

Educational Research for Social Change (ERSC)**Volume: 5 No. 1, April 2016****pp. 107-130****ersc.nmmu.ac.za****ISSN: 2221-4070****Emergence of Environment and Sustainability Education (ESE) in Teacher Education Contexts in Southern Africa: A Common Good Concern***Caleb Mandikonza and Heila Lotz-Sisitka**Rhodes University Environmental Learning Research Centre, South Africa**calebmandikonza@gmail.com & h.lotz-sisitka@ru.ac.za***Abstract**

Environmental and sustainability issues prevail in modern society. Southern Africa, where this study is based, is one of the regions most at risk from intersecting issues of climate health risk, and poverty-related ills. Education has the potential to facilitate catalytic transformation of society through development of understandings of these intersecting environment and sustainability concerns, and to support engagements in more sustainable social practices oriented towards the common good. This requires a rethinking of education within a wider common good frame. It also has implications for how quality education is considered. However, little is said of how this could be done, especially in teacher education. The paper shares two cases of teacher educators' change project experiences, as they emerged via professional development support and the mediatory processes applied in courses conducted by the Southern African Development Community Regional Environmental Education Programme (SADC REEP) aimed at enhancing professional capacity of teacher educators and other environmental educators for mainstreaming environment and sustainability education (ESE)¹. These courses are framed using a change project approach, and involve teacher educators as main participants. In-depth data were generated from interviews with two teacher educators, their assignment write-ups, and observations of their teacher education practice. Realist social theory, particularly the principle of emergence, was used to trace the emergence of change in teacher education practice. Sociocultural learning theory was used to explain mediation of learning-oriented changes in teacher education practice. We illustrate how the change project model and approach contributed to mediating change in practice, showing emergent attributes of capacity for mainstreaming ESE and elements of a concept of quality education among course participants oriented towards the common good. In conclusion, we argue that ESE seems to be a sensitising construct for initiating and sustaining change for ESE in teacher education. In addition, the change project has proved to be a potential vehicle for mainstreaming the notion and practice of ESE into social systems and teacher education

¹ In this paper we use the term, environment and sustainability education (ESE), to indicate that it includes an emphasis on environmental education (EE), and education for sustainable development (ESD). ESE, as used in this paper, includes a strong focus on the interrelated nature of environmental, societal, political, and economic concerns, and the way in which this term is used is oriented towards the wider common good.

practices. We argue that reflexive ESE praxis provides a sensitising focus, initiating quality education with humanising properties necessary for the common good.

Key words: environment and sustainability issues, mediation, emergent properties, the common good, education for sustainable development

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Introduction

Environmental and sustainability issues prevail in modern society. It is widely documented that southern Africa is one of the regions most at risk from climate change and ongoing environmental degradation (Southern African Regional Universities Association [SARUA], 2014), a situation and vulnerability exacerbated by intersecting concerns such as health-, economic system-, and poverty-related ills (Intergovernmental Panel on Climate Change [IPCC], 2014).

Environment and sustainability concerns in southern Africa and elsewhere have a long history. They emerged via industrial and agricultural revolutions that, despite bringing forms of progress, were also responsible for reprehensible colonial intrusions, creating substantive degradation of the natural environment. This has led present-day scientists to suggest that the earth systems and their functioning are being fundamentally altered by human activity, ushering in a completely new geological epoch: the Anthropocene (Steffen, et al., 2015). The rise of modernity and colonial intrusion patterns have also fundamentally transformed the social and cultural fabric of societies around the world, including in southern Africa, as the model of societal development became homogenised in the image of the West and the modern marketplace (De Sousa Santos, 2014).

From a recent policy perspective, *United Nations Educational, Scientific and Cultural Organization* (UNESCO)'s *Education 2030* agenda (UNESCO, 2015b), which also forms the foundation of Goal 4 of the sustainable development global goals (Global Goals, 2015; UNESCO, 2015a), foregrounds the need to integrate sustainability and global citizenship concerns into education in ways oriented towards the common good. UNESCO (2015b) argued that inclusion of sustainability concerns into education at all levels should be seen as a core dynamic of what counts as quality education. The argument is that education is likely to lack contemporary relevance if such concerns are not included. UNESCO subsequently prioritises teacher education and the professional development of educators in its Global Action Programme on Education for Sustainable Development (UNESCO, 2014c)—an integral part of the Education 2030 framework. Although teacher education and academic professional development of educators are distinct notions, we worked with both as we focused on the professional development of teacher educators who are integrating ESE into their practice via a reflexive change project process, linking the professional development course to teacher education work. To fully understand the changes in teacher education work initiated via ESE, it is necessary to consider this body of work in the wider context of rethinking education for the common good (UNESCO, 2015b).

Rethinking Education in Practice

Education has the potential to facilitate catalytic transformation of society through development of understandings and actions that contribute to more sustainable social practices. These

understandings and emergent social actions would be oriented towards the common good as reported at the end of the *UN Decade of Education* monitoring and evaluation report (UNESCO, 2014a) and in the Southern African Regional Environmental Education Programme's final evaluation report (Mukute, Marange, Lotz-Sisitka, & Pesanayi, 2012). In both these reports (regional and international), teacher education was prioritised and seen to be a highly catalytic arena for investing in educational transformation oriented towards the common good. In 2004, UNESCO reported that the teacher is one of the most significant influences in the creation of quality education (UNESCO, 2005). In order to facilitate the notion of quality of education that foregrounds transformation and transformative learning, there is need to reconsider the usefulness of current approaches to education in the lives of the learners. This calls for the need to rethink the way education is conducted in various settings (UNESCO, 2006).

ESE, however, needs to be critically reflexive (Lotz-Sisitka & Lindley, 2014) and should allow people to think about and consider a view of development and progress that charts new and alternative pathways to reduce human impacts on the earth system, while also seeking out new social progress models that take future generations into account. Bengtsson (2014), UNESCO (2014a), Jensen and Schnack (1997), Gough and Robottom (1993), and many others in southern Africa (Lotz-Sisitka, 2004; Mokuku, 2012) have argued that current technicist and utilitarian or functionalist approaches to education, driven by current developmental hegemony and ideas of progress, are inadequate for addressing both contemporary and future social-ecological concerns, and more humanistic ways of thinking about education. Bhaskar's (1998) dialectical critical realism proposed the need for social change processes that mobilise individual and collective agency in ways that produce new social practices and new conditions for being and becoming (Kapoor, 2009; Lotz-Sisitka, Wals, Kronlid, & McGarry, 2015). This paper focuses on the emergence of such agency in teacher education contexts, and how it is supported to emerge via mediation processes in a professional development course.

One of the main aims of ESE is to rethink education (UNESCO, 2015a) in such a way that it can help to transform human lives towards sustainability. This reorientation of education must be inclusive of teacher education so that teacher educators and, subsequently, teachers can also participate in this transformation (UNESCO, 2015a)—suggesting an emphasis on evolving culture and cultural practices in education (UNESCO, 2015b). Concerns for the future among humans include better citizenry, social justice, equity, peace, harmony, and social stability (Chikunda & Mandikonza, 2014). ESE has the potential to offer opportunities for the world to respond to issues arising from development, with teachers as key actors (UNESCO, 2005, 2006, 2014b). As noted above, UNESCO has recently coupled this commitment to education for sustainable development to the notion of the common good (UNESCO, 2015a).

If knowledge prepares better citizens, then knowledge developed through education is a good for the society (UNESCO, 2015a). Since the Jomtien Conference of 1990 (UNESCO, 1990, 2000, 2015a), access to education has thus become a human right, and education in itself is seen as a common good. The notion of the common good is built on the premise that all living things have life in common and all need to have a good life. The assumption is that if humans understand life as a common good, they must strive to enable all other life forms to live their good lives. Once humans live harmoniously and in solidarity with each other while upholding such values as respect, truth, love, peace, right conduct, social justice, and tolerance, they start living a better life (UNESCO, 2015b). These values acknowledge that life is made of interdependent relationships between humans and nonhuman living things for these different dimensions to flourish. The concept of the common good, understood in this way, is a profound guiding concept for education, because it fundamentally transforms the nature–culture dualism on which modern forms of environmental destruction and social disruption have been constructed.

ESE, when framed within a focus on the common good, seeks to enable participation in common good social practices, involving knowledge for the common good based on values of equity, respect for life forms, future generations, and sustainability of the planet. By emphasising learning from context, education for sustainable development is also a humanising concept because it takes account of people's views, cultures, and ways of being (Kapoor, 2009; Lotz-Sisitka et al., 2015; Neocosmos, 2012). It also prepares learners to learn to live justly, equitably, and sustainably in the world, in other words, not learning for the sake of human capital development to serve the market.

In most cases, various structural conditions prevent people from flourishing because of their dehumanising, constraining, subversive, oppressive, or discriminatory nature. Thus, following Bhaskar's (1993) logic of seeking out the *pulse of freedom*, it is possible to suggest that engagements enabling people in dehumanising conditions to realise that, despite barriers, they still have agency and potential to remove the barriers, becomes a humanising form of learning and pedagogy. Bhaskar (1993) suggested that, through some form of reasoning, one can establish connections, relations, and contradictions in any real social context. To this end, one can further establish the absences. Absences are those features that cause the connections and relations not to function appropriately, culminating in contradictions. Absenting such absences, are therefore seen by Bhaskar as pulses of freedom, which are emancipatory and humanising and, in ESE, also give attention to the interconnected nature of humanity's relations with the more-than-human world. Epistemologies that provide conditions for learners to reflect on their conditions, visualise a better future, weigh out options, and set up conditions that address negative factors that hinder attainment of freedom and their visualised future are humanising (Freire, 1970). This has wider implications for the more-than-human world too. These conditions facilitate transgressive learning (Lotz-Sisitka et al., 2015) for individual, community, and societal freedom. Such learning involves learners critically and reflexively engaging the conditions and contradictions influencing their lives and lived experiences in order to disrupt those factors and create conditions for a better future (Kapoor, 2009; Mamdani, 1996; Mbembe, 2001; Mukute 2010; Neocosmos, 2012; Wa Thiongo, 1981).

ESE educators argue that teacher educators should have the capacity to embrace and implement change in their teacher education practices, allowing them the scope for engaging with, and responding to, contemporary issues in society with their students as future teachers (Chikunda, 2007; Jobo, 2013; Monjane, 2013; Shumba & Kampamba, 2013). Critical realists have argued that this ability to respond to change depends on how the institution is structured, the cultural processes inherent in the institution and how these influence each other, and whether the teacher educators find the need to change (Latour, 2004)—as well as their drive for change and agency (Archer, 1995; Bhaskar, 1979). If they find the need to change, it also depends on whether they have the agency to implement changes to their practice (Archer, 1995; Emirbayer & Mische, 1998). This paper provides insight into these processes in a teacher education context.

Rethinking education at any level, including teacher education, cannot, however, be divorced from current debates on quality education. Lotz-Sisitka (2013), drawing on the findings of a regional research programme involving 10 countries in southern Africa, argued that quality education not only entails a focus on learning for a sustainable future. Quality education should foreground sociocultural meaning making processes or *learning as connection* because such processes tend to deepen understandings of context, concepts, and practices, enhancing inclusivity and epistemic access. ESE seems to offer possibilities for learners to develop understanding of concepts, their surroundings, and their practices (Janse van Rensburg & le Roux, 1998; Mandikonza 2007; Masuku van Damme & Neluvhalani, 2004; Motsa, 2004; Shumba & Kampamba, 2013). Lotz-Sisitka (2013) further argued that teacher educators need to develop concepts of quality in and through their practices, oriented towards the common good. As argued by UNESCO (2015a), a sustainable future is

a right for everyone, therefore a common good for all life on earth. Education itself is a common good that is necessary for the common good, or for enabling a more sustainable future for all life on earth (UNESCO, 2015a).

Research Design, Question, and Methods

While much is said about what needs to be put in place for this transformation, there is still inadequate knowledge of how such transformations are to take place. In this paper, we share an in-depth case study (Bassey, 1999; Corcoran, Walker, & Wals, 2004; Yin, 2009, 2012) of teacher professional development mediation processes that are oriented towards the concept of quality education noted above. The research question guiding the study was: “How do mediated actions in a regional teacher education academic professional development programme and the workplace influence ESE competencies, practice, learning, and agency in teacher ESE change projects?” The case study focuses on the influence of mediation activities across three phases of the Rhodes University (RU)/SADC REEP professional development course, with emphasis on ESE teacher education practices in the course and in two teacher education workplaces.

The specific case or course under study is the RU/SADC REEP International Certificate Course in ESE (hereafter called the RU/SADC course), in which teachers were involved in various academic professional development activities including lectures, discussions, debates, excursions, and written assignments, organised around a central change project. More specifically, through case studies of two teacher educator participants and their work before, during and after the RU/SADC course in two countries, data were generated through document analysis, lesson observations, and interviews. Portfolios of evidence were historical documents of the selected teacher educators’ on-course phase written work, analysed for emergent properties. Observations of research participants in their context of practice were conducted to triangulate the research data. Observations were meant to establish if the lessons conducted, showed some of the features of ESE (UNESCO, 2009; Wiek, Withycombe, & Redman, 2011). Interviews were conducted with the two case teacher educators and members of their communities of practice during and after the course. Members of the communities of practice included colleagues in their teacher education institutions and individuals from institutions that the two case teacher educators worked with to mainstream ESE in their practice through the change project. Members of the communities of practice were involved to triangulate the teacher educators’ experiences in mainstreaming ESE. Abductive and retroductive modes of inference (Danermark, Ekström, Jakobsen, & Karlsson, 2002) were used to make meaning of the data.

The focus of the enquiry was to understand how learning of two course participants was mediated through the change project course processes. In order to develop this understanding, the study used theory to engage with how the course processes (tools and artefacts, lectures, assignments, tasks, and excursions) contributed to learning by course participants across all phases of the change project course. Emergent properties—structural, cultural, and people (Archer, 1995)—whose powers influenced capacity of the participant (the agent) to mainstream ESE in teacher education practice through the change project were discerned from the portfolios of evidence of the two teacher educators. Portfolios of evidence provided evidence of the two teacher educators' engagement with the course and change project during the on-course phase.

Theoretical Perspectives

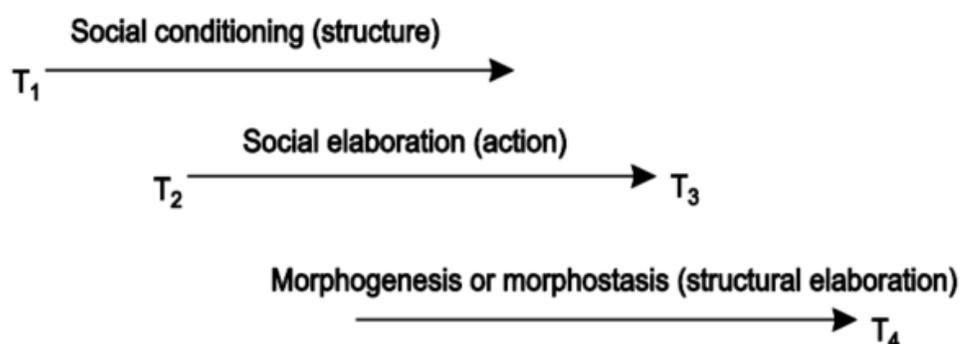
To be able to observe expansion and social change processes, we drew on Archer’s (1995) concept of morphogenesis, which evolved the work of Roy Bhaskar (1979). Basic critical realist ontology presupposes that it is possible to separate *being* (ontology) from *knowledge of the being* (epistemology), allowing these to be studied independently of each other, using analytical dualism

(Archer, 1995), while acknowledging their interrelatedness. According to Bhaskar (1979,) a stratified ontology allows for a more complex reading of the world as it is (i.e., being), and for a theory of emergence. Critical realist social theory and the principle of emergence (Archer, 1995), the backbone upon which this study was framed, proposes that social realities, that is, what we observe in society, are emergent properties and powers that emerge from the interaction of generative mechanisms (Bhaskar, 1979; Cruickshank, 2003). Realist social theory is a form of critical realism, aiming to explain society by recognising that social reality is stratified, existing in the form of three orders (Archer, 2010). The natural order is composed of the physical being, which owes its existence to its parts that have interactions in them and interact amongst themselves, producing a coordinated body. The practical order is experiential in that it involves people, who are the subjects, working with human and nonhuman objects from their social reality. The social order is created when individuals interact with each other, whereupon their interaction produces knowledge that is context dependent and, therefore, can change through reflection and reflexivity (Archer, 1995, 2010).

Archer (1995, 2010) proposed that social processes can be explained in terms of interaction of structural, cultural, and people—what she termed *people* and *parts*—the components of social life. These are interactions between intransitive and transitive dimensions of social reality. People have agency but this agency operates in, and is influenced by, properties and powers of the parts, structures, and cultures. Structures and cultures predate the agent, who is born or enters into them. The agent's functions are either enabled or constrained by the structures and cultures the agents find themselves in. The agent has agential powers to interact with structures and cultures, potentially, to transform, or maintain them. These interactions, according to Archer (2010), cause social change.

For analytical purposes, the structure–culture–agency interaction can be separated into and analysed in terms of structure in relation to agency. Culture, on the other hand, can be analysed in relation to agency. Archer (1995, 2010) called this separation *analytical dualism*, and used analytical dualism to suggest a temporal scale of social change in relation to the structure–agency and culture–agency relationship (the *morphogenetic cycle*), comprising three physically separate but functionally and temporally continuous lines, T1–T4, shown in Figure 1 below.

Figure 1: The morphogenetic cycle (Archer, 1995, p. 157)



The morphogenetic cycle is a retrospective tool for explaining social action. The T1 phase signifies structural conditioning, a period where agency is influenced by preexisting structural and cultural conditions. T2–T3 represents a period of cultural mediation through the use of tools and artefacts. In T4, the structure is elaborated or reproduced.

This study analysed for emergent properties and powers: structural emergent properties (SEPs), cultural emergent properties (CEPs), and people's emergent properties (PEPs). Emergent properties were guided by outcomes of the RU/SADC International Certificate in EE course that framed the course (SADC REEP, 2009). SEPs can be observed in relation to human and nonhuman material resources such as rules, regulations, and guidelines, in addition to situations where the interactions result in further rules, regulations, and guidelines (Archer, 1995). These denote the ability of the research participant to take note of and appreciate features or attributes that arise from or result in CEPs—interaction between people (Archer, 1995; Tikly, 2015). These characteristics enabled the participant to show representation of the personal nature of interactions and relations (PEPs). In addition, they recognised that a person exists in a society with other persons, so whatever decision is taken tends to influence how that person interacts with other persons (Archer, 1995).

The notion of mediation used in this research was based on classical Vygotskian views of mediation—looking at mediation of the ability to be aware of the world and experiences to think, and to feel: the ability to think and make meaning (Vygotsky, 1978). The classical view of mediation, namely, mediation of mind, was complemented with mediation of activity, from neo-Vygotskian work by Engeström (1987) and Engeström and Sannino (2010). Vygotsky argued that any learning has to be mediated through use of physical as well as semiotic tools and artefacts. Semiotic tools include signs and language that facilitate meaning making.

Case Description: The RU/SADC Course

The RU/SADC course was a regional response to the need to respond to environment and sustainability concerns, and to improve educational quality within the humanistic and social-ecological relational systemic framework outlined above (Mukute, et al., 2012). By enhancing capacity and agency of teacher educators, this regional course aimed at transforming teacher education practice through enabling conditions for reflexivity (Archer, 1995; Bourdieu, 1998; Raven, 2005) in social-ecological contexts in which teacher education institutions were also embedded. The reflexivity would potentially provide conditions for a good education, a common good, for improving the quality of education, and for the purpose of educating for a better and sustainable future—the wider common good.

Course outcomes were considered as the changes in course participants' practice that reflected these intentions and included more specifically:

- Enhance the policy, institutional, and contextual relevance and quality of environment and sustainability education programmes and activities.
- Develop deeper understanding of unsustainable practices and associated environmental issues and risks and how to respond to them through educational mediating activities.
- Develop understanding of how to mediate sustainable alternatives through educational mediating activities.
- Improve the use of educational methods and materials for mediation of better learning and more sustainable alternatives for the common good.

The core course process and framework were established around an emergent, relational, and contextualised learning process called the change project. The change project was a mediatory tool for engaging with and developing ESE reflexivity and practice in teacher education contexts by enabling course participants to reflexively engage with their teacher education practice. The change project development process was made up of many interrelated mediatory tools such as lectures,

practical activities, discussions, and assignments. It entailed a 4-stage process including work from home (workplace-based pre-course), work away (on-course), and work from home (workplace-based post-course and ongoing engagement) phases. The assumption was that the pre-course assignment activities would enable teacher educators to reflexively engage with their teacher education practices and their community of practice in the workplace. The fourth phase was the period of ongoing ESE work, following the initial reporting once course participants returned to their workplace after the on-course phase. Table 1 illustrates the framework of the change project assignment.

Table 1: The RU/SADC International Certificate in EE/ESD Change Project Course

Phases	Pre-course	On-course			Post-course	Ongoing engagement
Assignments	Pre-course assignment	Assignment 1	Assignment 2	Assignment 3	Reporting on	Ongoing activities
Key expectations	<ul style="list-style-type: none"> - Identify and critically review policy relevant to workplace educational mediating activities - Identify and critically review unsustainable practices - Consult with others in the workplace and work as a CoP to prioritise matters of concern 	<ul style="list-style-type: none"> - Policies relevant to the management of environmental issues/s and risk/s - Identify appropriate and relevant sustainable alternatives - Use of knowledge resource and production 	<ul style="list-style-type: none"> - Policies relevant to ESD are critically reviewed - ESD methods have been identified - Explain ESD methods relevant to your context of practice - The use of two ESD methods in a context of practice 	<ul style="list-style-type: none"> - Policies and other factors influencing a shared interest in ESD are identified and discussed - Relevant ESD CoP described - Key factors necessary to strengthen the work of an ESD CoP identified and discussed - A strategy for evaluating learning in an ESD CoP developed 	<ul style="list-style-type: none"> - Feedback on EE change project from workplace colleagues managers and CoP participants - Feasibility of the EE change project plans - The value of your knowledge resource - if and how your change project plans are changing 	<ul style="list-style-type: none"> - Ongoing activities on the change project - Alternative pathways for mainstreaming EE/ESD - Any other courses attended emerging from the change project - Any contributions to networks and communities of practice
Period	1 month	One and half weeks	One and half weeks	One week	One month	Ongoing after the first month
						

The first phase, whose purpose was to enable course participants to understand their context in view of environment and sustainability, was workplace-based in the form of an audit of institutional and personal teacher education practices. Reference was made to national and institutional policies influencing these teacher education practices. During this session, course participants engaged their institutional leadership, colleagues, and community of practice (CoP)² to elicit the nature of the course participants' environment and sustainability practice in the institution. The second phase, the on-course session, was conducted at the capacity building institutions by partners, RU and the SADC REEP.

² The community of practice of teacher educators included their colleagues in the same discipline, in the same department, in the same faculty, and individuals and institutions with whom the teacher educators were involved in mainstreaming environment and sustainability into their practice.

The three assignments (see Table 1) sought to enable participants to:

- deepen their knowledge and produce a knowledge resource on issues or matters of concern (Latour, 2004) identified during the pre-course phase,
- deepen their understanding of teaching and learning methods in relation to the issue and their context of practice, and
- design a practical plan of action of how they expected to contribute to changed practices in their individual and institutional practices in view of sustainability in a community of practice.

The third phase started when participants returned to their workplace. Upon arrival home, they had to engage with their community of practice. Their report was the fourth assignment.

All phases of the change project course contributed to mediation through engaging teacher educators with activity (Engeström & Sannino, 2010). These authors view the activity as a complicated interaction of elements that can only happen in a particular context through mediatory processes. The activity in this study is the mainstreaming of ESE, mediated through the change project that served as a mediatory tool, and implemented through a variety of actions. The assumption at the end of the change project course was that the participants should be able to show characteristic features related to teacher education practice and to the mainstreaming of ESE. Some features of ESE are:

- it is based on principles and values underlying sustainable development and social justice,
- it deals with the well-being of all four dimensions of sustainability—environment, society, culture, and economy—and the relations between these,
- it uses transformative pedagogical techniques promoting participatory learning and higher-order thinking skills,
- it accommodates the evolving nature of the concept of sustainability, taking local and global dynamics of sustainability into account,
- it builds civil capacity for community-based decision making, social tolerance, environmental stewardship, an adaptable workforce, and
- it is interdisciplinary and oriented to the common good (UNESCO, 2009, 2015b).

Features of ESD can also be understood in terms of one's ability to show sustainability competences (Wiek et al., 2011). Wiek, *et al.* (2011) suggested five key competences for sustainability: system thinking competence, strategic competence, interpersonal competence, normative competence, and anticipatory competence. The features proposed by UNESCO (2009) were further described in terms of the four pillars of learning, namely, learning to know, learning to do, learning to be, learning to live with others sustainably (Delores, 2013). Changes in practice showing features of ESE or competences for sustainability were understood to be evidence of expansion of the mind and activity in the zone of proximal development for mainstreaming ESE (Engeström & Sannino, 2010; Vygotsky, 1978).

Key Findings

Change emerges from an interaction of structural, cultural, and emergent properties.

As indicated above, teacher educators were involved in a course that spanned both pre-course and post-course activities over a period of a year. Analysis of two of these teacher educators' (Participants A and B) experiences in engaging with the change project course revealed structural, cultural, and people emergent properties, presented in Table 2 below with evidence from the data:

Table 2: Structural, Cultural, and People Emergent Properties as Observed in the Two Case Studies of Changing Teacher Education Practice

Emergent properties	Participant A: University context (Zimbabwe)	Participant B: Teacher education college context (Lesotho)
Structural Emergent Properties (SEPs)	<p>Policy guidance: Used a selection of relevant national and regional policies. Showed ability to identify, describe, and discuss global, regional, and national policies that promote collaborative practice and working in communities of practice.</p> <p>Institutional frameworks: Ability to identify institutional colleagues to work with, particularly those involved with the master's in Environmental Science and Mathematics course in relation to earlier notions such as gender, HIV/AIDS, orphaned and vulnerable children (OVCs) and resources management.</p> <p>Expansion of mainstreaming opportunities: Influence of prior experiences with action research in ESE in a rural school was shown to generate the initial interest to pursue further capacity development in ESE. Through the RU/SADC REEP course, she became involved in other programmes with Swedish partners, and she started a PhD on Climate Change and Physics Education in the same field of ESE.</p>	<p>Policy guidance: Used a range of global, regional, and national policy frameworks in relation to her conceptualisation of ESE practice.</p> <p>Institutional frameworks: Ability to locate the change project into the Agriculture Science course that she taught, with institutional support, and related to other ESE activities in the college context.</p> <p>Expansion of mainstreaming opportunities: Linked RU/SADC ESE programme to earlier outdoor-based change project, which in turn led to expansion via the SADC ESE Leadership change project and the Swedish ESE initiative instituted in the college.</p>
Cultural Emergent Properties (CEPs)	<p>Made use of, and generated, opportunities for professional training and capacity development of colleagues and students: Consulted with colleagues and institutional leadership, hosted research meeting on ESE, conducted an audit on ESE, identified relevant spaces for supporting capacity development in ESE for colleagues and students.</p> <p>Ability to critique own practices and work collaboratively: Able to critique own practices in teaching and learning methods in relation to policy, context, and concepts; worked collaboratively with colleagues at institutional, national and international levels; students' and own work in CoPs on ESE concepts and practices in context.</p> <p>Choose and develop alternative teaching and learning methods: Chose and used methods that promote students to take action for environment and sustainability in relation to policy guidelines on ESE; choice of teaching approaches and methods was meant to promote sustainable practices such as waste management and responding to climate change.</p> <p>Ability to select and use appropriate teaching and learning resources: Actively changed the delivery methods because she found these to be inadequate for ESE, individual, and social transformation. She developed new materials on the course—a factsheet and other</p>	<p>Made use of, and generated, opportunities for professional training and capacity development of colleagues and students: Engaged in capacity building activities with students and staff in the department and faculty, including an audit of ESE and use of ICTs in supporting new teaching methods.</p> <p>Ability to critique own practices and work collaboratively: Critiqued own practices in relation to context and ESE policy in ways that engendered collaborative practice among students, between herself and her students as well as her ability to work in CoPs.</p> <p>Choose and develop alternative teaching and learning methods: Showed ability to choose teaching methods (including ICT use) that promote change of practice in relation to ESE policy, collaboration, and their potential to facilitate change in practice.</p>

artefacts to promote thinking about waste, climate change, and sustainable living.

Valuing of collaborative and democratic practice: Evidenced in ability to work with others, institutional leadership, students, and to work within CoPs and in her choice of classroom methods that encouraged students to work together.

Commitment to social justice: Recognition that provision of resources such as power are unevenly distributed, with well-to-do people receiving longer hours of power availability as evidence for a social justice concern.

Sustainable living and more sustainable alternatives: Use of ESE policy to support learning and deliberation on electricity generation, climate change mitigation and adaption, and related that to sustainable use and social justice in the classroom and in CoPs.

Valuing collaborative practice: Used ESE policy on collaborative practice in relation to teaching–learning (T/L) methods and CoP. Collaborative practice was evident in her ability to work in CoPs and classroom-based T/L methods and activities.

Commitment to social justice: Evident in use of T/L methods that facilitated deliberation, collaborative decision making, and action taking. Also used ESE policy on environment care and livelihoods in T/L methods and working CoPs.

Sustainable living and more sustainable alternatives: ESE policy and T/L methods were used to facilitate deliberation on sustainable living and more sustainable alternatives related to land and land use in class and in CoPs.

People Emergent Properties (PEPs)

Valuing: Valued teaching approaches that were more practical and tended to respond to contemporary issues while working in CoPs. Also valued institutional and global ESE policy that supported individual and collaborative learning—individual and collaborative decisions on sustainable use of resources especially electrical energy.

Criticality: Ability to critique own teaching practices, and realised inadequacy in current content delivery teaching methods and content of teaching.

Reflexivity: Showed ability to reflect on own teacher education practices and experiences, especially effectiveness of own teaching methods on how they influence social action. She also showed reflexivity by her ability to mainstream electrical energy generation and sustainable use in Bachelor of Education (BEd) programmes when the master's in Environmental Science and Mathematics Education was suspended.

Deepened knowledge: Demonstrated knowledge and experience of power cuts and of the Physics Education curriculum. Deepened knowledge of the influence of international national and institutional policy on more sustainable alternatives and T/L methods. Understood methods for collaborative sustainable practices, collaborative action, and working in CoPs. Knowledge of the process of electricity generation, distribution, and use;

Valuing: Valued producing teachers who are capable of responding to societal problems. Valued ESE policy that promoted T/L methods that facilitate change for socio-ecological sustainability, including use of ICTs.

Criticality: Ability to critique own practices, and observed the need to change T/L approaches to include those that promote change in teaching methods and contents of teaching.

Reflexivity: Reflections on own teacher education practices and experiences, especially the preparation of graduate teachers for their roles in society. Also demonstrated ongoing desire to improve practice, which was evident in the way she tried out T/L methods with different student cohorts.

Deepened knowledge: Demonstrated knowledge of the influence of international and national policy, on concepts, and on more sustainable alternatives and T/L methods with depth and understanding. Change project reflected complex understanding of biophysical, social, economic, and political aspects.

sustainability notions were also expertly used in relation to climate change mitigation and adaptation.

Agency: Recognition of inadequacy of current own T/L methods and interest in professional development. Ability to use policy guidelines to support relevant T/L methods in a change project. Using T/L methods that promote deliberation and collaborative decision making to facilitate individual and societal reflexivity on energy use and climate change adaptation and mitigation.

Agency: Able to use policy guidelines to support relevant T/L methods for the change project. T/L methods that promote social change through collaborative practice in CoPs were used in T/L contexts. She also took leadership to form local CoP/ESD Team, a team of teacher educators keen on mainstreaming ESE.

Ability to produce own resources, source own and to use own resources: Undertook an audit of resources supporting environment and sustainability learning in the institution. She was able to produce resources such as fact sheet guided by context dependent and context independent knowledge in relation to T/L methods that develop critical thinking. Ability to make own teaching and learning resources through use and adaptation of available resources facilitated her independence from prescribed texts.

Ability to produce own resources, source own and to use own resources: Ability to produce resources in relation to T/L methods suggested by policy. Ability to use fact sheets produced, the teaching methods handbook, PowerPoint presentations. She was also able to create, design, and use MSWord documents and to design assignments that promote the use of these ICTs for better learning of Agriculture Science and sustainability concepts.

As can be seen from the data summarised in Table 2 above, a range of interacting SEPs, CEPs, and PEPs led to ESE-related changes in teacher education practice, encompassing engagement with policy, institutional structure and mainstreaming opportunities (SEPs), available professional development opportunities, commitment to social justice, professional development opportunities, collaborative practice, and sustainable living practices (CEPs), and personal capacities for valuing sustainability and social justice, criticality, reflexivity, and agency (PEPs). Deeper analysis of the way in which these SEPs, CEPs, and PEPs were enabling of changes from a morphogenetic perspective shows the following findings, which provide further perspectives on the concern of how such changes towards education for the common good emerge from being (prior to the course) to becoming (after the course). In addition, these views also show that education for a common good can potentially be mediated in and via teacher education professional development courses if they allow for reflexivity and a form of change-oriented learning emergent from context—yet mediated and supported in and through a complex change process.

Mediation in and as academic professional development activities, using a change project approach, strengthens mainstreaming of ESE.

The case analysis of the two teacher educators' changed practices shows that the mediation in and as academic professional development activities points to the teacher educators having gained capacity for mainstreaming ESE. Enhanced capacity was considered to be evidence of expanded zones of proximal development. Table 3 below shows the capacity of teacher educators before and after engaging with the change project course.

Table 3: Summary of Learning Emerging across the Change Project Course and Post-Course Processes

Features at the beginning of the course	Demonstrated enhanced ability during the change project on-course and during the post-course period	Course outcome achieved
Participants indicated that their teacher education practice was guided mainly by institutional mission and vision, a few national policies and a few global or international policies.	ESE mainstreaming and change project was influenced by more international policies and national policies that relate to their teacher education practice in addition to institutional guidelines. When policy guidelines were constraining implementation of the change project and mainstreaming ESE, participants chose alternate pathways that were at times not conventional.	1, 2
Participants were only able to identify and describe a few policies influencing ESE practice in teacher education.	Participants were able to critically engage with main policies guiding ESE practice, including how they influenced alternatives as well as teaching and learning methods.	1, 2
Participants were able to identify environment and sustainability issues affecting society.	Participants were able to find relationships between the identified environment and sustainability concerns with other aspects of life that are related to biophysical, social, economic, and political dimensions.	2,4
Participants were able to identify an area that needed change, and engage the focus of their change project with relevant CoP.	Participants were able to streamline their focus of the change project, usually by focusing it on their individual and institutional roles. At times, they had to shift their ideas from one possibility to another until they settled on a more feasible choice.	1,2,3,4
Participants were able to locate the change project in the contexts of their work, such as specific courses or their community engagement work.	Participants were able to refine locating their change project in their practice more clearly into a module or into a specific topic in a module.	1,2
Participants were able to identify resources that were unsustainably used or harvested, and were able to describe relationships between different resources and were able to relate this unsustainable use to equity and social justice concerns.	Participants were able to suggest sustainable and more sustainable alternatives, and how education could help in transforming society towards sustainability, and respond to inequity in accessing and using resources.	2,3,4,5
Participants' ideas were influenced mainly by their contextual experiences to describe notions that influenced their practice.	Participants were able to deepen and critically engage with knowledge and wider perspectives related to their chosen change project.	2,3,4,5,6
Participants used a variety of teaching and learning methods but mainly used delivery approaches for delivering knowledge on concepts.	Participants were able to think carefully, choose, and use a wider range of teaching and learning methods with a purpose. Teaching methods chosen for the change project foregrounded context and experiences of the learner for the purposes of developing critical thinking and agency for sustainability. Participation, collaboration, and democratic practice were key in choice of methods. Teaching and learning methods were chosen in relation to policy guidelines proposed for ESE.	2,4,5,6
Participants used conventional teaching and learning resources prior to the course.	In addition to using conventional resources, participants learned to look for information from a variety of sources to make their own resources—especially on concepts that are not in conventional sources. Participants diversified their teaching and learning resource materials to include technological innovation of ICT applications such as PowerPoint as well as videos and photographs.	2,4,5,6

Participants demonstrated agency by seeking for opportunities to develop their capacity in ESE.	Agency manifested in the participants' ability to design and implement the ESE change project. During this implementation, participants had the agency for ongoing trying of new educational methods in their classroom practice. They also showed agency in influencing others to gain capacity in ESE and in working collaboratively to mainstream ESE in the communities of practice.	1,2,3,4,5,6
Participants demonstrated ability for reflexivity that enabled them to be dissatisfied with their teaching practices and seek capacity development.	Participants showed enhanced reflexivity in many ways, including when participants were able to reflect on the teaching and learning methods that they tried—and modified the same methods in the following year with a different learner cohort. During implementation of the change project, participants realised that they could not make change happen alone; they had to engage others and work collaboratively. Reflexivity was demonstrated when participants' plans for the change project could not proceed because the courses in which they had planned to implement the change project were either discontinued or deemed not appropriate. They instead continued to find relevance of ESE and mainstreamed it in other activities that they had not planned for, such as mainstreaming climate change education in other courses.	1,2,3,4,5,6
Participants expressed that they worked more individually in their institutional practice.	Participants demonstrated tendencies to work in collaboration with others in their disciplines, across disciplines, and across institutions. The notion of community of practice guided their interactions with others. They also showed commitment to participation, collaboration, and democratic practice through their tendency to choose and promote participatory, experiential, and collaborative teaching and learning methods.	5, 6
Participants demonstrated criticality by recognising that the conceptual content they taught and content delivery methods that they used were not adequate for their student teachers' experiences in their schools.	Enhanced criticality was shown by the participants' ability to relate global, national, and institutional policies to curriculum content and to sustainability concerns. Criticality was closely tied to reflexivity as participants thought more carefully about their teacher education practices and how they contributed to developing more critical and reflexive student teachers.	1,2,3,4,5,6
Alertness to capacity building was dependent on colleagues and networks alone	Participants focused more on ESE when searching for capacity building opportunities. Alertness to other capacity development opportunities arising from being a member of an international community of practice in mainstreaming ESE facilitated active searching for opportunities. Participants gained recognition by capacity building institutions for more specific ESE related notions such as climate change education.	4,5,6
Networking was limited to teacher education, national, local, and institutional networks.	Networking was expanded by the notion of communities of practice—as teacher educators, they potentially belonged to many. Participants became more involved in networks that were making efforts to mainstream ESE such as EEASA, MESA, and Regional Centres of Expertise because they claimed to have better understood the notion of ESE.	4,5,6

Teacher educators demonstrated expansion of their zones of proximal development by being able to:

- identify relevant global, national, and institutional policies that support ESE mainstreaming;
- deepen knowledge on environment and sustainability issues or their matters of concern in ESE mainstreaming;

- identify and deepen knowledge on sustainable and more sustainable alternatives on the identified issue, including education;
- identify teaching and learning methods appropriate to context for mediating the educational response as well as the ability to deepen knowledge on the methods chosen;
- engage their community of practice to identify and prioritise environment and sustainability issues as matters of concern for mainstreaming ESE; and
- find ways of mainstreaming ESE in their teacher education practice after the change project course.

In the terms of Engeström and Sannino (2010), the change project was a *germ cell* through which all other processes and activities for building and demonstrating capacity of teacher educators for mainstreaming ESE materialised. While working with change projects in higher education contexts, Lotz-Sisitka and Hlengwa (2012, 2015) used the metaphor of change project seeding. The change project was considered as seeding mainstreaming ESE because the initial change project transformed over time as it challenged and permeated the practice architectures, individuals' practice, that of colleagues, the institution in general, and communities of practice.

Mediation in and as academic professional development activities in EE/ESE catalyses development of morphogenetic properties in teacher education practice.

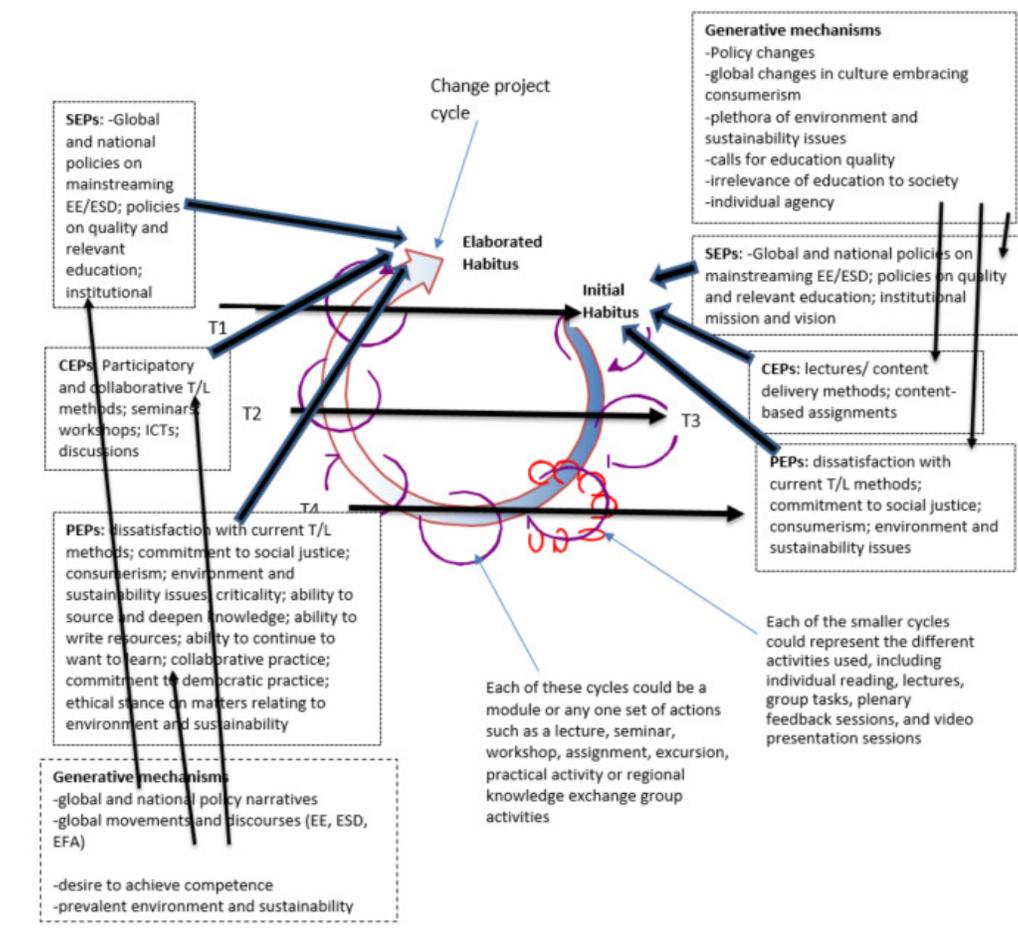
The change project course provided momentum for potentially morphogenetic changes in teacher education practice (Archer, 1995). The course expanded zones of proximal development for those characteristics of learning, illustrated in Table 3, which showed as emergent properties and powers in participants' practice. Participants who were already dissatisfied with their teacher education practice within a structural and cultural context sought academic professional development in T1 of the cycle. The pre-course assignment was the first tool to mediate their dissatisfactions or inconsistencies in praxis (Bhaskar, 1979). As shown in Figure 2, dissatisfactions and inconsistencies were derived from properties and powers of such generative mechanisms as policy changes. Response to policy is a structural emergent property. Environment and sustainability concerns and the quest for the form of quality education built from epistemological access and inclusivity were also generative mechanisms in teacher education practice. Sensitivity to the generative mechanisms would stimulate SEPs, CEPs, and PEPs as teacher educators sought to respond to the generative mechanisms through their practice. Fuelled by their structural emergent properties (SEPs, CEPs, and PEPs) teacher educators would then interrogate their own teacher education habitus, engage the CoP and prioritise participants' ultimate concerns, thereby catalysing the disruption of the culture, including that of working individually, and increasing the potential for collaboration. Inconsistencies in praxis constituted generative mechanisms whose powers stimulated emergent properties and powers of teacher educators. The pre-course assignment initiated the phase T2–T3 that was constituted of processes to further disrupt the habitus of teacher educators, which was mainly influenced by prevailing unsatisfactory structural and cultural conditions—described as generative mechanisms above. The on-course phase had activities such as assignments, lectures, discussions, practical tasks, and excursions shown by the small circles on the larger circular arrow. These approaches to teaching and learning that entailed interaction of learners constitute CEPs. The small arrows on their own were mediatory tools that further contributed to disruption of the teacher education habitus to facilitate potential for an elaborated habitus. The elaborated habitus supported mainstreaming of ESE in T2–T3 in individual and institutional teacher education practice, in a community of practice as shown in Figure 2 below.

Mediation activities for mainstreaming of ESE tended to be influenced by casual powers of emergent properties (Archer, 1995). During the morphogenetic phase T2–T3 and T4, participants showed

structural emergent properties (SEPs). They recognised that policies at global, national and institutional levels had powers over choices of what they could choose (PEPs) to do and how they could perform SEPs on those choices when mainstreaming ESD. Archer suggested that social action be explained in terms of people and parts (structure–agency and culture–agency) because these three components are interactive and interdependent.

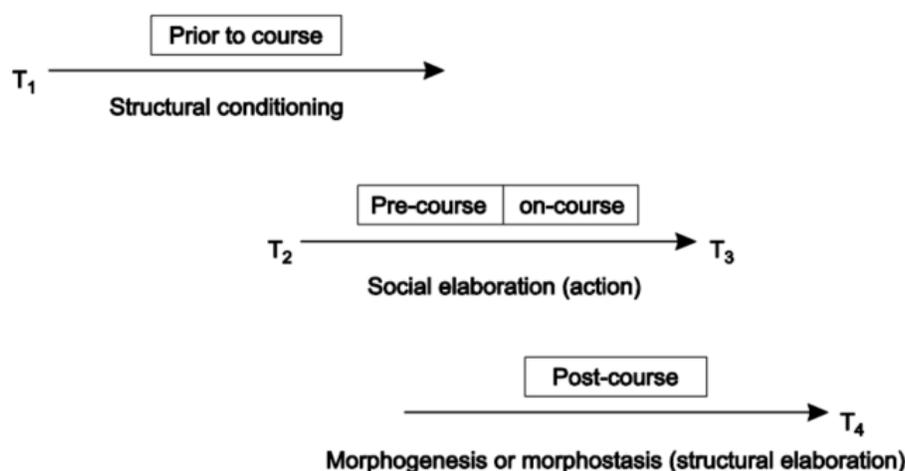
For example, participants identified global policies (their SEPs) that promoted mainstreaming of ESE such as the UN Decade of ESD Implementation Scheme (UNESCO, 2006), which they related to their national policies. Of the many possible ways of implementing ESD suggested in the policies, participants used their PEPs to respond to ESE issues by enhancing capacity for particular teaching and learning methods—their CEPs). Teaching and learning methods were participants' ultimate concerns, their CEPs, as teacher educators. Suggested teaching and learning methods were written up in course outlines, which were used by participants. Although the course outline was not an institutional policy, it was a record for use by any teacher educator who took the course or module. In this way, the course outlines are a form of policy document because of their powers to guide practice at the individual teacher educator level. As a result, powers of ESD policies (SEPs) influence and shape the choice and conduct (PEPs) of teacher education practices in the form of teaching and learning methods (CEPs), which in turn influence and shape the structures (SEPs) in the morphogenetic phase T1–T4. The combination of SEPs, CEPs, and PEPs arising from this interaction is the elaborated habitus in teacher education practice at T4. This elaborated habitus at T4 is a pre-condition for the next morphogenetic cycle at T1.

Figure 2: The morphogenetic cycle (Adapted from Archer, 1995 and Engeström, 1996)



This study shows that it is possible to proactively set up a morphogenetic framework to develop capacity for reflexive engagement with practice through a course. The course was structured to disrupt the teacher education habitus through the pre-course assignment and on-course activities (which fall in the T1 phase of the morphogenetic framework). In this study, the change project course implementation fell into the period (T2–T3). Beyond the course period was T4 as illustrated in Figure 3 below. The course can be consciously set up to disrupt habitus at T1 in ways that potentially facilitate social elaboration along T2–T3 and structural elaboration along T4 by incorporating mediation tools and artefacts.

Figure 3: The morphogenetic cycle with the change project mediation phases (Archer, 1995, p. 157)



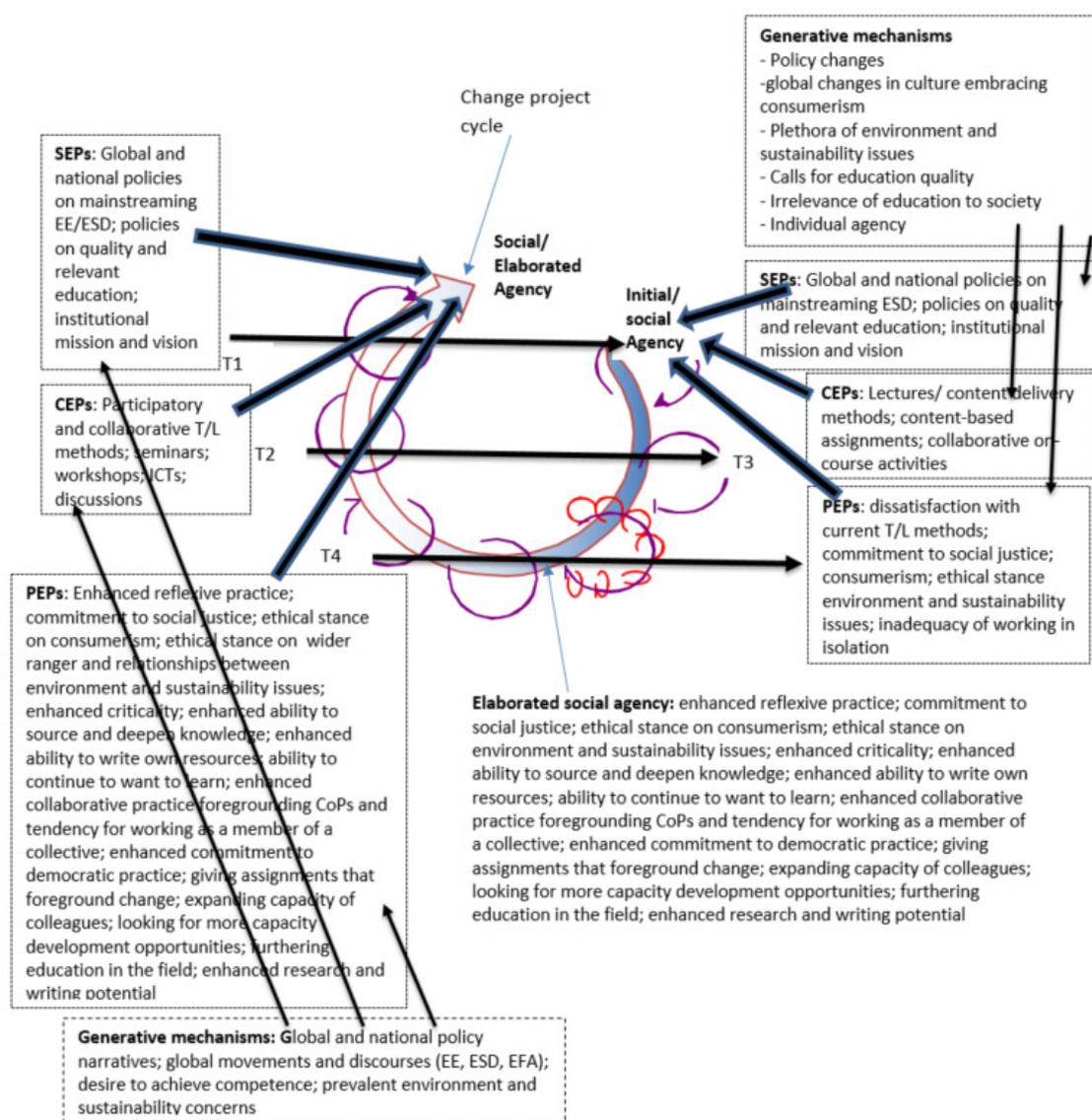
Mediation in and as academic professional development activities in ESE catalyses agency (double morphogenesis) of teacher educators in their teacher education practice.

Archer (1995, 2004) asserted that interaction of emergent properties and powers of people (agency) and parts (structure and culture) result in system transformation (morphogenesis) or reproduction (morphostasis). Figure 4 is, in reality, superimposed on Figure 2 because at the same time that sociocultural interactions cause changes in practice, the individuals involved in the change in practice end up transforming themselves. Although changes in agency and identity are part of emergent properties and interactions, they are unique to the individuals involved in the interactions. While agency can, through its emergent properties and powers, result in structural and cultural elaboration or reproduction, it is in turn transformed during the process. This transformation of agency is *double morphogenesis*. According to Archer, elaboration of agency results in a more reflexive social agent. Emergent properties should illustrate tendencies of the agent to be working with others or promoting social interactions (see Figure 4 below).

Existing structures and culture at T1 influence manifestation of habitus and, ultimately, agency in particular ways. The desire to change is influenced by properties and powers of generative mechanisms as illustrated in Figure 2. A disruption of habitus in response to properties and powers of generative powers tends to disrupt agency as well. Agency is elaborated through sociocultural interaction during period T2–T3. The elaborated at T4 phase, constitutes the precondition of the next cycle of morphogenesis represented by T1 but at a slightly different level to the initial starting point. Figures 2 and 4 happen simultaneously, as the agent works to transform the system while being transformed by the same system.

Teacher educators demonstrated enhanced reflexivity in their teacher education and individual sustainability practice when they could reflect on their teacher education methods and how these were playing out in classrooms across student teacher cohorts, and over the years. Enhanced reflexivity was co-constitutive with criticality. Criticality was shown by the participants' ability to relate global, national, and institutional policies to curriculum content and to sustainability concerns. Teacher educators thought more carefully about their teacher education practices and how these contributed to developing more critical and reflexive student teachers (see Table 3). Teaching and learning methods were the conditions in which participants could relate with their student teachers. Participants reviewed the teaching and learning methods they used each time to facilitate more meaningful interactions with student teachers. During and after the change project course, participants tended to use more experiential as well as collaborative methods, illustrating their elaborated social orientation to teaching and learning processes.

Figure 4: The double morphogenesis or change in agency (Adapted from Archer, 1995 and Engeström, 1996).



Individual agency was, at times, interlinked with collective agency when participants collaborated with colleagues to work on on-course assignments. Collaborative tendencies were also shown during change project implementation where participants sought support and found it useful to work with colleagues in their different communities of practice. Such CoPs include colleagues in the same discipline, across disciplines, and at the faculty level. The change project therefore contributed to scaling in disciplines, across disciplines, and across the faculty. Participants found it necessary to collaborate and engage in capacity building of the faculty, whereupon they brought their individual capacities into the collective for the good of capacity for mainstreaming ESE in the faculty. Figure 4 shows the change (elaboration) in agency during the course and its dependence on the system change, represented by Figure 2.

Participants showed the ability to source and deepen knowledge on selected issues while critically engaging with them. This knowledge was used to ascertain the relevance of existing resources and for developing their own resources for teaching, learning, and assessment in the classroom. Enhanced knowledge as well as teaching and learning resources were used to facilitate learning interactions in particular ways. Participants challenged their student teachers to relate classroom knowledge to its relevance in their daily lives. Examples include when they asked their students so-what questions in relation to content knowledge, and when they innovated teaching and learning equipment using other disused equipment. Participants carefully thought about their teaching and learning methods in relation to the purpose of learning the concepts, so teaching and learning methods were chosen for a purpose. Participants continued to use their networking abilities to actively look for and engage in other capacity development activities in the field, including further study.

Participants could fairly autonomously influence their course outlines and their teaching or curriculum interactions. They could influence the assignments and examination tasks for students and the curriculum and syllabus under their control. Once these were changed, the same educators would act on them. Their role shifted from social agent to social actor. Agents could reflect on what and how they acted, therefore their actions iteratively influenced their agency.

Mediation in and as academic professional development activities in ESE provided a platform for teacher educators to show tendencies for engaging humanising pedagogical methods.

The change project course referred to in this article also revealed humanising tendencies. The pre-course assignment facilitated participants to reflexively engage with their individual and institutional teacher education practice. Through this process, they worked with their community of practice (CoP) to identify and prioritise issues preventing mainstreaming ESE. They also collectively suggested responses to the issues identified. All assignments on the course were to develop the participants' ability to engage with their context and experience in relation to content and experiences on the change project course. Foregrounding reflexivity is a humanising tendency because reflexivity notes the located nature of individuals and groups, practice, and praxis (Lindley, 2014; Motsa, 2004; Raven, 2005). As a result of this experience, participants gave their own student teachers assignments based on context, and tended to develop responses to local environmental and sustainability issues. Cases of students who researched the possibility of constructing laboratory equipment through reusing parts of old technological equipment are examples of this.

The RU/SADC International Certificate in EE course contributed to teacher educators using more participatory and collaborative teaching and learning methods. Individuals can have agency, yet these individuals do not live in isolation, but relationally—in relation to other individuals, communities, and institutions. The collaborative methods recognise that agency can be both individually and collectively developed. Because the interest in ESE is capacity building for social action, the change project course seems to have provided a platform for participants to engage in

contextually framed reflexive collaborative social action on contextually located environment and sustainability issues. We believe that the change project was humanising in its role of enabling participants to promote collaborative deliberations, decision making, and social actions for the good of community and society.

Conclusion

ESE tends to provide a sensitising focus for initiating and sustaining institutional change (O'Donoghue, 1986). The change project course proved potential to develop capacity for reflexive praxis and agency that can be implemented to educate for a sustainable future. This capacity is relevant for mainstreaming ESE in teacher education contexts particularly for scaling³ up, scaling out, scaling across, and scaling innovatively during the *UNESCO 2030* agenda period (2015b), and within the *UNESCO roadmap on the Global Action Programme for mainstreaming ESD* (UNESCO, 2014c). By conducting the change project, participants showed commitments to learning from context while using and promoting teaching and learning methods that are critical, collaborative, and experiential while foregrounding values. These teaching and learning methods tend to be humanising, constituting the new form of education quality suggested by the *World Conference on Education in Incheon Declaration* (UNESCO, 2015b) that could potentially stimulate appropriate agency for environment and sustainability at individual and collective levels. The change project seems to be a meaningful way for building capacity for quality education, which is a common good for the good of humans and the future of planet earth.

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³ *Scaling* is a term used in the Global Action Programme for mainstreaming ESD to mean expanding capacity for mainstreaming EE/ESD among individuals, between individuals, within disciplines, across disciplines, across faculties and across institutions.

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