability of geography education. The starting assumptions are:

- Geography academics, teachers and teacher students have been trained and are familiar with current debates in sustainability and education for sustainability in different ways and to a certain extent. So, their competence in developing and delivering a sustainable curriculum that is transformative could be high, average, or limited.
- There is no single recipe or way to undertake the “sustainabilisation” of geography education. At the same time, there are few works written or models that guide geography educators in the critical reflection and systematization of how to advance in this process of transformation.
- Not all approaches have the same transformative impact and geography educators should be aware of that and learn how to measure it.

These assumptions lead to the main research question: How can different levels of implementation be determined that could be helpful for advancing in the transformation of curricular sustainability in geography education?

The aim of this article is to provide a theoretical model that will serve to characterize, differentiate, and critically evaluate the transformative practices and initiatives in curricular sustainability in geography education that could be used at different educational levels.

The proposed model is called *The Transformative Sustainable Curricula* (TSC model). It has been created from a theoretical reflection on current debates on curricular sustainability and geography education research. It is structured in three levels or stages that differentiate the degree of integration of sustainability and its transformative approach. Each level or stage is described according to the elements that the author has determined as key and that are described in the next section. This theoretical model has been validated by experts in the field, and its final purpose is that it will help geography teachers reflect on the position where their professional approach and practice is situated in each of the actions they are carrying out with reference to these three levels of implementation.

3. Methodology

The development of the TSC model relied on two processes that involved, at the same time, two different methodologies: the creation of the model through document analysis [58], and its validation from interviews with experts in education for sustainability and geography education.

3.1. Creation of the TSC Model

A theoretical framework consists of theories and concepts and is used to explain some phenomena from a particular perspective. A model is an abstract representation of phenomena that structures how components and/or variables are connected and influence each other. Process models try to describe and simplify the process of translating theory into practice. They determine what knowledge and understanding a person may need to act in more informed and effective ways to go to the next stage. Their main patterns include concreteness, simplicity, significance, and process-orientation.

The TSC model was developed through document analysis [58]. This qualitative research methodology is a systematic procedure for reviewing or evaluating documents. Documents were analysed to suggest questions and to delimit key aspects regarding sustainability curricula, as well as tracking change and development in the field. The first phase consisted of a review of the literature through a search using the following key concepts: curricular sustainability, curricular reorientation, integration of SDGs, geography education, education for sustainability, and others. The search was carried out in both Spanish and English languages. Once the reference documents were chosen (a sample of 50 works), a theoretical framework was created based on existing theories and approaches. In the second phase, the framework distinguished the key elements or variables that, from the author's point of view, are necessary today for understanding and moving towards transformative sustainable curricula. After the determination and definition of the elements of the instrument, the third phase involved creation of the TSC model. The model consists of three levels of transformation and/or implementation that are described according to the elements of the instrument (see Section 4 of this paper).

3.2. Validation of the TSC Model

3.2.1. Expert Interviews

The use of expert interviews has long been popular in social sciences and education as a method of qualitative empirical research. Although the term expert interview reflects on a plurality of methods, emphasizing different methodological and epistemological aspects, there is a key issue on which most of the authors agree: expert interviews emphasize the importance of investigating viewpoints or perspectives, experiences, and orientations of the interviewees. Bogner et al. [59] state that the justification of using expert interviews as an independent research method must clarify what constitutes an expert, and which type of interview is best for the aim of the research and the purpose of the expert interview. In this case, the definition and selection of the experts is explained later in Section 3.2.2 (sample). The final purpose of the expert interviews was to validate the theoretical proposal. To this end, it was necessary to obtain critical evaluations, as well as to collect proposals for improvement. According to this purpose, the type of expert interview that was selected was "the problem-centred expert interview" proposed by Döringer [60]. This approach merges the theory-generating expert interview (TGEI) by Bogner and Menz [61] and the problem-centred interview (PCI) by Witzel [62]. This meant the following characteristics were possible:

- Consider that both the interviewer, and the interviewee are familiar with the field and its practical conditions and, therefore, the interviewer is seen as a co-expert.
- Design the interview in accordance with research needs and remain flexible during the research process.
- Plan the interview process as a dialogic-discursive structure to enable exchange and co-creation of knowledge. The interview comprised a first narrative episode where the theoretical framework was presented and the TSC model explained. Secondly, the interviewer began with an opening question that focused on the matter of interest and that stimulated the expert. Finally, the interviewer moved on to both general and specific explorations through ad hoc questions. For example, the interviewer asked about the relevance of the model, if the main structuring elements of the model were suitable (and if there were any missing), what their components were and if

the use of terms was appropriate. Other questions focused on the description of the elements for each level of transformation and whether this helps in the understanding and differentiation among levels of transformation. Further information on questions, responses and suggestions is provided in Table A1 in the Appendix A.

3.2.2. Sample

The sample consisted of eight experts. What really constitutes an expert? What special characteristics does a person need to have to constitute an expert in regard to the type of information that should be gathered? Following Kaiser [63], experts are those academics that are agents of truth and authority, that is, they are knowledgeable (or identified by virtue of their specific knowledge) and have a position and status in the educational community in the fields of geography education and sustainable education. The experts were also recruited by accessibility criteria, and they were contacted through electronic mail. The interviews were conducted through online video calls that lasted for an hour and a half each. The interviews were recorded and then transcribed. In order to meet ethical research requirements, the transcriptions were codified, and the identity of interviewees preserved. MAXQDA software was used for interview transcription and analysis. The validation of the TSC model consisted in selecting units of meaning according to the observations and suggestions made by the experts, they were codified and then applied to the initial proposed model. As a result, the final TSC model was finalized and validated. Finally, the proposal was shared with colleagues from the “Xarxa d’Innovació Docent en Integració dels ODS” (Network for Innovative Teaching in SDG Integration) of the University of Girona and was presented in two international conferences.

4. Results

4.1. The TSC Model

The structuring elements of the TSC model (see Figure 1) emerged as critical analysis of existing models and proposals [10,64,65] and by considering an emerging theory and practice of transformative change related to the SDGs’ implementation [66].

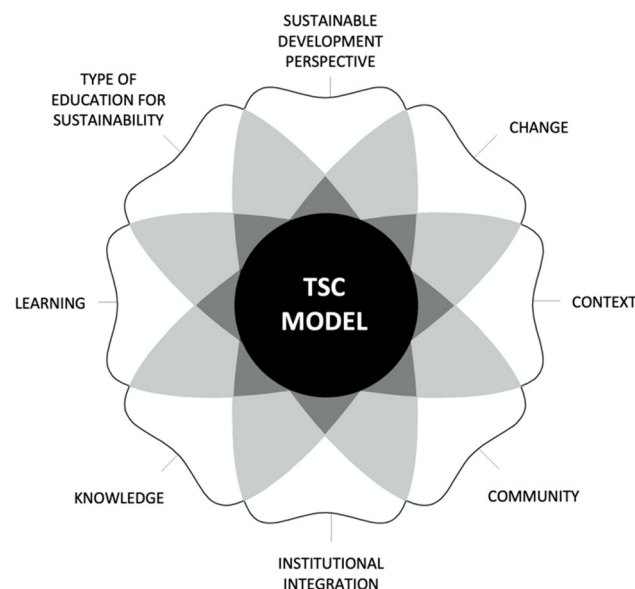


Figure 1. Structuring elements of the TSC model.

The elements that structure the TSC model are:

- *The perspectives of sustainable development.* There are three major different perspectives to understand and address sustainable development [67,68]: the traditional perspective or improvement of current systems, which continue to favour economic growth;

- the reform perspective, which focuses on the transition to sustainability through technological innovation; and the perspective of transformation, which proposes a change in the prevailing value system in society, as well as a restructuring of power relations.
- *Sustainable Education (ESD)*. In terms of education, the main question is: what type of education do we need to transform current unsustainable reality? There are several approaches in relation to ESD. It can be considered as education about sustainable development, or as an education that promotes sustainable development. But current trends advocate for a sustainable education [24], which implies learning by living sustainably. This type of education is a transformative learning process in which students develop their own ability to analyze, negotiate, search for alternatives, and make sustainable choices (individually and collectively) [57]. For Biesta [69], sustainable education is an education where citizens experience democracy and sustainable development by doing and living it.
 - *Institutional integration*. Traditionally, curricular sustainability has been understood to mean just changes in the curriculum and in-classroom programming. In those initial approaches, the operationalization of curricular sustainability consisted in defining themes for each course, the identification of possibilities for embedding, the implementation and the assessment [10]. The process was differentiated in terms of adaptation (where changes were implemented on an existing curriculum) and genesis (when the creation of a program or curriculum occurs from scratch). Today, we understand that curricular sustainability transcends the mere curriculum and what is taught and learned must be in tune with the reality of the educational institution in all its dimensions. For this reason, we must contemplate the integration of the actions that are implemented in the four key areas of educational institutions [14] (direction and management; teaching and learning (or training); research and knowledge creation; and the relationship with the community).
 - *Knowledge*. All subjects can contribute towards achieving sustainability, but knowledge for sustainable development should be transdisciplinary [70], since it transcends subjects and implies the interrelation between fields of scientific knowledge (interdisciplinarity [71]) and other areas of knowledge and manners of knowing [72]. An ecology of knowledge [49,73] is needed in order to achieve the seventeen SDGs, and it can be built through discourse (a process of problem resolution and meaning made together, by sharing knowledge and practices related to sustainability, and by challenging others' assumptions and beliefs) [36].
 - *Learning*. The process of achieving sustainability implies a transformative learning process. Transformative learning theory [74] involves changes in the epistemological, ontological, and normative dimensions of knowledge and learning. It involves a shift towards an awareness about how we learn, how we create knowledge and give meaning to things, what we know and define as reality, and how we value and assess all these aspects [41]. Transformative learning affects all dimensions of the human person and, therefore, alters feelings, thoughts, and actions. From a didactic point of view, this implies acting in the different domains of learning, that is, going beyond cognitive learning and incorporating physical, emotional, and social learning, as well as metacognition. Sterling [75] distinguishes between three levels of knowing, or orders in learning and change. The first order is focused on cognition. The second order includes metacognition, while the third order entails epistemic learning and change. The third-order change is the most transformative one because the learner reflects and transforms his/her worldview. As reported by Mezirow [42], the key characteristics that transformative learning should focus on are the learning processes, the learning outcomes, and the learning conditions. For Calleja [76], transformative learning transcends the intellectual process and the reflection phase, and individuals should show action engagement by planning a course of action, experiencing new roles, testing, and integrating solutions into their lives. The didactic scenarios that are developed must promote learning experiences of geography for sustainable de-

velopment which, as the IGU [44] recommends, are authentic, inspiring, fascinating, and feed curiosity. However, they also must allow the formation of a more ambitious sustainable global citizenship [20] and go beyond a change in behavior and focus on empowering students through competent action, both individually and collectively. It is important that citizens participate actively in the creation of sustainable actions in their community and in others that are more distant. Learning ecologies are described as temporary learning experiences that unite different agents and social groups through the challenge of community sustainability. This experience implies the development of trust, social cohesion and the exchange of perspectives and knowledge, as well as constituting a way of learning to work in cooperation with others, which in turn opens the door to new challenges and projects [73]. These initiatives imply the involvement of more educational and social agents in curriculum development.

- *Context.* The actions for a sustainable curriculum that teachers wish to undertake should be circumscribed in a context. Figure 2 presents three types of contexts: a context of isolation (Figure 2a) is when there is not communication between educational spaces and structures, both horizontal and vertical. A context of connection is when spaces and structures are permeable and enables communication and collaboration (Figure 2b). A context of interrelationship is where a common vision is shared, the community is committed and works for the common good (Figure 2c). According to transformative learning theory [74], the context is key in determining the learning conditions.
- *Change.* Banathy [77] states that what is needed in education today is a systems-design approach to educational change that considers the scope of the change process, the focus of the change process and the relationship between the educational system and other systems in the community. The scope and the expected level of change or transformation must be clear (whether it is partial or systemic, and if it supposes a micro, meso or macro scale), realistic and feasible (knowing what possibilities exist and which can be created).
- *The community.* The concept of community is linked to aspects such as territory and geographical location, identity, the circumstances of a common problem, interest in and affiliation to a group or a collective [78]. There is a need to define what do we understand by community, and what place and role is ascribed to it. The development of a sustainable global citizenship implies multiple identity and belonging to a wide range of communities at different scales. At the same time, geography education for sustainability should enable us to cultivate competences for community building.

After this stage of determination and definition of elements, the TSC model was created. The model consists in three levels of transformation and implementation that are described in the section that follows.

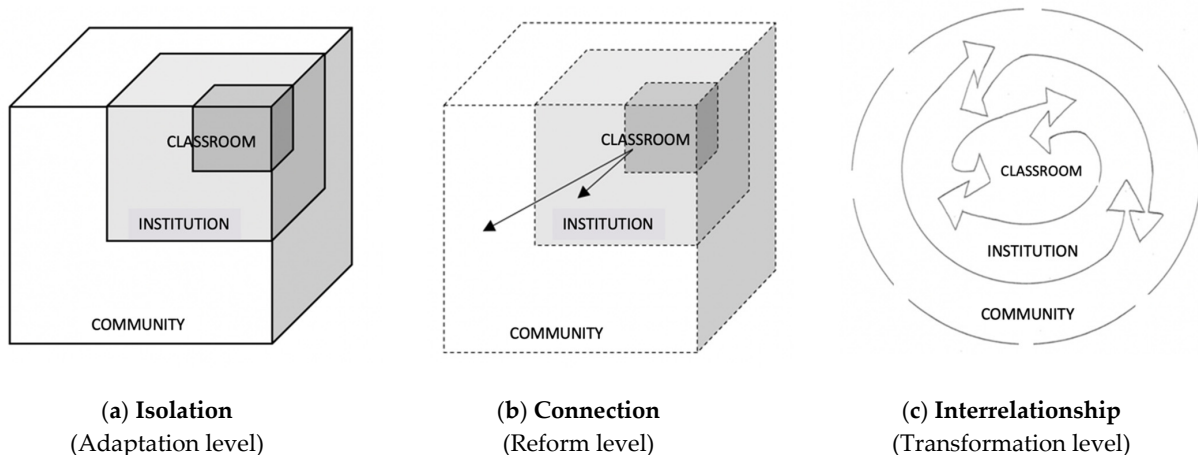


Figure 2. Different contexts for action.

4.2. A Characterization of Levels of Transformation and Implementation in Curricular Sustainability in Geography Education

Sustainability implies an epistemological change regarding our educational thought and practice. This entails a new look at the curriculum, didactical methodology, the organizational change of educational institutions and ethical values [79].

Although Swyngedouw [80] states that he has not found anyone who is against sustainability, not all academics and teachers are convinced about the value of sustainability [81]. We understand by “the battle of ideas in geography education” to be the confrontation between those in favour of adopting ESD as the central axis of the teaching of geography, and those who stand for the essence of the geography subject and complain that this is being lost in favor of an interdisciplinary area, ESD, which blurs the subject and geographical knowledge [15]. Supporters of this position complain that there is a state-wide promotion of ESD that is indoctrinating and manipulating students towards a new green morality. So, faced with this dilemma, the first step to take is to decide if geography educators are convinced about giving a prominent role to sustainability or not. This means deciding to remain in the comfort zone and continue doing the same thing (status quo) or if, on the contrary, teachers intend to contribute to sustainable development and determine at what level they expand their commitment and introduce changes that increase the impact of geographical education in the ability to build a more sustainable world.

The unsustainable context compresses educators like a spring trapped in a box from which it is trying to escape. The metaphor in Figure 3 presents transformative curricular sustainability as an ascending spiral with three different levels of action and transformation: stage 1 or adaptation level; stage 2 or reform level; and stage 3 or transformation level.

The metaphor of the ascending spiral is interpreted as a transition that makes teachers leave the box in which they are situated (the paradigm), go up the spiral of knowledge and place themselves in a higher perspective, which will provide them with greater clarity and awareness.

This proposal of levels or stages of curricular sustainability does not have to be taken as a process to follow, but rather tries to draw or characterize different approaches that produce impacts of greater or lesser transformation. The author believes that it is a useful tool to position our teaching practice and to guide teachers on their evolution towards higher stages. The following sections describe the three stages or levels of transformation and their didactic implications.

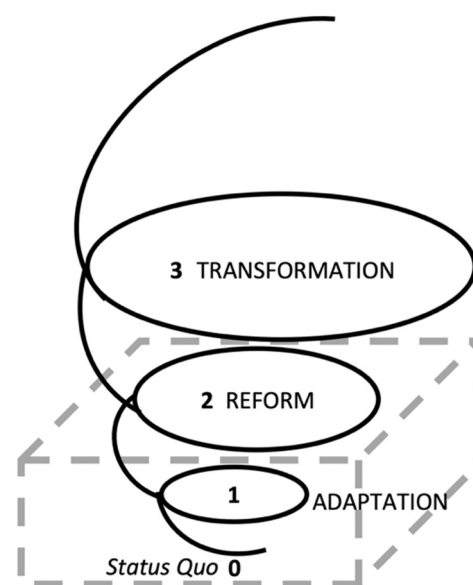


Figure 3. The upward spiral of transformative sustainable curricula.

4.2.1. Stage 1: Adaptation

The adaptation stage means abandoning the status quo to start introducing curricular changes that promote sustainability. Actions in the adaptation stage are characterized by what Gadotti [82] qualifies as isolated and disconnected actions, which are carried out by the teachers who are most aware of sustainability but undertake actions individually in most cases. This makes them fragmentary sustainability projects with limited impact. In the case of the curriculum, they are usually interventions that affect a course and that are circumscribed in the classroom and that are not usually connected with a joint strategy of the educational institution. The classroom, the educational institution and the community are sealed compartments with no unifying relationship or strategy addressing sustainability.

The adaptation stage represents a first-order level of change, since the change occurs within the same system and aims to do things better, in a somewhat more sustainable way. It is a style of education that provides knowledge about sustainable development. To do this, it is about adapting and correcting different aspects of teaching practice and adding some new aspects of ESD, so that students can acquire a basic education on concepts, themes, skills and values of sustainability (learning within the paradigm that does not change the paradigm itself). Table 1 shows a characterization of this stage based on the elements of curricular sustainability that are determined.

At the beginning of 2000, UNESCO presented several guides to reorient education towards ESD valid for all disciplinary fields [21,31]. The idea behind these guides was to reflect on how subjects and courses could contribute to ESD. It proposed asking questions such as: to what extent does my course's syllabus include key concepts of sustainability? What concepts of sustainability are typical of the geographical subject? These questions help to start a review of what each teacher already does in their courses in relation to sustainability (analysis of the starting point) and also leads them to see what new things can be introduced.

Table 1. Main characteristics of the level 1 or stage of adaptation.

	Adaptation
SD perspective	Sustainable development focuses on improving current systems and structures.
ESD Type	Education about sustainability and sustainable development that has an adaptive purpose.
Context	The context is limited to the classroom and has a low impact on the promotion of change of the current situation.
Institutional integration	Internal actions in the fields of management, research, teaching and learning and the relationship with the community could exist, but there are no interconnections between these actions.
Type of knowledge	Knowledge is disciplinary (geographical analysis). Geography provides knowledge about how the SDGs are advancing and/or met around the world.
Learning	Student learning is cognitive (mainly conceptual and factual) and focused on the individual. Assessment is based on geographic content related to the SDGs.
Type of change	Teachers who carry out adaptations for curricular sustainability change their teaching practices and incorporate new methodologies specific to ESD.
The community	The community is conceived in two ways: as an object of study and as a source of information for disciplinary study.

Sterling [83], inspired by the ideas of the Forum for the Future, proposes a start in the systematization of curricular reorientation towards ESD with the First Step Model for Change, which focuses on four actions (the 4Rs):

- Review: What needs to be changed? The curriculum and syllabi of the courses needs to be reviewed to identify what to reject, what to retain and what may be subject to renewal.
- Reject: What can be abandoned of what it has been doing? What is not valid now from a sustainable perspective? What is no longer useful has to be discarded.
- Retain: Of what is being done, what has value that should be kept? What is useful, relevant and up to date can be kept.
- Renew: What new ideas, concepts, principles of sustainability and methodologies and learning strategies of ESD are going to be implemented? Educators need to innovate and create new teaching materials.

As can be seen, this initial scenario is about making adjustment in what is taught and learned. This means adapting easily and without assuming risks by adding or including in the courses some aspects of ESD that may be relevant, complementary, or useful. As a result of these actions, the changes made are usually related to the inclusion of some specific topic or activities that try to work on new skills and procedures related to ESD. One of the most practical guides in those early days was that of McKeown [84], which was based on the following elements:

- Areas of knowledge. The contents should be related to sustainable development and its three dimensions: environmental, social and economic.
- Topics. The most relevant issues are those described in Agenda 21. Today these topics would continue to apply, but the sustainable development goals would prevail [7].
- Skills. The main competences to acquire are knowing how to communicate, make predictions, think in perspective (from distinguishing different points of view and assuming the precautionary principle), think critically, move from knowledge to action and develop the aesthetic sense.
- Values. The values underlying sustainable development are those that appear in the Earth Charter [85].

Full or integral adaptations are those actions that propose the redesign of the program or the curriculum of an entire course. The Lucerne Declaration on geographical education for sustainable development [53] is a specific example that aims to help change the teaching of geography towards ESD in a global way. This declaration is conceived as a guide to show educators how to completely remake the curriculum of a geography course. Although this document gives generic guidelines, it also warns that, in the same way that the characteristics of sustainable development are contextual and cultural interpretations are diverse, educational curricula and the reorientation of subjects towards ESD have to be carried out in an individualized manner in different territories in order to line up with the needs of each region or place, and its relationship with the rest of the world. Granados-Sánchez [86] makes a specific proposal or model for the sustainabilisation of secondary geography education in Catalonia, focusing on geographic skills and competencies, the selection of content (through the themes and the relationship between key geographical concepts and ESD key concepts), how to work with space and scale, and which geography teaching and learning methodologies are best suited to contribute to sustainable education. Another contribution for the sustainabilisation of a full geography program is that collected by UNESCO-MGIEP [87] in its guide to reorient textbooks. In the chapter dedicated to geography [87], it is pointed out that the three great didactic methods of geography are geographic research or inquiry, the development of a geographic perspective on phenomena and relating geographic learning to one's own experience. The proposal explains that in order to make the reorientation of the textbook curriculum tangible, it is necessary to identify and relate the geographic content and the geography teaching and learning activities with the didactic principles of ESD. For this, they propose diagrams that they call spider webs (or amoebas), in which the integration scale is valued (from not being taken into consideration, up to being taken into account a great deal). A full adaptation should include all the elements.

4.2.2. Stage 2: Reform

Stage 2, or the reform level, represents a second-order level of change, which implies the creation of new meanings. It supposes a reform starting with critical reflection and the examination of our assumptions, since it begins to challenge the system with ideas and actions that go beyond the predetermined, anticipated results. This stage places educators in the liminal zone of the institutional and paradigmatic box, a position of reform that has no return and that prepares them for the path to transformation.

The didactic proposals of this stage maintain a creative tension between the theoretical ideas and the practice of sustainable development. In terms of learning, it implies a double-loop learning, where generative learning and metacognition are encouraged and opportunities are created for students to develop skills for sustainability [79] from action and experimentation itself, due to the use of sustainable pedagogies in geography [88,89] and experimentation with interdisciplinarity [90,91]. In addition, this teaching and learning is enriched with the students' informal curriculum [92] (or students'/children's geographies as suggested by Catling [93]), and by the desire to be part of the community of sustainable practices that the educational institution becomes. In summary and using the words of Reid [94], this education goes beyond the cognitive aspects and emphasizes participatory learning and learning for action, levels of reflection and a holistic viewpoint.

The big ideas that underlie the reform scenario are the permeability between the classroom, the educational institution and the community, and the establishment of a connection or relationship between the fields of the educational institution, joining aspects of management and research with teaching and how it contributes to the community. As a consequence, this approach implies working with others, opening up to dialogue between subjects and other fields of knowledge and implementing joint actions in the institution itself or with other institutions. It is recognized that there are problems that can be solved from the subject, but there are other problems that need interdisciplinarity and that differentiation needs to be addressed (see Table 2). Thus, subjects and disciplines start working together using multidisciplinary or interdisciplinary approaches [71]. This does not mean that geography fades and disappears; in interdisciplinary views it is important to provide perspective and geographic analysis as a contribution to solving problems based on their capacity for synthesis.

Educational institutions also create liquid structures [95] to allow new forms of learning and to experiment with epistemological diversity. The community is used as an object of study and involves work in the community and for the community, but without the community.

Table 2. Main characteristics of the level 2 or stage of reform.

Reform	
SD perspective	Sustainable development is a process that should be brought about through technological innovation.
ESD Type	Education for sustainability. This is education that shows how to move towards sustainability.
Context	The context of action is the educational institution.
Institutional integration	An institutional strategy or project is created which integrates and designs sustainability in its own systems in a unitary way. In this way, there is a connection and coherence between the measures adopted in the different institutional areas. There is an overall vision and a strategy or project for the institution.
Type of knowledge	Knowledge is interdisciplinary, with a holistic and synthetic view of geography. It is knowledge for acting upon the SDGs (normally focused on one or few SDGs at the same time).
Learning	Learning is cooperative and a learning community is created. Learning is systemic and includes individual and collective assessment through metacognition and reflection on what has been learned and developed, and its relevance for sustainable development.
Type of change	Whole institutional change: the change involves a profound reform of the organization and its operations in its entirety.
The community	This is an external reality with which the educational community interacts.

4.2.3. Stage 3: Transformation Level

Educational institutions tend to be rigid and not very self-transforming, even knowing the needs and challenges that sustainable development demands from the educational

sector. So how can educational systems be designed and function sustainably? How can educational, research, management and co-creation practices be integrated with the community? [96]. How can transformation be made possible at all levels?

The transformation scenario is the one outside educators' and academics' usual frame of reference and offers them a meta-perspective to be able to redesign all systems. According to Kuenkel [66], transformative process design refers to the temporal sequence of the collaborative process architecture that supports multiple actors to solve problems and issues of mutual concern. If these processes are properly designed, they can enhance people's competencies and help the different actors to collectively shape transformative change. Transformative system design involves multi-stakeholder interventions to deal with complex problems and requires meta-collaboration between multi-agent initiatives at different scales and requires collective work and management, and transdisciplinary agency [34]. Curricular sustainability that is situated in a transforming stage makes it essential that what happens in the classroom is connected with what is experienced in the school and the community. It is about adopting a transdisciplinary approach [70] that embraces scientific and other types of knowledge, as well as ideological perspectives and value systems. Transformative learning is third-order learning that allows to recognize a paradigm for its subsequent reconstruction [75]. This type of learning includes everything that is related with being human and involves a clarification of values and beliefs, and a new way of perceiving and learning (re-cognition) that includes both intellectual and emotional aspects and intuition. In this stage, and in my opinion, the main learning outcome should be the development of the transdisciplinary and transformative competence. This competence is complex and involves process design for the creation of partnerships and their associated sustainable interventions. The competence implies the ability to engage with other individuals, stakeholders, and other social agents from the community in order to create democratic partnerships where the leadership and the decision-making processes are shared. The competence, then, enables cooperative work that is needed for the cocreation of a common purpose, the discussion of different perspectives, and the design and development of an action or intervention that would improve the sustainability of the community. The results of this intervention need to be presented to, and celebrated with, the people in the community. The process ends up with an evaluation of the impact on people's lives, and with a reflection of the whole process and the lessons learnt (see Figure 4).

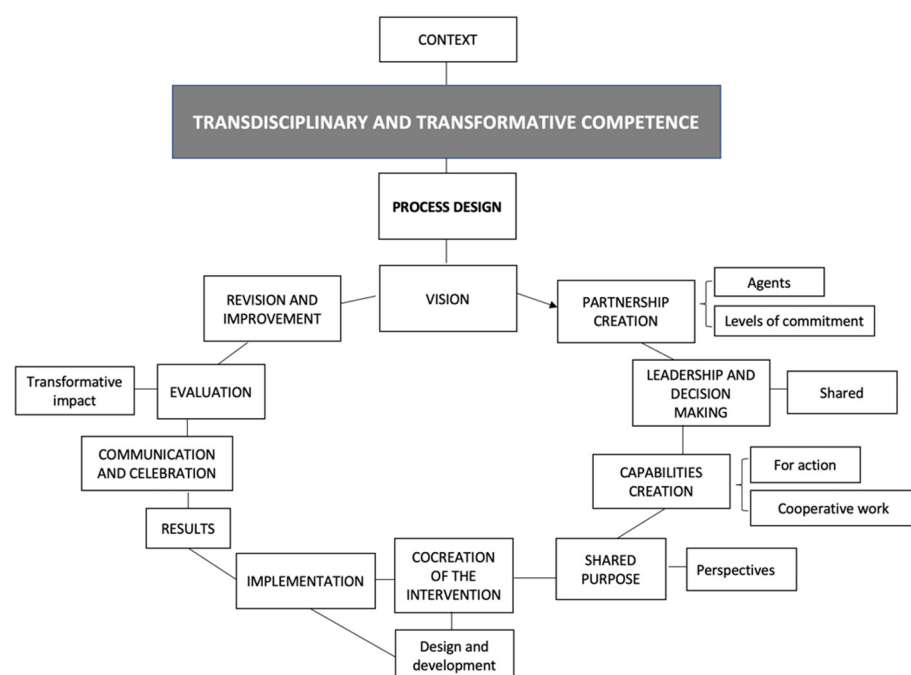


Figure 4. The main components of the transdisciplinary and transformative competence.

The characteristics of the transformation level are summarized in Table 3.

Table 3. Main characteristics of the level 3 or stage of transformation.

	Transformation
SD perspective	Sustainable development implies changing the system.
ESD Type	This is sustainable education or education as sustainability, which encourages living in a sustainable way arising from educational practice.
Context	The context is variable; it integrates various scales, from local to global, depending on the object of the action or project and the partnership created.
Institutional integration	Creation of alliances for the co-creation of sustainable initiatives that go beyond the institution and link it to various groups and social actors in the community.
Type of knowledge	Knowledge is comprehensive as it brings together all human facets. It includes different types of knowledge and ways of knowing (ecology of knowledge). It is complex, transdisciplinary, and integrative (since it includes different perspectives, values and/or ideologies). SDGs must be tackled in an integrative way, so holistic approaches to knowledge are required.
Learning	This implies a higher order learning of all those involved, in which they acquire a new perspective on reality and on how to approach it. Learning sustainability from creating, experiencing and living it. Assessment focuses on the transdisciplinary and transformative competence (what involves working with others for the implementation of actions for sustainability).
Type of change	There is a transformation of reality as a result of the co-creation of collective actions. This process constitutes a paradigmatic reconstruction in which new meanings are co-created and shared.
The community	There are diverse communities, which are common spaces that are the object of involvement and co-responsibility for the co-creation of fairer and more sustainable realities.

4.3. Didactic Examples

To understand didactic implementations of the proposed TSC model, a practical example of how to work on a problem such as the sustainable use of energy resources and, specifically, biomass power plants, is presented. This opportunity arises from a real example of the initiative of a business group that wants to build a biomass power plant in the town where the teachers and students live and to whom the example is directed. This didactic proposal fits into the sustainable development goal 7, which deals with affordable and non-polluting energy and, specifically, would carry out actions related to goals 7.2 and 7.3 [7].

4.3.1. Status Quo: The Study of Energy Sources

From a perspective that does not include sustainability, the types of energy would be studied in the subject of geography in a traditional way. The teachers would cite types of energy sources and the students would carry out a geographical analysis of their distribution in a specific country and the world. Special treatment would be given to biomass to see how the business initiative has ramifications in other contexts, but at no time would this or any other type of energy source be questioned or valued in terms of its environmental impact, its efficiency and other aspects of sustainability. The geographical skills that are carried out are those of differentiation of the types of energy and the geographical location of these using cartography (analogue or digital). Assessment is based on content and skills.

4.3.2. Adaptation: Awareness and Critical Evaluation of Energy Types

In the adaptation stage, a critical evaluation of energies would be carried out based on the understanding and assessment of the importance of the energy transition towards more sustainable models that help mitigate climate change. The evolution and advances in the presence of renewable and clean energies could be analyzed at different scales, from the global, to the state-wide and to the local region itself. The state of biomass energy in the region would be analyzed with regard to the following factors: its total contribution to energy production; its acceptance or rejection by the population; the places where the plants are located; the needs of biomass; and where biomass plants should be located depending on various geographic factors. Students' assessment would focus on their competence in critical thinking.

4.3.3. Reform: Implementation of Actions to Make and Promote Responsible and Sustainable Use of Energy

Teachers adopt two strategies. On the one hand, they aim to carry out a project in which the students analyze the degree of sustainability of the biomass plant to be built in the municipality; on the other hand, they take advantage of the case study to assess and implement changes in the energy model of the educational institution with the participation of both staff and students.

The project to evaluate the degree of sustainability of the biomass plant involves interviewing the promoters, other local actors who defend the project, the local administration, as well as the environmental and neighbourhood associations that have spoken out against it. Once the perspectives are collected, the students and teachers of different subjects ask themselves questions about the location, operation and environmental, social and economic impact of the biomass plant in the population. A study or report is generated by the students and teachers that provides a global analysis of the project and is accompanied by a consensus statement from the educational institution that positions it for or against the project.

As a result of the project mentioned previously, a second project could be carried out which aims to improve the energy consumption of the institution and to opt for self-generation. The result would be the implementation of changes in the educational institution related to energy efficiency and saving and the commitment to renewable energies and the reduction of the carbon footprint (decarbonization of the educational institution).

In this level, the assessment would look at different aspects of the learning experience: students' learning and competence development; the suitability of the didactic scenarios that were created; and the impact of the project in achieving the SDG 7 in the local community.

4.3.4. Transformation: Contribution to a Sustainable Energy Model

The initiative of building the biomass plant serves as a pretext to co-build the municipality's energy model. The educational institution leads the initiative to open a dialogue with the local authority/administration, the company promoting the project, other energy supply companies, citizens' associations, and other stakeholders. The first step is to make a joint assessment of the project. Obviously, this proposal may or may not be accepted by the social agents, with which there may be different scenarios of action if the initial proposal is not shared. For example, it can be rejected (and other energies and/or energy consumption alternatives opted for) or be accepted, but with the incorporation of aspects of improvement (such as, for example, incorporating the latest generation of filters that prevent the emission of polluting particles).

This is about undertaking a transdisciplinary project with the participation of many social agents from the locality (and beyond) who feel involved and/or affected and who want to decide on the future and sustainability of the municipality. This requires the collaboration of the local government and the will to jointly build on the part of all interested parties. The result would be the creation of a local partnership or alliance that aims to

agree on a local energy model and establish an action plan for its implementation. Student learning is transformative, because they develop competencies based on action, joint work, and consensus, which are typical characteristics of sustainable global citizenship [20]. Thus, assessment will focus on the development of the transdisciplinary and transformative competence of all participants.

5. Discussion and Limitations of the TSC Model

As Morgan [15] says, geography teachers are idealists because they believe that their subject can have a transformative effect on how young people see the world. In contrast, not all teachers have had initial and continuing training in sustainability education and transformative learning, which makes it difficult for them to be able to sustainabilise the curriculum and promote a positive vision of sustainability in an optimistic and effective way. At the same time and according to Föster, Zimmermann and Mader [40], there is a need for consolidating frameworks for transformative teaching and learning in the field of sustainability education. The TSC model is a proposal that tries to fill these gaps by providing levels of transformation in sustainability curricula in geography education. Its main aim is to improve the teaching and learning experience of geography teachers and students, so that they can carry out transformative learning experiences that enable them to envision, discuss, elaborate, and implement sustainable actions.

The model presents some limitations related to its creation, understanding, application, and assessment.

5.1. Limitations of the Model

The TSC model is a personal proposal based on the existing literature. The elements that underpin the model are the ones the author believe are necessary for a comprehensive approach to the complexity of curricular sustainability today. These elements are described briefly, and a further detailed description has to be developed and customized by the users (according to their understanding and significance). At the same time, as the model does not delve into how to quantitatively measure each element, this matter will require future work.

The model establishes three levels of transformation, but these stages are not a progressive guide to be followed. They are an X-ray of possible stages that aim to make educators aware of where their teaching practices are located and how to move forward. The use of the model is easier if users focus on the elements. Each element acts, and should be measured, individually. It may be the case that the curricula of a course or an education program is not in a specific stage, but rather in various positions of the proposed stages, depending on how each element is approached. Therefore, a didactic proposal could have elements at different levels of transformation.

The reform and transformation levels require certain conditions that are not easy to meet or that do not exist in many of the world's educational contexts. That does not mean that the model is utopian since there are an increasing number of examples of good practices in this direction today [97,98].

5.2. Limitations Related to the Understanding and the Application of the Model

Geography teachers need to be familiar with ESD approaches and transformative learning theory in order to understand and use this model. The engagement in transformative learning activities requires time and full involvement, which is a great effort and an extra workload for teachers.

The results from neurobiological investigations carried out by Taylor [41] suggest that emotional discomfort is a prerequisite for transformation. This implies that educators are willing to experiment with liminality and to abandon the emotional comfort zone. Teachers must possess and develop competences for accompanying students in transformative learning processes [33] where a safe learning environment is provided. The examples

provided in the previous section are taking place in ideal conditions, but real conditions can present several issues:

- Transformative learning requires purposeful work and supported action [74]. Educators need to understand that transformative learning can take several forms involving either objective or subjective reframing [99].
- There may be difficulties in establishing internal and external alliances and in creating a partnership [66].
- It is essential to provide a safe learning environment and trustful and meaningful relationships with all the people participating in the project [78].
- The external and internal factors that determine the learning conditions do not always make it possible for the learner to have access to truthful information or to alternative and/or divergent perspectives. It is also necessary that the learner has opportunities to participate and be free from coercion. Thus, the learner will be able to reflect on presuppositions critically [100].
- In the examples, the disorienting dilemma occurs as structured and intended situations. There must be learning situations that are unintended and non-structured [36] that arise from the students' interests.
- Some sort of projects cannot be replicated, and others need long periods of time before they can be repeated. Finding opportunities for transformative learning continuously over the years is a challenge.

5.3. Limitations Regarding the Assessment of Transformative Learning

Learning outcomes in transformative learning are difficult to determine and assess [41]. They can impact on learner's worldview, self, epistemology, ontology, behavior and capacity and they could be measured in terms of depth, breadth, and relative stability [100]. Transformative learning experiences can involve a wide range of didactic approaches (from short activities to complex projects) and they are very personal, unique, iterative and context bound. As a result, the process of changing meaning perspectives can take place suddenly or over a long period of time. Learning outcomes are unpredictable and subjective what adds complexity to their assessment. For this reason, assessment approaches must be based on self-reflection and metacognitive activities. Once the transformation is achieved, it is irreversible and further transformation may follow.

6. Conclusions

The GUNi Report on sustainability in higher education [14] concluded that the introduction of sustainability in education is being slow taking into account the urgency of the situation in which humanity is and the changes that are necessary. This is because it is not having a majority impact on the educational community because there is resistance to changing the status quo and because the solutions that have been provided are conservative and not very imaginative (following the line of what is known). According to Tilbury [14], education and education systems are not understanding the true challenge of sustainability. If education aims to be transformative, first it must profoundly transform itself. It is not about introducing new subjects on sustainable development, nor about making small changes to existing subjects. This implies major changes in the four strategic areas of educational institutions including changes in management, changes in the way of teaching and learning, changes in the way of connecting with the community and, finally, changes in the way in which knowledge is created and investigated. These changes should not be made in isolation but in an integrated way with a holistic vision.

The TSC model is a tool to systematize the levels of transformation in sustainability curricula in Geography education. Its three levels and the structuring elements provide a path to follow and a framework for reflection. It determines what elements constitute a prop for sustainability and how these can guide educators in scaling vertically and horizontally their contribution towards a geographic education that is more sustainable and transformative, should they wish to do so. It is a useful tool to increase the awareness

of the type of transformation that is produced with each action and at every moment. To assess the relevance and success of this model will require future empirical research on its implementation that will measure the real transformative impact.

This proposal has its limitations, since the change in teaching and learning practice, the transformation of curricula and educational institutions entails and depends on many other factors and making a change in the entire system is not always completely in the hands of educators and academics. Leal Filho et al [39] highlight that there is often no adequate institutional support and incentives for those academics and educators willing to transform their courses and integrate sustainability. Sterling [79] uses the iceberg metaphor to remind us that changing teaching practice is just the tip of the iceberg. The great root of unsustainability is the paradigm that must be overcome and that is the great base of the iceberg or the problem. Educators and academics must change to a more holistic and systemic vision [67], which leads us to an ethical change. The paradigmatic change would make people turn towards a sustainable lifestyle and would move them away from an education that prepares people for an economic lifestyle. It would also make political change possible, in which education would go from being seen as a product to being seen as an individual and collective process that has the ability to help people learn continuously throughout life and transform themselves. Educational practice would change its methodology and the way of teaching and relating, taking care of the affective domain, and moving from transmission teaching to participatory, active, and generative learning that produces knowledge and meanings in real life contexts, to design and build the world in the way people want to live in it.

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Appendix A

Table A1. Main interview questions and responses.

Questions	Responses and Suggestions
Is this model a relevant and useful framework for advancing in curricular sustainability today?	It is an interesting tool that helps to advance and raise awareness of the aspects to consider in curricular sustainability, and how to scale one's own contribution. It provides an interesting, complete, and useful systematization.
To what extent are the structuring elements of the TSC model appropriate?	The interviewees proposed separating some elements into parts due to their relevance. This is the case of SD-ESD and context-change.
Are there any missing key elements?	Assessment should be included, at least through the learning element.

Table A1. Cont.

Questions	Responses and Suggestions
Does the characterization and description of each element, and at each of the three levels, help understanding and differentiation?	The characterizations and descriptions of the elements of the model are clear and help to visualize the evolution of each element. When other professionals use the model they will have to provide each element with more content depending on the context.
Is there a correct use of terms and concepts? Which term is the most suitable for our classification?	Terms are used correctly. Use levels or stages and remove scenarios when talking about the evolution in transformation.
To what extent is the use of different theories for each element correct and/or appropriate?	Some theories provide a better framework for one or more elements, while others are only useful for some elements. Therefore, a combination of theories makes sense since the objective of the model is to find guidelines to advance and progress in each domain. It is important to make clear the theoretical references that support each chosen theory.
The progress from one level of transformation to another is complex because it depends on many elements, factors, and circumstances. How can it be solved?	Each element acts individually. Therefore, it has to be measured individually. A didactic proposal could have elements at different levels of transformation.
How can the understanding of the model be improved in a way that facilitates its use among educators and academics?	It would be very useful to provide examples of didactic activities or educational projects that illustrate each level.

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