Transformative learning in the field of sustainability: a systematic literature review (1999-2019)

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Abstract

Purpose – This study aims to investigate how transformative learning has been conceptualised and operationalised in education for sustainable development (ESD) and sustainability learning and to collect evidence on how to support transformative learning in formal and non-formal environments.

Design/methodology/approach – The authors conducted a systematic literature review to provide a structured and replicable search and analysis of the relevant literature to produce a bibliometric overview that combines a quantitative description of the body of literature and qualitative analysis of the learning processes, outcomes and conditions.

Findings – The convergence between transformative learning and sustainability has become an emerging field of inquiry, despite the superficial use of transformative learning theory in many studies. By examining the learning process, outcomes and conditions in the core sample of studies, this study demonstrates that transformative learning theory – if carefully studied – can contribute to the design and implementation of educational interventions and assessments of learning towards sustainability. Furthermore, the sustainability context provides an empirical grounding that highlights the fact that social learning, the role of experience and the development of sustainability competencies are inherently part of transformative learning.

Originality/value – To date, few attempts have been made to better understand how transformative learning theory has been used in sustainability learning and ESD research. This systematic review allows for a better comprehension of how concepts and mechanisms elucidated in transformative learning theory are operationalised in sustainability learning and ESD research and serves as a source of inspiration for those researchers and practitioners who aims to make sustainability education, teaching and learning more transformative.

Keywords sustainability, transformative learning, critical reflection, systematic literature review, education for sustainable development, learning outcomes

Paper type Literature review

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1. Introduction

In the field of sustainability, transformative learning is gaining increasing impetus and recognition and is considered critical to enhancing and catalysing social transformations towards sustainability (Boström *et al.*, 2018). Consequently, the field of education for sustainable development (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 (Balsiger *et al.*, 2017; Sterling *et al.*, 2018). At the same time, transformative learning influenced through many other disciplines (e.g. psychology and sociology) has evolved from an alternative perspective of learning to a learning theory characterised by its diversity of perspectives and discourses (Kitchenham, 2008; Cranton and Taylor, 2012; Hoggan, 2015; Laros *et al.*, 2017). Thus, the question remains as to how transformative learning theory has been used and put into practice in sustainability learning and ESD research, and how research on learning and sustainability can contribute to the further development of the understanding of transformative learning.

To date, few attempts have been made to investigate these questions. By using a systematic literature review (SLR), we aim to close this gap in the literature and provide a reliable account and an accurate overview of how the theory of transformative learning is applied in the sustainability context.

2. Transformative learning theory

Transformative learning evolved from the concept of perspective transformation (Mezirow, 1978) into an established learning theory based on concepts from constructivism as well as humanist and critical social theory (Cranton and Taylor, 2012; Tisdell, 2012). Transformative learning can thus be defined as:

> [. . .] learning that transforms problematic frames of reference – sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets) – to make them more inclusive, discriminating, open, reflective, and emotionally able to change (Mezirow, 2003, p. 58).

Mezirow (1981) also described some key characteristics of such learning by focusing on learning processes (how people learn), outcomes (what they learn) and conditions (how to best support their learning). In this paper, we will refer to the above definition of transformative learning and use its structure of learning processes, outcomes and conditions for the exploration of the data.

2.1 Process of transformative learning

Based on Mezirow's ten stages of transformative learning (Mezirow, 1994), the learning process encompasses a series of elements that are evolving, recursive and spiral in nature (Taylor, 1997). Prior learning is considered to be the accumulation of interpreted experiences in meaning structures or frames of reference, which "selectively shape and delimit expectations, perceptions, cognition, and feelings. They set our 'line of action'" (Mezirow, 1997, p. 5). These structures are the result of a dynamic adaptation of human needs to the cultural and economic conditions of a society in a given historical period (Fromm, 1941). Situations in which meaning structures are challenged to the extent that they are no longer useful to fit the interpretation of some experiences are captured as *disorienting dilemmas*. A personal life crisis can trigger these disorienting dilemmas, or they can come from a series of circumstantial events (Laros, 2017).

A further element focuses on the act used to critically analyse an individual's unexamined meaning structures and how these structures were constructed when someone

tries to render meaning from a disorienting dilemma (Mezirow, 1998). This *critical reflection* can be differentiated according to its object of content, process and premise (Lundgren and Poell, 2016); moreover, it is also possible to distinguish whether the subject includes only the premises of the external world or also her/his own premises, the latter case being an example of critical self-reflection (Mezirow, 1981, 1998). Discourse is described as a:

> [. . .] special kind of dialogue in which we focus on content and attempt to justify beliefs by giving and defending reason and by examining the evidence for and against competing viewpoints (Mezirow, 1994, p. 225).

Discourse occurs as a dialogue between at least two people and is triggered and enhanced through critical and critical self-reflection reflection.

Finally, transformative learning is not merely an intellectual process, and individuals cannot remain in the pure reflection phase. They have to show *action engagement* by negotiating or exploring new relationships or roles, planning a course of action, testing solutions and integrating these solutions into their lives (Calleja, 2014).

2.2 Learning outcomes in transformative learning

The term "learning outcomes" refers to what learners are capable of doing and thinking by the end of the learning period after having been embedded in disciplinary and professional contexts (Caspersen *et al.*, 2014) – that is, it refers to the results of the learning process. In the case of transformative learning, learning outcomes are difficult to be determined as many learning experiences tend to be labelled as transformative (Hoggan, 2016). On the one hand, learning outcomes from transformative learning processes have been categorised and classified according to Mezirow's (1981) domains of learning framework (instrumental, communicative and transformative/emancipatory). On the other hand, Hoggan (2016) created a typology in which changes in an individual's worldview, epistemology, self, ontology, behaviour and capacity are the most common learning outcomes from transformative learning endeavours and introduced criteria of breadth, depth and relative stability to differentiate among these outcomes.

To identify and determine when transformative learning happens, researchers have reviewed ways to evaluate transformative learning outcomes in both research and practice (Cranton and Hoggan, 2012; Romano, 2018). They have analysed qualitative instruments such as observations, checklists, journals, interviews, self-evaluation and narratives, and quantitative ones such as surveys and questionnaires [e.g. the Learning Activity Survey (King, 2009), the Critical Reflection Questionnaire (Kember *et al.*, 2000) and Transformative Learning Survey (Stuckey *et al.*, 2013)].

2.3 Learning conditions

The learning conditions in transformative learning originally appeared as ideal conditions of discourse (Mezirow, 1991). Although these conditions are challenging to achieve in reality, Mezirow (1994) stated that a learner should have the capacity to evaluate arguments objectively, opportunities to participate, accurate information, and should also be open to alternative perspectives, free from coercion and able to reflect on presuppositions critically. Nonetheless, these ideal conditions of discourse overlap with the different phases of transformative learning and their potential learning outcomes, thereby rendering an analysis of the impact of the learning conditions in the whole learning process rather difficult. Further research in transformative learning has found more concrete conditions for transformative learning including learning environments with meaningful relationships, partner facilitation, purposeful work and supported action (Franz, 2005, 2010; Southern, 2007). In the present paper, we define learning conditions as the set of external and internal

factors, such as partner facilitation and openness to alternative perspectives, respectively, that influence the learner's capacity to engage in a learning situation.

2.4 Transformative learning and sustainability

Conceptualisations of transformative learning encompass different individual and social purposes, such as autonomy, individuation, empowerment, ecological consciousness, social action, citizenship and democracy (Mezirow, 1997, 2003; Cranton and King, 2003), and are applied in a diversity of contexts (Taylor, 2009). Research on transformative learning can be seen in many areas ranging from personal transformation to organisational change and includes (but is not limited to) intercultural learning, participatory processes, lifestyle, educational settings and social and community transformation (Taylor, 1997; Mezirow and Taylor, 2009).

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 appealing to ESD and sustainability learning. ESD is considered to have a robust transformative approach as it seeks -contrary to to other instrumental approaches- to empower individuals by encouraging them to critique status-quo values and social norms and to adopt sustainable principles and ethics by addressing unsustainable practices (Barth and Michelsen, 2013; Barth, 2015; Schneidewind *et al.*, 2016). However, while the discourse around transformative learning offers a rich diversity of perspectives (e.g. planetary, race-centric and cultural-spiritual) (Taylor, 2008), the term "transformative" has simultaneously taken on a looser meaning because it is often used to tag any learning experience (Tisdell, 2012). This looseness has affected the understanding and practice of transformative learning in sustainability learning and the field of ESD. Although there is only one review in the area of participatory processes of resources and environmental management (Diduck *et al.*, 2012), there is no general systematic link between transformative learning and sustainability and ESD. We, therefore, investigated the extent to which transformative learning has been conceptualised and operationalised in ESD and sustainability learning and collected evidence on how to support transformative learning in these scenarios.

3. Methods

To better understand the relationship between transformative learning and sustainability, a SLR was carried out on all peer-reviewed articles available in English that focus explicitly on transformative learning and sustainability. Systematic reviews represent a typical method of mapping the field and tracing recent developments in both educational science (Petticrew *et al.*, 2013) and sustainability science (Spangenberg, 2011) and have become a systematic method of investigation in their own right (Light and Pillemer, 1984; Littell *et al.*, 2008) [see Foster and Hammersley (1998) for a meta-review].

In the present study, we followed the systematic review approach outlined in Fink (2014) to provide a systematic and replicable search and analysis strategy that is fully documented and transparent. Our steps include:

- data collection;
- data processing and coding; and
- data analysis, which yielded a bibliometric overview that combines a quantitative and qualitative analysis of the learning process, outcomes and conditions.

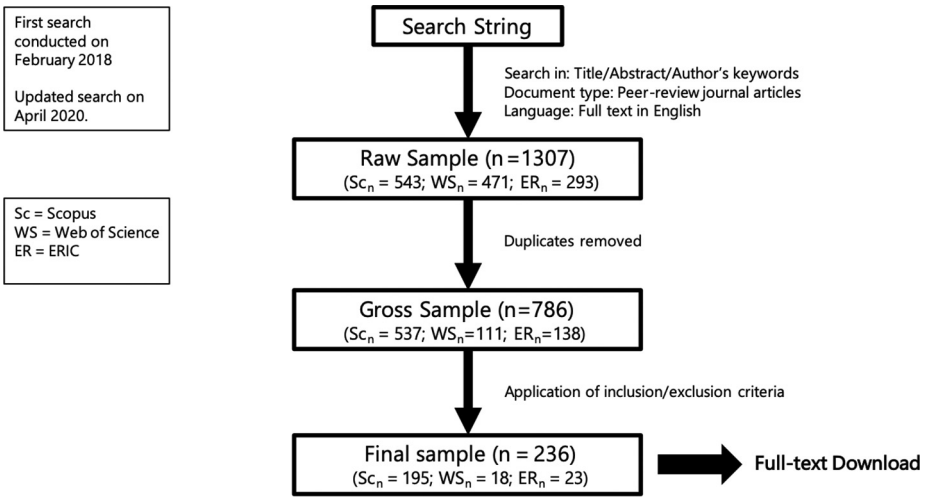

Figure 1.
Data collection procedure

3.1 Data collection

To provide a complete possible sample universe, we searched three databases (Scopus, Web of Science and ERIC) that broadly cover the social sciences and educational science, specifically. A literature search was conducted using the following search string:

(transformational OR transformative) AND (learning OR education*) AND ("sustainable development" OR sustainability).

Even though each database has different interfaces, settings and search engines, we applied the search string to all of them with the following initial settings (Figure 1): peer-review journal publications (article, review and article in press) and full text in English. The period of this research comprised all years until 2019.

We obtained a raw data set from each database consisting of 1,307 publications, which included numerous duplicates as the databases feature significant overlap. After eliminating duplicates, we retrieved a gross sample of 786 publications. The gross sample then went through an initial screening process with predefined criteria for inclusion and exclusion to ensure that the articles focused explicitly on transformative learning and sustainability. The inclusion criteria were papers, which either in their title, abstract or keywords, contained the terms of:

- "transformative/transformational learning/education"; and
- "sustainable development" or "sustainability" explicitly.

Some variations of these criteria included terms such as "transformative social learning" and "transformational sustainability education". This procedure led to a final sample of 236 articles, another 10 of which were removed because they did not meet the inclusion and exclusion criteria after full text screening.

3.2 Data processing and coding

The general research question was: What is the contribution of transformative learning theory in sustainability learning and ESD research, and vice versa? To answer this question, two specific research questions were posed (Table 1). *RQ1* allowed for a better

understanding of the types of articles in our sample universe and was a precondition for the subsequent in-detail analysis in *RQ2*.

For the analysis, a database was created out of the sample universe (n = 226) that included all available bibliographic data, the abstract and the full text. Additional variables were added to capture better the nature of the contributions (e.g. research area and application of transformative learning theory). Coding was done iteratively by screening the abstracts and then the full papers with an inductive coding approach, using Citavi 6 and Microsoft Excel software. Descriptors for each variable were assigned throughout the coding process and clustered according to patterns of similarity.

While the full sample universe in this way was captured for descriptive analysis, full text analysis was then carried out with the core sample of papers in which transformative learning theory is used in the argumentation, or it functions as the main framework (Table 3). These papers were coded qualitatively using MAXQDA as qualitative data analysis software. In an iterative coding process, the *a priori* established concepts of prior learning, disorienting dilemma, critical reflection, discourse and action engagement (Table 1) were applied to the full text body, and relevant themes were coded accordingly (Saldaña, 2013).

4. Findings

4.1 Understanding the sample universe

Transformative learning theory played a minor role in sustainability learning and ESD research from 1999 (the earliest year of articles published according to the search string and the databases used) to 2007, with less than five publications per year. From 2008 onwards, articles examining transformative learning theory and sustainability learning and ESD research began to increase, with an average of 18 publications per year (standard deviation = 11.7), and

Table 1. Research questions and elements of analysis for the SLR

Research question	Specific elements of analysis	*A priori* categories
RQ1: How has transformative learning been utilised in sustainability learning and ESD research?	Specific research areas	–
	Theoretical use of transformative learning	–
RQ2: How has transformative learning theory been operationalised in sustainability learning and ESD research?	Learning processes	Prior learning, disorienting dilemma, critical reflection, discourse and action engagement
	Learning outcomes	–
	Learning conditions	–

Table 2. Specific research areas in the field of transformative learning and sustainability

Research area	*N*	(%)
Higher education in general	88	39
Teachers education	24	10.5
Other formal learning	16	7
Non-formal and informal learning	58	25.5
Policy and guidelines	40	18
Total	226	100

reached its peak in 2019, with 41 published articles (see the link in the Appendix for the set of references within the sample universe).

The sample universe itself constitutes a heterogeneous field of articles on transformative learning and sustainability. Within the sample universe, we identified five distinctive research areas, as outlined in Table 2. A research area illustrates a domain in which a common topical focus best describes the various papers. Because of space constraints, all the citations provided henceforth in this section are only indicative, that is, they are only examples of articles.

The first research area – *higher education in general* – covers all contributions at the university level in either undergraduate or graduate programmes. Articles focus on the role of the curriculum (Winter *et al.*, 2015), teaching and learning in different settings (such as interdisciplinary environments; Noy *et al.*, 2017), field studies (Owens *et al.*, 2015) and study-abroad programmes (Ritz, 2011; Bell *et al.*, 2016). The second research area – *teacher education* – includes research on educational programs for teachers as such, as well as on the role of (pre-service) teachers as societal agents of change for transformative learning and sustainability (Iliško, 2007; Kostoulas-Makrakis, 2010). As teacher education played a significant unique role in a large body of research and as it also spans from pre-service education to in-service training, we singled out this area from *higher education in general*. *Other formal learning* refers to transformative learning and sustainability in settings other than higher education, such as K-12 (Goulah, 2011), for which the topics of ESD and curriculum figure prominently (E. Dyment *et al.*, 2015).

In contrast to formal learning, a fourth research area focuses on *non-formal and informal learning*. This area encompasses research in learning environments that are not directly linked to educational institutions and formal programs. Research in this area predominantly covers how learning processes unfold in experiences of public participation, such as in resources and environmental management (Diduck *et al.*, 2012), sustainable tourism (Coghlan and Gooch, 2011) and intercultural exchange (Lloyd *et al.*, 2015). The fifth and final research area – *policy and guidelines* – encompasses mostly conceptual elaborations on policy and general discourses on education and their links to ESD (Bell, 2016; Mochizuki, 2016), sometimes including more radical and novel perspectives (de Angelis, 2018; Lange, 2018) related to policy implications of specific topics, such as the role of technology education in ESD (Pavlova, 2013).

A closer examination of the role that transformative learning theory plays in the sample universe allowed us to further distinguish between publications. By analysing the understanding of the concept of transformative learning in the sample universe, we could cluster four different groups, as outlined in Table 3.

The first group – *buzzword* – (approximately one-third of the final sample) comprises articles that display an imprecise use of the term "transformative learning" by either not defining it at all or describing it superficially without direct bibliographic references to transformative learning theory. Almost 30% of the articles in this group have

Table 3. Classification of the sample universe according to the theoretical use of transformative learning

Research area	*N*	(%)
Buzzword	76	33.5
Supportive framework	52	23
Alternative approaches	15	6.5
Central framework	83	37
Total	226	100

transformative learning as a keyword and include highly cited articles that are relevant to the field of ESD (Wiek *et al.*, 2011).

The second group – *supportive framework* – is defined by articles that explicitly refer to transformative learning theory or some of its elements yet do not feature it as a central part of the narrative of the articles' main argument. Instead, transformative learning in these articles is part of the theoretical foundations of broader models, such as the INDICARE model (Disterheft *et al.*, 2016), or it serves to strengthen the theoretical rationale for different topics, such as innovative pedagogical models in ESD (Thomas, 2009).

In the third group – *alternative approaches* – the concept of transformative education is conceptualised as an approach opposite that of a transmissive approach in ESD, the latter having a more instrumental view (Lu and Zhang, 2014; Mogren and Gericke, 2017) that highlights the more radical and critical features of the former (Bell, 2016). This conceptualisation represents a different understanding than that of the classical stream of transformative learning (i.e. Mezirow and colleagues); however, links and similarities are used to underpin the authors' arguments.

The fourth and most significant group (with 37% of all contributions in this classification) is the *central framework*, in which transformative learning is the leading theory in the argumentation or the main framework of the article. Of the papers in this group, 73% are empirical and were framed either as qualitative case studies or as intervention studies in which some sort of change in the learner is the goal, sometimes supported by a specific instructional design.

4.2 Analysis of the core sample

In our further analysis, we focused on the group of key articles that used transformative learning as a *central framework*. Insights from these articles can be structured according to their description and explanation of the learning process, learning outcomes and relevant learning conditions. The themes that emerged from the analysis of the data (*a posteriori*) are compiled below (Table 4).

4.2.1 Learning process.

4.2.1.1 Prior learning. While only a few articles explicitly investigated the learners' prior perspectives and worldviews, the majority mentioned prior learning as part of learners' general background and sustainability-related experiences and thus as a general precondition for transformative learning. Learners' general background refers to expertise in a specific field or discipline and past experiences regarding the performance of specific tasks and socio-cultural interactions during educational interventions (Ritz, 2011; Lloyd *et al.*, 2015; Kalsoom and Khanam, 2017; Sims, 2017). Sustainability-related experiences encompass learners' previous related knowledge from a formal academic background or their work experience as manifested in conceptual literacy or practical skills (Bell *et al.*, 2016; Piasentin and Roberts, 2017; Cottafava *et al.*, 2019). Moreover, individuals sometimes bring along predispositions, expectations and attitudes for a change in sustainability because of their differing life experiences (Kerton and Sinclair, 2010; Burns, 2016).

4.2.1.2 Disorienting dilemma. In the reviewed articles, disorienting dilemmas can occur in three different ways:

(1) *Non-structured and unintended situations*: The disorienting dilemma is not contrived by the educator but occurs naturally. For instance, individuals may face an existential conflict or a difficult moral decision (Ball, 1999; Lange, 2004; Kerton and Sinclair, 2010), or they may have experienced socio-ecological problems in their own or foreign communities (Marschke and Sinclair, 2009; Quinn and Sinclair, 2016; Quang *et al.*, 2019).

Elements of analysis	*A priori* categories		*A posteriori* themes	
Learning process	Prior learning		Learners' general background	
			Sustainability-related experiences	
			Predispositions and expectations	
	Disorienting dilemma		Non-structured and unintended situations	Facing existential conflicts or moral decisions
				Having suffered socio-ecological problems in the past
			Structured and unintended situations	Entering new learning environments
				Forming new social relations
			Structured and intended situations	Presenting contrasting information
				Raising critical questions
				Designing educational programmes abroad
				Exposing students to unfamiliar methodologies
	Critical reflection	On content	Information, values and norms	
			Teaching practices	
			Resource management practices	
		On process	Participation in individual or group activities	
			Assessment of own performance and understanding	
		On premise	Thoughts, beliefs, attitudes, actions and behaviours in the context of:	
			Higher education	
			Teacher education	
			Environmental and resources management	
			Intercultural exchange	
	Discourse		Sharing of sustainability-related knowledge and practices	
			Commenting experiences of participation in community activities	
			Challenging others' assumptions	
			Making meaning together	
	Action		Adoption of sustainable behaviours	
			Development of new habits	
			Formulation of new plans of actions	
			Participation in decision-making	
			Initiation of group activities	
			Creation of community-based organisation	
Learning outcomes			Increase of new knowledge and practical skills	
			Reconstruction of values, norms and perspectives	
			Increase in the sense of, self-awareness, agency and empowerment	
			Development of critical, systems and complex thinking	
			Social learning (reinforcement of social relationships, social mobilisation and activism)	
Learning conditions			Power relations	
			Time and space for reflection and discourse	
			Social interaction among learners	
			Educational experiences beyond formal settings	
			Readiness and openness for a transformative experience	

Table 4.
Summary of themes found in the core sample

(2) *Structured and unintended situations*: They refer to planned learning activities in which the educators do not deliberatively trigger a dilemma but – because of the nature of the activity – the learners nevertheless experience such a dilemma. Examples include new learning environments – such as interdisciplinary settings

(Kokkarinen and Cotgrave, 2013; Noy *et al.*, 2017) – or learners being asked to participate in change processes and establish new social relations (Burns, 2016; Chao, 2017; Yeo and Yoo, 2019).

(3) *Structured and intended situations*: They refer to cases in which the disorienting dilemma is planned and induced deliberatively during educational interventions to challenge learners' frames of reference by either presenting contrasting information (Davis and Boulet, 2016; Piasentin and Roberts, 2017), raising critical questions (Kostoulas-Makrakis, 2010), designing educational programmes abroad (Bell *et al.*, 2016) or exposing students to unfamiliar assessment methodologies (Saravanamuthu, 2015).

4.2.1.3 Critical reflection. Three different types of reflections mentioned in the theoretical framework section could be identified. *Reflection on content* encompasses the analysis of information, concepts, values and norms (Sims and Sinclair, 2008; Quinn and Sinclair, 2016) or individuals' practices in teaching (Kostoulas-Makrakis, 2010) or resource management (Bull, 2013; Lankester, 2013). It also covers reflection on relationships within and among organisations and communities (Walker *et al.*, 2014; Young and Karme, 2015). *Reflection on process* refers to assessing the way learning experiences unfold. Examples include situations in which learners reflect on their participation in a particular individual or group activity (Wahr *et al.*, 2013; Chao, 2017) that involved a form of assessment of their performance and understanding (Quinn and Sinclair, 2016; Piasentin and Roberts, 2017). Finally, *reflection on premise* is the deepest level of reflection and occurs when learners assess the assumptions that underlie their thoughts, beliefs, attitudes, actions and behaviours in the context of higher education (Brunnquell *et al.*, 2015), teacher education (Feriver *et al.*, 2016), resource and environmental management (Sims, 2012) and intercultural exchange (Ritz, 2011; Young and Karme, 2015).

4.2.1.4 Discourse. Some authors refer to the stage of discourse as a process of sharing knowledge and practices related to sustainability (Sims, 2012; Lankester, 2013) or experiences of participation in a community activity (Chao, 2017). Discourse is also shaped in processes of conflict and problem resolution in which challenging others' assumptions and beliefs and meaning-making together form the key features that transcend the simple process of sharing information (Iliško, 2007; Vanasupa *et al.*, 2014; Davis and Boulet, 2016). An interesting example of the above is the conceptual tool of "making (non) sense" developed and applied by James (2019) in a South African urban context.

4.2.1.5 Action engagement. The transformation process is sometimes followed by adopting sustainable behaviours as part of designed experiments (Bentz and O'Brien, 2019) or implementing new behaviours that are consistent with the insights acquired in transformation experiences. These experiences include the development of new individual habits (Bell *et al.*, 2016) or to the formulation of new plans of action in the context of teaching (Kostoulas-Makrakis, 2010) and community-resource management (Marschke and Sinclair, 2009). Action takes place not only individually but also in groups of learners who engage in social action by participating in decision-making processes (Sims, 2017), initiating group activities to raise critical awareness regarding sustainability issues (Kerton and Sinclair, 2010; Quinn and Sinclair, 2016) or creating community-based organisations (Westoby and Lyons, 2017).

4.2.2 Learning outcomes. The most prominent learning outcome is the *increase of new knowledge and practical skills* linked to sustainability-related issues, which range from the understanding of concepts and technical information to the ability to implement environmental management practices (Diduck and Mitchell, 2003; Sims and Sinclair, 2008; Chao, 2017; Phuong *et al.*, 2019). Reflection and the *reconstruction of values, norms and*

perspectives represent another learning outcome in which learners become more empathetic and compassionate (Young and Karme, 2015), move away from self-interest to more collective concerns (Sims, 2012), give more importance to environmental resources and social justice (Moyer *et al.*, 2016) and sometimes gain a sense of unity and interconnectedness with their natural and social surroundings (de Angelis, 2019). The latter is also related to changes in life perspectives and worldviews (Feriver *et al.*, 2016; Papenfuss and Merritt, 2019).

Learners also experience self-awareness (Papenfuss and Merritt, 2019), gain personal confidence and develop a more integrated identity, which increases their sense of *agency and empowerment*, as manifested by a willingness to make a change in their communities, promoting sustainable actions (Iliško, 2007; Bell *et al.*, 2016; Piasentin and Roberts, 2017; Probst *et al.*, 2019), expressing feelings of responsibility towards climate change (Bentz and O'Brien, 2019), assuming active roles in communal and management activities and communicating change (Bull, 2013; Davis and Boulet, 2016; Sims, 2017). This sense of agency and empowerment is also complemented by the acquisition and improvement of different managerial related skills, such as business modelling, leadership and design thinking (Cottafava *et al.*, 2019).

A fourth learning outcome is the development of *critical, systems and complex thinking*, through which learners can see the interconnectivity of cultural, economic, social and environmental systems (Kostoulas-Makrakis, 2010; Kalsoom and Khanam, 2017) and thus comprehend the interdisciplinary nature of sustainability problems (Piasentin and Roberts, 2017). Learners are also able to recognise everyday situations, such as contested social constructs under the influence of power structures (Iliško, 2007). Finally, *social learning* outcomes throughout this review manifest in the reinforcement of social relationships within and among groups and organisations (Ritz, 2011; Bull, 2013; Westoby and Lyons, 2017; Quang *et al.*, 2019). These outcomes also refer to social and political action, such as social mobilisation and activism (Diduck and Mitchell, 2003; Marschke and Sinclair, 2009), in which individuals become part of community-based environmental organisations (Lange, 2004; Sims, 2017) or initiate projects to promote sustainable consumption in their communities (Sims and Sinclair, 2008; Moyer *et al.*, 2016).

4.2.3 Learning conditions. Among external conditions, *power relations* are reported as a crucial factor in management and decision-making processes in which participation processes are controlled by influential external stake holders who limit proper access to information and constrain opportunities for participation, thereby triggering a sense of futility and a lack of agency among the public (Diduck and Mitchell, 2003; Walker *et al.*, 2014).

One of the most often-mentioned conditions for fruitful transformative learning processes is providing *time and space for reflection and discourse*. Through this process, learners can express their emotions, narratives and thoughts freely and ultimately reflect upon their beliefs and assumptions via anything small, informal, genuine conversations to formal and structured gatherings (Ritz, 2011). As part of the transformative learning process, *social interaction among learners* is of rather importance – especially for the stages of discourse and action – as it enhances the understanding of the self and others (Lankester, 2013; Westoby and Lyons, 2017). Furthermore, this social interaction also manifests in the creation of a supportive social environment for learners, where they can feel safe and trustful, such as peer-, network- and community-based support to cope with disorienting dilemmas (Sims, 2012; Saravanamuthu, 2015).

Educational experiences beyond the formal settings are reported as being valuable to the transformative learning process and include activities in nature (Blake *et al.*, 2013) and study-abroad programmes (Ritz, 2011; Winter *et al.*, 2015; Bell *et al.*, 2016). Similarly, hands-on experiences have been able to leverage the transformative learning process by enabling learners to experiment with

sustainable behaviours and art projects (Bentz and O'Brien, 2019), or to implement ecological-related techniques and resource management plans (Burns, 2016; Sims, 2017).

The primary reported internal factor is that learners display *readiness and openness for a transformative experience* (Ball, 1999; Lange, 2004). This predisposition has multiple manifestations: excitement at taking part in new and challenging educational experiences (Blake *et al.*, 2013), a willingness to be an active part of management and decision-making processes (Sinclair *et al.*, 2013) and an interest in experiencing alternative tourism activities (Lloyd *et al.*, 2015; Chao, 2017). Another manifestation is that, before the learning experience, individuals have already changed their frames of reference to contribute to sustainability both individually and socially (Kerton and Sinclair, 2010; Lankester, 2013).

5. Discussion

The field of transformative learning theory in sustainability learning and ESD research has become an emerging field of inquiry, as demonstrated by the growing number of publications over time – a common trend in numerous areas of research not only in sustainability and ESD (Barth *et al.*, 2016; Figueiró and Raufflet, 2015; Aikens *et al.*, 2016) but also in adult learning and transformative education (Lange and O'Neil, 2018). Within this body of literature, several distinctive features of how transformative learning theory is used can be found.

Firstly, our findings indicate that transformative learning has become an attractive theory that is used in the field of sustainability but is far too often implemented without a critical exploration of the underlying theory. Transformative learning was a buzzword and a catchphrase among many publications in the review – a phenomenon that is also evident for other concepts, such as social learning (Reed *et al.*, 2010). There are at least three possible explanations for this occurrence:

(1) the term "transformation" is widely used in the sustainability discourse without further systemic characterisation, which renders it a buzzword for any process by which any change takes place (Feola, 2015; Few *et al.*, 2017);

(2) as a result of the influence of other disciplines (e.g. psychology), transformative learning is used as an adjective to tag different human experiences, thereby rendering the term meaningless (Tisdell, 2012); and

(3) many different perspectives and discourses have emerged within transformative learning, thus leading to a fragmentation of the theory rather than its unification (Cranton and Taylor, 2012).

Secondly, the findings of this review reveal that researchers identify a broad spectrum of potential learning outcomes for transformative learning; however, what often remains somewhat unclear and unspecified is whether transformative learning represents a learning outcome in itself or a means of achieving cognitive and non-cognitive outcomes to enable transformative actions. Moreover, the different frameworks reported in the literature to classify transformative learning outcomes (Sipos *et al.*, 2008; Diduck *et al.*, 2012) do not address this issue. The complexity of this problem could lay in the unpredictability and subjectivity of the outcomes of such life-changing experiences as well as the methodical and ethical implications in evaluating them. Nonetheless, recent efforts in evaluating transformative learning outcomes and levels of reflection through surveys and questionnaires were found in this review (Papenfuss and Merritt, 2019; Probst *et al.*, 2019; Brunstein *et al.*, 2019).

Thirdly, this review makes self-evident that transformative learning shares common elements to both experiential and social learning (Kolb and Kolb, 2005). From the experiential learning cycle, concrete experience and active experimentation figure

prominently in the results from this review, as exemplified by situations in which learners have hands-on experiences or are in contact with the natural environment or experiment with specific techniques to solve environmental problems. However, these activities also involve engagement in social interaction, reflection and dialogue in the form of discourse and thereby complete the experiential learning cycle: abstract conceptualisation and reflective observation. Furthermore, transformative learning involves two distinctive elements in social learning, as highlighted by Barth *et al.* (2017):

(1) social learning as the social environment that surrounds the learning process or learning that occurs via social interaction; and

(2) social learning as a learning outcome of a group, community or society.

Several times during this review, social learning as social interaction and as a learning outcome was identified: the social interaction component was seen in the transformative learning process, especially in discourse and action engagement, and social learning as an outcome was visible in non-formal and informal learning, especially in the context of environmental and resource management. Therefore, although transformative learning theory has received critiques of focusing solely on individual change rather than on social change (Hoggan, 2015), individual transformative learning increases the likelihood of social change (Quang *et al.*, 2019) within, among and beyond communities and organisations, sometimes even involving political action towards sustainability.

Finally, systems-thinking competencies, as well as normative and interpersonal competencies (Wiek *et al.*, 2011), can be related to the learning outcomes identified in this review. As an analytical meta theory (Hoggan, 2015), transformative learning can provide valuable insights into the process of developing these competencies. The development of each competency can be conceptualised as a transformative learning journey that involves several disorienting situations that require critical (self-) reflection efforts and that are put into practice through action engagement.

What can we learn from this review? Transformative learning holds valuable insights into informing and supporting the design and implementation of learning and educational interventions for sustainability. In ESD literature, the need for reorienting pedagogical practices from the "conventional" ones is repeatedly emphasised when seeking impactful learning outcomes both individually and socially. There are a variety of pedagogical efforts to accomplish this goal, from specific approaches, such as problems and project-based learning (Brundiers and Wiek, 2013) and art methods (Bentz and O'Brien, 2019; Walshe and Tait, 2019), to broad settings, such as interdisciplinary and intercultural learning environments (van Dam-Mieras *et al.*, 2008); nonetheless, the introduction of these methods and settings can provoke unexpected dilemmas. Hence, it is essential to consider both the disorienting dilemmas that can emerge during the learning interventions (whether they are planned as transformative or not) and the prior learning of individuals before embarking on these processes. Moreover, the normative orientation and inherent emotional charge in environmental and sustainability issues are also drivers of disorienting situations. The findings reveal the importance of planning these educational interventions to create supportive learning conditions such as those identified in the review (e.g. power relations, time and space for reflection and discourse, social interaction and support; see findings section). The most important precondition for coping with disorienting situations is to have the proper social support mechanism without precluding the triggering of learning. Additionally, the review highlighted the importance of being aware of individuals' readiness and openness to change and to learn, especially in the designing of the disorienting dilemmas, as not all individuals are ready to participate in these learning events.

6. Concluding remarks

The field of transformative learning and sustainability will continue to grow as researchers and practitioners in the field are searching for more transformative approaches to find better ways to promote sustainability transformation through learning and education. This systematic review allows for a better understanding of how the concepts and mechanisms explicated in transformative learning theory are used in sustainability learning and ESD research. We acknowledge the limitations of this paper regarding the inclusion of all core sample articles in the findings and discussion section, the depth of the discussion of the categories and themes presented, and a detailed elaboration of some elements and perspectives present in transformative learning theory. We consider our work to be exploratory and to serve as a point of departure for debates in the field. Our intention with this review is to set a point of reference from which potential articles that we might have missed (as well as future articles) can be integrated into the sample universe.

We found with this review that transformative learning theory has been used extensively in sustainability learning and ESD research, yet there is considerable superficial use of it. With the majority of studies concentrated in the *higher education in general* area, transformative learning in sustainability has become an emergent field of inquiry, supporting theoretical production as well as teaching and learning practices towards sustainability. Moreover, by examining the learning process, outcomes and conditions in the core sample of articles, we demonstrated that transformative learning – if carefully studied – could contribute to the design and implementation of the assessment of learning as well as to educational interventions towards sustainability. Furthermore, research on sustainability learning has contributed significantly to the further development of transformative learning theory. The sustainability context provides an empirical grounding that helps to highlight the fact that social learning, the role of experience and the competencies for sustainability are inherently part of transformative learning. Moreover, approaches in the assessment of learning outcomes in the field of ESD can contribute to completing and strengthening the evaluation methods of transformative learning.

Even though there is no direct impact in practice with this review, it serves as an organised literature source to support further knowledge in the field of transformative learning theory and sustainability. Especially for those dabbling in the field, both practitioners and researchers, this paper contains essential literature references to transformative learning theory and references of its application in sustainability-related contexts. Future research in transformative sustainability learning would be wise to note that more empirical research is needed in the areas of teacher education and formal learning other than in higher education. Finally, there is a need for better methods and tools that can provide insights into the processes and outcomes of transformative sustainability learning.

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Appendix

Set of publications of the sample universe (n = 226) organised according to the theoretical use of transformative learning (see Table 3).

Link: www.researchgate.net/publication/335920777_Appendix_-_Final_sample_of_articles_collected_in_a_systematic_literature_review_published_in_Rodriguez-Aboytes_and_Barth_2020_submitted_Transformative_learning_in_the_field_of_sustainability_A_systema

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