Transformative Learning for Teacher Educators: Making sense of Education for Sustainable Development (ESD) policy emphasis on transformative education

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4.4 Transformative Learning for Teacher Educators: Making sense of Education for Sustainable Development (ESD) policy emphasis on transformative education

Heila Lotz-Sisitka, Ingrid Schudel, Di Wilmot, Zintle Songqwaru, Rob O'Donoghue, Charles Chikunda

Abstract

This chapter addresses UNESCO's ESD for 2030 call to push the transformative edge on education needed all over the world so that a sustainable future can be created. More specifically, it responds to the need for building educator capacity for transformative and transgressive learning in a developing world context where high levels of inequality persist in society as a whole, and in the education system. The concept of transformative, transgressive learning is examined against a backdrop of contextual realities and challenges. This is followed by a detailed discussion on how, through multi-stakeholder partnerships and networks, we are building teacher educator capacity in the *Schools and Sustainability, Fundisa [Teaching] for Change* and the *Sustainability Starts with Teachers Action Learning* programme in South and Southern Africa respectively. These initiatives may offer insights into transformative learning in teacher education for those seeking to enable transformative ESD learning in their programmes.

4.4.1 Introducing ESD and the emphasis on transformative education

We are living in a time of unprecedented global environmental change, uncertainty and risk attributed primarily to human activities such as deforestation, fossil fuel consumption, urbanisation and waste production. Climate change is arguably the greatest threat facing humanity today (Intergovernmental Panel on Climate Change (IPCC 2021). There have been several international efforts to address these concerns, not least in education. The concept of Education for Sustainable Development (ESD) was born from the need for education

to address growing environmental challenges facing the planet (UNESCO/ MGIEP 2017, S. 13). Building on a long history of environmental education, ESD mainstreaming took place via the United Nations Decade of Education for Sustainable Development between 2005-2014 (UNESCO 2014a) a process that was not without contestation, and the scope of anticipated success or transformation remains incomplete (UNESCO 2012; 2014a; Huckle/Wals 2015), with ongoing calls to give more attention to teacher education in ESD (UNESCO 2014a, b). In 2015, the global community launched 17 Sustainable Development Goals (SDGs) addressing issues related to poverty, hunger, health, education, energy, work, industry, inequalities, cities, consumption, climate, ocean life, ecosystems, peace and partnership. Achieving these goals requires a profound transformation in the way we live, think and act. Renewed impetus has been given to ESD since it is included as a target of Goal 4 on quality education, and its dual role in supporting not only quality education, but also achievement of the SDGS, a role emphasised in the most recent ESD 2030 Agenda by UNESCO (2020).

Repeated calls are being made for a new type of education that is transformative and oriented to the common good (e.g. UNESCO 2015, 2016, 2020, 2021), but as shown in the 2016 UNESCO Global Education Monitoring report much work still needs to be done in education to respond to current challenges and risks. Most recently (2021) UNESCO are centering 'transformative education' as a crucial dimension of global social change; a new social contract on educationis being called for as part of a landmark report on re-imagining the futures of education (International Commission on the Futures of Education (ICFoE 2021). In reference to the report of the ICFoE, entitled '*Reimagining our futures together: a new social contract for education*', UNESCO (2021a) states:

> *The new social contract for education must unite us around collective endeavours and provide the knowledge and innovation needed to shape sustainable and peaceful futures for all anchored in social, economic, and environmental justice. It must champion the role played by teachers.*

Here UNESCO, drawing on the ICFoE's work, is making a bold statement about the re-orientation of the public purposes of education, "to repair past injustices and enhance our capacity to act together for a more sustainable and just future". And, "for education to be of quality, it must be transformative" (ibid.). Like the ICFoE 2021 Re-imagining our Education Futures report, the ESD for 2030 roadmap (UNESCO 2020) calls for pushing the transformative edge of education that is needed for creating a sustainable future. Both stress the need for 'stepping up' teacher education and training for sustainable futures, which has attained new meaning following the COVID-19 pandemic which started in December 2019. Risk and vulnerability were exacerbated and reached new heights as countries and territories around the world went into lockdown, creating anxiety and

trauma, loss of lives and livelihoods, increased unemployment, poverty, widening inequality and digital divide (Hartford/Fricker 2020), but also revealing agency, resilience, and adaptation.

In May 2021, the ESD for 2030 roadmap was endorsed at the UNESCO World Conference on Education for Sustainable Development. The conference headlines and subsequent declaration communicated a powerful message: "Transformative learning for people and the planet is a necessity for our survival and that of future generations. The time to learn and act for our planet is now" (UNESCO 2021b, S. 4). It reaffirmed the urgency of the intersectional crisis facing humanity, namely "the climate crisis, mass loss of biodiversity, pollution, pandemic diseases, extreme poverty and inequalities, violent conflicts, and other environmental, social and economic crises that endanger life on our planet" (ibid., S. 2). This same declaration emphasises the coming together of cognitive, social-emotional and behavioural aspects of learning as a transformative learning process, as is also anticipated in the ESD for 2030 roadmap (UNESCO 2020).

Thus, it is encouraging to see that current global thinking is oriented towards rethinking the purpose of education and building teacher capacity for transformative and transgressive learning. This new agenda, however, needs to be contextually grounded, and there must be recognition of the "legacy of colonialism and segregation" (Lotz- Sisitka/Lupele 2017, S. 3), but also recognition of people's capabilities (what they have reason to value) and their inherent ability to reflect and act on their circumstances (agency for change) (ibid.). Reflecting on a large body of ESD work in southern Africa, these authors argue for:

- ESD learning processes that involve engagement with matters of concern arising at the social-ecological-political-economic interface. These matters of concern involve "engagement with risk, uncertainty and 'wicked' or difficult-to-resolve problems" AND "envisioning new futures and engagement in actions and practices that model and enable the emergence of a more sustainable, inclusive and socially just society"
- ESD and learning processes that involve the acquisition of new knowledge (critical thinking, systems thinking), ethics (e.g. care and empathy), action competence (abilities to act), and agency (evidence of action), and a commitment to transformative co-engaged, active learning pedagogies.
- A situated learning framework that recognizes that while topics like sustainable development, climate change, disaster risk management and loss of biodiversity carry universal meaning, they are also locally imbued with contextual meaning as the issues they represent differ in different contexts (ibid., S. 8). These topics require critical engagement with new forms of knowledge, new skills and competencies and new values. Teachers need a deep understanding of these new concepts and contexts so that they are able to mediate learning effectively in school.
- The importance of ESD learning processes drawing on indigenous and local knowledge to enable epistemological access to abstract forms of knowledge

that circulate in schools and universities (ibid., S. 10). ESD should promote 'learning as connection' which recognizes the relationship between meaning making, context and concept.

• Learning processes that enable a more reflexive society in which reflexive citizens critically review and alter everyday systems that we live by and often take for-granted. We need learners who constantly evaluate what they are learning in relation to the real world and to situations they have experiences of.

ESD for 2030, emphasizes the need for transformative education which enables learners to undertake transformative actions for sustainability. This perspective on education advocates, amongst other things: 1) a certain level of disruption, with people opting to step outside the safety of the status quo or the "usual" way of thinking, behaving or living, and 2) the acquisition of knowledge that enables learners come to be aware of the existence of certain realities and through critical analysis begin to understand the complexity of those realities. Furthermore, it requires an experiential exposure to these realities so that connection and empathy may be developed and compassion nurtured (UNESCO 2020, S. 13).

4.4.2   Contextual influences

Southern Africa, like many other parts of the developing world, is dealing with pressing environmental and sustainability challenges including climate change, loss of biodiversity and a scarcity of freshwater resources (Lotz-Sisitka 2011). While such issues are permeating sector policies and national development planning (e.g. South Africa National Development Plan - 2030 (National Planning Commission (NPC) 2011), these issues are slow to permeate teacher education context and practice. For example, South Africa still lacks substantive policy on ESD in teacher education (Schudel et al. 2021) and has education curricula that fail to give adequate attention to critical issues such as climate change, water scarcity, biodiversity loss and the critical relationship between humans and the environment (ibid.).

The impact of climate change is already being seen in southern Africa, and is projected to intensify over the coming decades. Increases in extreme weather events including floods and droughts are projected (South Africa. Department of Environmental Affairs (DEA) 2014), and the 2018 IPCC report notes that the temperature over southern Africa is rising faster at 2 °C (1.5 °C–2.5 °C) as compared to 1.5 °C (0.5 °C–1.5 °C) of global warming (IPCC, 2018). Areas in the south-western region of South Africa, parts of Namibia and Botswana, are expected to experience the largest increase in temperature and the western part of southern Africa is projected to become drier with increasing drought frequency (IPCC 2018, S. 197). This is already causing severe drought, retrenchment and job losses in the agricultural sector, and a sharp rise in food prices that have

pushed up inflation. Water availability is also a critical issue for many southern African countries, which, when coupled with climate change induced increases in evaporation and transpiration rates, creates intersectional crises. For example, this raises issues pertaining to hydroelectric power across the region, when energy supply is already sporadic and insecure.

The intersectoral nature of the crisis is clear. The water crisis includes issues of demographics, urbanization, economy, geography, sociology and more. Water stress will (and is already) affecting key economic activities, notably mining and electricity generation (DEA 2014). Groundwater resources are also under pressure, including from decreased runoff from climate change and the polluted runoff from mine waste dumps (DEA 2014, S. 27). "An increased frequency and intensity of extreme weather events is often cited as one of the most dangerous impacts of anthropogenic-induced climate change" (Fitchett 2018, S. 1). This was dramatically illustrated in 2018 when Tropical Cyclone Idai, a massive category four cyclone (Fitchett 2018), swept inland over Mozambique, Malawi and Zimbabwe, causing severe flooding, damage to property and loss of life (more than 1000 people died in Mozambique and more than a million were affected in Malawi - the poorest country in Africa - where 80% of its population rely on agriculture), creating intersectional vulnerability. By way of example, Idai impacted food security, created water borne disease risks, impacted homes and livelihoods, and left a problem of lack of basic services because of the destruction of infrastructure.

This shows the interconnected nature of the concerns that need to be addressed via ESD/transformative education in the southern African regional context where poverty levels remain amongst the highest in the world. As a matter of urgency, therefore, we need to build capacity for adaptation and sustainable livelihoods and lifestyles, especially for those in rural areas (e.g. 38 % of South Africans, 62 % of Namibians and 80 % of Malawians live in rural areas) where people are most vulnerable to social, environmental and economic risks (Lotz-Sisitka 2012). The influence of teachers across the region should not be underestimated, as they often hold high status in rural communities. Involving teachers in environment and sustainability concerns via continuous professional development training and educating the next generation of teachers in universities and colleges is therefore a key priority area in ESD, not only globally but also regionally.

The teacher education context itself, has its own complexities shaped by social inequalities and histories of coloniality and poor quality education, including poor quality teacher education. While considerable progress has been made in the post-independence period in addressing inclusion in education across the Southern African region, especially with regards to gains made in achieving universal primary education (over 80 per cent of appropriately aged children are now enrolled in school), on average only 50 per cent of children are in lower secondary education and 33 per cent in upper secondary education, showing a

strong drop off pattern (Association for the Development of Education in Africa (ADEA) 2014). There is strong agreement that the Southern African Development Community (SADC) countries need to address "the fundamentals of schooling – increase post-primary access and ensure quality teaching and learning" (ADEA 2014, S. 2) as learners across the region tend to perform poorly in international benchmark tests. The SADC is said to be continuously improving its education system, and is one of strongest regions in terms of educational progress on the African continent, but internationally it lags behind in many areas of educational performance, thus many challenges remain. Teacher education and supply has also seen some improvement, but remains a critical issue for some countries (ADEA 2014). Large classrooms and classroom conditions are also not ideal for many (ibid.). In addition to regional inequalities, South African schooling is also impacted by internal inequalities due to our history of colonialism and in particular apartheid. For example, Spaull contends that due to the apartheid government's racialized legislation, educational outcomes "are still split along traditional cleavages of racial and spatial apartheid [geographical separateness], now also complemented by the divides of wealth and class" (2019, S. 3). He argues that if the trajectory of improvement is to be sustained, teachers' content knowledge must be deepened and meaningful opportunities must be provided for teachers to improve their pedagogical practices.

In light of the above, ADEA (2012, S. 8) states that while important, "… simply expanding the quantity of education and lifelong learning will not be sufficient to advance sustainable societies". They argue that the quality of education and training, *including appropriateness and relevance,* must be enhanced. ADEA states further that "Thus ESD has come to strengthen the agenda for improvement of quality by focusing on the importance of learners effectively acquiring core skills needed for life and work" (ADEA 2012, cited in Shumba 2018, S. 20). As stated further by Shumba (2018, S. 20) "in ESD, teacher educators and teachers need to fundamentally change their own perspectives and learning cultures as well as the learning cultures in their institutions. There needs to be a change in the context and content of learning and the entire process of education", with Chikunda (2018) and Dei (2002) both arguing for strengthening Afrocentricity in ESD processes.

With this as background, our enquiry in this paper focuses on how transformative learning (T-learning) can be enacted in practice in Teacher Education in complex social-ecological settings, with specific reference to the southern African region where we live and work. We hone in on models and approaches for supporting *transformative learning in teacher education,* drawing on a body of research and practice that we have been developing over a twenty year period. In doing this, we follow Shumba's advice that "there is a need to critically reflect on pedagogy with an ESD perspective" (2018, S. 19), and that there is need to work with pedagogies that link teaching and learning processes with local culture, social, ecological and economic experiences, and people's matters

of concern and aspirations (Manteaw 2012). Such processes and engagements with people's 'matters of concern' as they arise in context, create better links between educational institutions and communities and thus situate learning in local sustainable development contexts (Lotz-Sisitka 2013; Lotz-Sisitka/Lupele 2017; Wilmot 2017), providing the foundational context for transformative learning, as we will elaborate below. Of interest to this perspective is the insight from the abridged UN DESD Monitoring and Evaluation report of 2012 which noted that ESD is characterised by a "co-evolutionary pedagogy" in which "as the sustainability content of the curriculum evolves, pedagogy is evolving simultaneously." (UNESCO 2012, S. 5). This offers an important onto-epistemic relational foundation for transformative learning in teacher education; in other words the content and the pedagogy are intimately connected, and arise from context, culture and social-ecological circumstances. This does not mean that wider knowledge(s) are not needed, but it means that transformative learning processes need to be situated, while reaching for wider knowledge(s).

4.4.3   Working out the meaning(s) of t-learning for teacher education in a southern African context

To support transformative pedagogies in South Africa, the environment and sustainability education community has developed and expanded the notion of active learning with an explicit interest in social-ecological change and counter-hegemonic learning with characteristics that can be described as open-ended, situated, deliberative and co-engaged, and action-oriented (Schudel 2013). Catalysing this work is a widely used model of active learning, developed by O'Donoghue (2001, S. 8) (see Figure 4.4.1) for the National Environmental Education Programme (NEEP) in South Africa, but which had wide uptake in southern Africa via the Southern African Development Community Regional Environmental Education Programme (SADC REEP) working across 14 countries. The framework structures information-based, enquiry, action and reporting/reflection activities around a central environmental focus (problem, risk or concern). The framework was influential in shaping teacher professional development programmes (see cases below), teaching practice, and teacher education practice since 2000 (i.e. a twenty year period). We share developments of this approach below drawing much on our published works, but also on some empirical data sets.
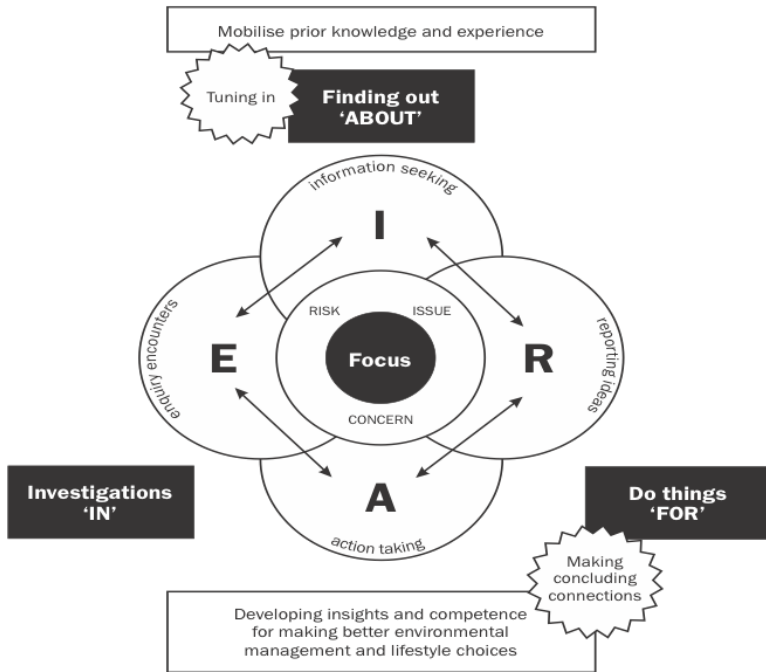
Fig. 4.4.1: Active learning framework (O'Donoghue 2001)

O'Donoghue's open process framework suggests the identification of an environmental focus (which may be a problem, concern or risk) and then draws attention to four different types of activities that can be used to structure environmental learning programmes around this focus. The active learning framework is designed as a structure for guiding learning programmes, but due to the under-theorising of active learning in relation to transformative pedagogies as described above, it can be used in many different ways depending on how its users see its purpose. It is easy to conceive of the active learning framework being used in a behaviorist way that is authoritarian and top-down or instrumentalist. This possibility is backed by previous research in the *Schools and Sustainability Course* where Hoffmann noted that: "It seems that behaviourist assumptions and intentions can easily be camouflaged within techniques borrowed from popular contemporary theories such as the active learning framework" (2005, S. 128). This implies that the active learning framework, as an intended open-ended exploratory and emancipatory tool, could ironically or paradoxically be re-interpreted by teachers to endorse oppressive relationships such as mandated litter clean-ups or other regimented activities in schools. This observation prompted

further research-based engagement with the model by Schudel (2013) who applied it in the *Schools and Sustainability* professional development course for teachers, with critical realist philosophical underlabouring (Bhaskar 1993; Schudel 2017). Schudel's interest was to deepen the emancipatory potential of the active learning framework. Dialectical critical realism (Bhaskar 1993 – which uses a schema called MELD – see below), as applied by Schudel (2013; 2017), allows for elaborating on the onto-epistemic dialectic of active learning as follows:

- The First Moment (1M): The situated nature of active learning is deepened through an understanding of critical realism's insistence on grounded knowledge of 'what is' and 'what is not', thus highlighting the importance of understanding context and what works in context, but also taking a critical stance on inequalities and oppressive relations in social-ecological relationships by focusing on 'what is not'.
- The Second Edge (2E): The open-ended nature of active learning is deepened through developing knowledge of what is absent and what could be done differently (knowledge of 'what could be'), thus insisting on the need for transformation (change in the status quo) and on the need for creative re-imagining of possibility in the grounded world described at 1M.
- The Third Level (3L): The deliberative and co-engaged nature of active learning is deepened through an understanding of 'totality' (Bhaskar 1993) which embraces a laminated understanding of social-ecological complexities. A laminated perspective brings in an insistence on a holistic understanding and the ethical implications of possibilities considered at 2E. There thus becomes an emphasis on deliberations with and amongst all peoples, inclusive of other life forms and healthy ecosystems that insists on consideration of 'what should be' in the context of the whole.
- The Fourth Dimension (4D): The action-oriented nature of active learning is deepened through knowledge of what real change can be achieved in context (knowledge of 'what can be'). This dimension insists that responsive and restorative actions are grounded (informed by 1M), realistic (informed by 2E), ethical (informed by 3L) and suitable and practicable for those implicated in and affected by their execution. This dimension emphasises decision making and agency for change.

O'Donoghue et al. (2021) have further elaborated on active learning in the Fundisa for Change programme using critical realism and also the work of Edwards (2014). Their work is especially in the context of the South African curriculum's call for strengthening discipline knowledge and higher order thinking. They emphasise "What can be known and understood through a subject discipline" (Schudel et al. 2008) which is an elaboration on the importance of understanding 'what is' and 'what is not' (1M). By asking "are grasp of concepts and systems thinking being developed for deliberating better ways of doing things together" they are emphasising critical realism's 2E emphasis on possibility for change

as well as 3L's interest in 'what should be' (the ethical imperative for things to 'be better' in the end). By asking the question, "Are relevant applications being assessed?", the notion of relevance resonates with 4D's insistence on what works in specific contexts (see discussion in Case 2 below).

Lotz-Sisitka et al.'s (2015) work on transformative, transgressive learning in an International Science Council (ISC) funded research programme focussing on the type of learning that is necessary to respond to climate change challenges and deeply rooted 'systemic dysfunction', has expanded the understanding of potential dimensions and learning outcomes from such processes. It also offered a scoping of intersecting theoretical influences in theorising transformative learning. These included phenomenological and experiential deepening of transformative learning, decolonial impulses shaping transformative learning praxis, reflexive social learning theories that emphasise situational evaluation, and studies that have been shaped by socio-cultural and critical realist influences (as in Schudel and O'Donoghue's work above). This work is broadening perspective on what transformative learning is, including, but extending beyond UNESCO's conception of ESD being about cognitive learning, socio-emotional learning and behavioral or action oriented learning (Rieckmann 2017; UNESCO 2019). Lotz-Sisitka's (2021) review of the ISC research programme points to the need to include these three dimensions in conceptions of T-learning (cf. Figure 4.2.2), and our research shows the need to consider socio-emotional (ethical) as well as action oriented dynamics, in accordance with UNESCO's (2019) finding that "there is a great need for countries to pay more attention to the social and emotional and behavioural [action oriented] dimensions of learning, to create synergistic and holistic impacts" (S. 1), *but* that transformative learning reaches beyond individualised gains, towards transgressive/emancipatory, social or collective learning approaches that challenge taken for granted norms that hold unsustainability and social injustices in place (cf. also Lotz-Sisitka et al. 2017; Wals/Peters 2017; Wals 2019, 2020; Kulundu/McGarry/Lotz-Sisitka 2020). By definition such a process is transdisciplinary in the sense that the ontologically grounded and dialectically emergent actions (in open systems) that are catalysed by education and learning in response to sustainability challenges are most often oriented towards producing new forms of human activity (cf. Lotz-Sisitka/Mukute 2012; Lotz-Sisitka/Pesanayi 2020; Bhaskar 2010), and if this is the case, this needs to be done collaboratively (cf. Engestrom/Sannino 2010). This (see Figure 4.4.2) expands more traditional or individualised notions of transformative learning (e.g. those influenced by Mezirow 1978, 1985, 1990, 2000 – as also reviewed by Kitchenham 2008; UNESCO 2019); hence we refer to the heuristic of T-learning (to expansively and dialectically accommodate the breadth of extended meaning(s)).

Transformative learning in transformations to sustainability involves expansions that are transgressive, transdisciplinary and together

transformative
encourage cognitive and emotional perspective shifts that potentially lead to political/social-ecological/eco-cultural relational change necessary for care, protection and affirmation of species being on our planet

transgressive
explicitly challenge taken for granted normalised practices, activity, cultures, views and systems that have become oppressive, discriminatory and unsustainable with critique, empathy, care and reflexivity

transdisciplinary
crossing boundaries to co-create new concepts and forms of human activity in iterative and collaborative ways at multiple levels; weaving inter-disciplinary synthesis back into reality via transformative praxis engagements

together
working with others to right and re-write the wrongs, strengthen collective emancipatory agency, ethico-political commitments to the common good, and system wide change

application to ALL learning systems, curricula, processes and praxis in context of transformations to sustainability
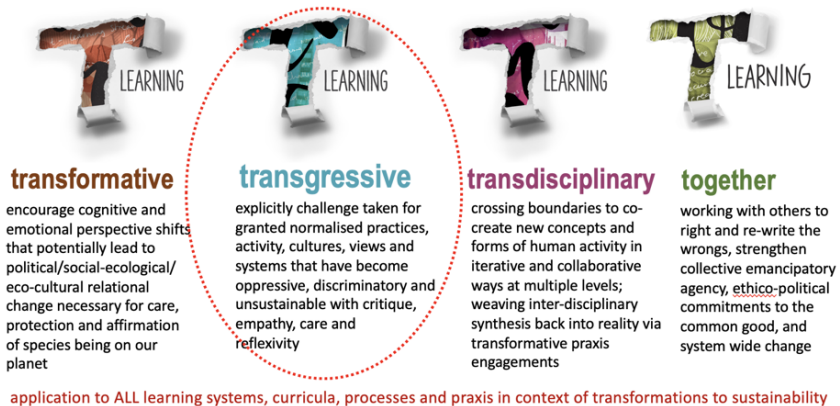
Fig. 4.4.2: A framework for transformative learning in transformations to sustainability (T-learning) Source: Lotz-Sisitka (in press)

The onto-epistemological framing of transformative active learning (cf. Figure 4.4.1 after O'Donoghue 2001; 2013; 2019; and Schudel 2013; 2017; 2021) has been widely applied in a number of different teacher education programmes in southern Africa, with the T-learning framework (Lotz-Sisitka et al. 2015; Lotz-Sisitka in press) discussed above (cf. Figure 4.4.2) being used to consider the scope and potential outcomes of such learning processes. Below we share three short vignettes of these applications.

4.4.4   Applying transformative learning models in teacher education programmes

Case 1: Schools and Sustainability Teacher Professional Development Course

The *Schools and Sustainability Course* was a Rhodes University accredited teacher professional development course. The course ran over one year with three regional workshops and one or two tutorial workshops in between respective regional workshops. The course supported teachers to realise opportunities for environmental learning in the curriculum and to support sustainable lifestyle choices through this curriculum work. Course outcomes focussed on planning, implementing and evaluating lesson plans with an environmental focus; adapting, using and reflecting on learning materials; applying and reflecting on active learning processes; and selecting and applying relevant assessment processes (Schudel et al. 2008).

The course was a muti-partner initiative, and was run for eight separate cohorts of teachers across South Africa's nine provinces. Consistent throughout all versions of the course was a focus on the active learning framework (Figure 4.5.1 above), following the NEEP's commitment to the same (Lotz-Sisitka/ Raven 2001; NEEP-GET 2005; Schudel 2021). The process of teachers' engagement with the active learning framework (Figure 4.5.1) included:

- Information seeking activities: During which learners find out what is already known about the environmental focus (by learners themselves, their peers, relatives and neighbours). They identify what else they need to find out (know) and find that information (with help from the teacher) through the use of information resources and 'expert' knowledge from institutions and individuals in the local community. Amongst other possibilities, types of information might include foundational environmental knowledge of ecological principles and systems, scientific (natural science or social science) information about an issue or practice, a technological design to support a particular practice, or information on an ethical standpoint on a particular issue.
- Enquiry encounters: During which learners investigate the focus further through establishing (through studies such as interviews, audits, surveys, observations, and field studies) how the environmental issue, risk or concern is being experienced in their community through undertaking "investigations in local surroundings" (O'Donoghue 2001, S. 7). "This enables learners to monitor, analyse, and evaluate [a] situation, resource or activity, and then plan to take appropriate action" (Schudel et al. 2008, S. 2).
- Action taking: During which learners act to make "a conscious and informed response" to an issue/concern/risk raised in the course or "[try] out ways of doing things differently" (O'Donoghue et al. 2007, S. 141). Schudel et al. (2008) explained that action does not necessarily have to be a practical hands-on activity, but can also involve planning for action, or lobbying for authorities to take action.
- Reporting: During which learners reflect on the other dimensions of the framework. This dimension brings in opportunities for critical reflection especially around O'Donoghue's suggested "steering question" of "What do we now know and what have we achieved towards sustaining alternatives?" (2001, S. 10).

Use of this framework revealed a number of successes and challenges that can be explained by making use of the deepening perspectives provided by critical realist underlabouring as described above. Schudel's (2017) work applies the critical realist inspired questions of 'what is?' and 'what is not?', 'what could be?', 'what should be?', and 'what can be?' to two case studies from the *Schools and Sustainability Course*. Here, a third case study is briefly explored, applying the questions to a lesson developed by a teacher around water and sanitation issues.

At the time of the course (in 2008), Zodwa[44], was teaching in a densely populated informal settlement where only thirty percent of learners could afford school fees in a community with high unemployment, poverty, illiteracy and crime. Learners came to school hungry, and some lived in child-headed households because parents had sought employment elsewhere. The community was affected by a high rate of illnesses such as HIV/AIDS, leaving orphaned children, and parents struggled to pay municipal bills. The school had a permaculture garden (including fruit, vegetables, herbs and flowers) watered partly by recycled water. Permaculture techniques such as intercropping, and innovative rainwater harvesting approaches were evident in the flourishing garden. At the same time the school was struggling with sanitation problems such as blocked toilets, broken hand basins, leaking taps and pipes and blocked drains leading to foul smells. Zodwa explained that development builders had used very cheap material with small water pipes. All of this was exacerbated by vandalism, and theft, which resulted in learners and teachers having to leave school early due to inadequate sanitation facilities, affecting teaching and learning, and thus ultimately quality education opportunities. Zodwa taught in an overcrowded classroom of 60 or more Grade 3 learners at a time.

Influenced by the information and enquiry dimensions of the active learning framework Zodwa began lessons by mapping water wasting activities and water hazards with the learners, noting 'hot spots' for intervention and discussing and reported in class the implications for health and human rights (all at a Grade 3 level). They deepened their inquiry by collecting and measuring water lost from leaking taps and, as an assessment task, they drew a bar graph showing daily water loss from the taps. Influenced by the 'information dimension' of the active learning framework, they then learned about ways of saving water. Firstly, they were shown practically how the permaculture garden at the school demonstrated principles of water saving. They also used a textbook to read about ways of saving water. Influenced by the 'action' aspect of the active learning framework, they then signed a pledge regarding their commitment to water saving. Following this the class discussed the knowledge they gained from the reading and designed a water policy by bringing suggestions after working in groups. The policy included commitments such as: "You must wash hands in a bucket", "You must water trees with water used for washing dishes", "You must close the tap even if it is not you who opened it", "Collect water from leaking taps with a bucket" (and more). Additionally, learners wrote placards as an awareness campaign to be distributed to the whole school. In a further enquiry activity, learners interviewed educators and members of the school governing body about what caused water waste in the school and in the community. They then conducted another action by writing letters to the principal and school governing body, and municipal ward councillor about these problems.

Applying a critical realist underlabouring to this case study as described above, we can identify the following successes and challenges for Zodwa's lesson plan.

- Zodwa had a solidly grounded lesson in terms of supporting learners to explore at 1M 'what is' and 'what is not' through her situated enquiries. Learners had quantitative studies of water loss, descriptive mapping of water loss hot spots and qualitative enquiries through their interviews into the social complexities of water management and water loss.
- At 2E, learners developed extensive ideas regarding 'what could be' by exploring ways of saving water both through an inspired tour of the permaculture garden as well as through suggestions from their textbook about ways to save water.
- At 3L, learners developed a sense of 'what should be' when their discussion of health and human rights helped them to realise that they had rights to a better situation at school.
- At 4D, action projects developed incrementally as successive challenges were revealed to the learners. But each successive action project was grounded in something that they had learned at 1M. Despite their class commitment in their establishment of a water saving policy, they realised after returning to 3L, that a more holistic response was needed and therefore they needed an additional awareness campaign to get the rest of the school on board. Even after that, they realised that issues such as vandalism are more complex than simply creating a policy and lobbying for it. They then did a further grounding by conducting the interviews described at 1M above. Insights from this interview process included the need for: Building additional toilets, improving water supply, employing general workers to clean and look after them, and putting security measures in place. Realising that these measures were beyond the learners themselves, Zodwa devised a new strategy of helping learners to write letters to the principal, school governing body and municipal ward councillor. Learners received a positive reply from the ward councillor, which later (two years later) had continued to generate collective agency and cooperation with the school. Zodwa (in 2011) stated: "The councillor worked hand in glove with the community police, local policing forum, ward committees and residents to address the issue of vandalism – at community meetings where residents could act as watchdogs for their school."

On reflection on her experience of teaching through these active learning processes, Zodwa commented on the success of the placards in raising awareness amongst teachers and other learners. Additionally, she noted: "I have experienced that I must never under-estimate learners. I have seen the manner in which they could discuss and write their plan of action like identifying relevant people, the places they have identified in the community with leaks etc." She also noted that "they enjoyed doing things on their own and they were proud of their work."

Case 2: Fundisa for Change Teacher Professional Development Programme

The Fundisa [Teaching] for Change is a national environmental learning/ESD teacher education network (Schudel et al. 2021). It built on the *Schools and Sustainability Course*, and was established to strengthen the systemic impact of ESD in teacher education (Lotz-Sisitka 2011; Songqwaru 2020). The programme is implemented through a national consortium of environmental sector partners and teacher education institutions. It has developed a model which supports teachers to 'know your subject, improve your teaching practice, and improve your assessment practice' in response to the call for strengthening teachers' subject knowledge, their pedagogical content knowledge and assessment praxis. This need is particularly acute in a context where new environmental/sustainability concepts have been introduced into the national curriculum (e.g. sustainable development, green economy, integrated water resources management, climate change, environmental impact, biodiversity etc.) and teachers have had little orientation to these concepts either in their own schooling or teacher education, yet they are expected to teach these using active learning approaches as is the case in South Africa (Lotz-Sisitka 2011; Songqwaru 2020; Schudel et al. 2021). Teachers participating in the Fundisa for Change programme would typically be provided with teacher education materials focussing on one of these concepts that are aligned with the curriculum. This would be during a five-day continuous professional development (CPD) short course offered by Fundisa for Change partners. Teachers submit a Portfolio of Evidence that shares how they have applied the professional development programme to their teaching practice. At the core of the programme is 'transformative environmental / ESD learning through teacher education' and teachers are typically exposed to active learning processes focussing on environmental concerns, and then typically consider how to engage learners in the active learning processes described above. According to Rieckmann (2017), although ESD typically prioritises content on climate change, poverty and sustainable consumption in the curriculum, it also creates interactive, learner-centred teaching and learning settings. In the Fundisa for Change programme, ESD goes beyond just addressing learning content but also includes a focus on learning outcomes, pedagogy and the learning environment.

In a typical Fundisa for Change climate change, water studies, or biodiversity etc. teacher education programme, teachers would start off by mapping out matters of concern/risks related to climate change /water/biodiversity etc. in their school and local community. These issues can be any that matter in the school, community or regional context. They are expected to reflect on what they want to change and/or strengthen in their school and community to consider more sustainable alternatives, and to identify how and who they can partner with to make the desired changes. Additionally they need to consider curriculum requirements and implications for how they teach and assess learners in their subjects in re-

lation to the identified matters of concern and how they can be addressed. Implementation in the classroom requires teachers to work with the O'Donoghue process model (Figure 4.4.3) for planning environmental learning. As can be seen below, the model is carefully designed to support transformative learning for teachers and the learners that they teach.
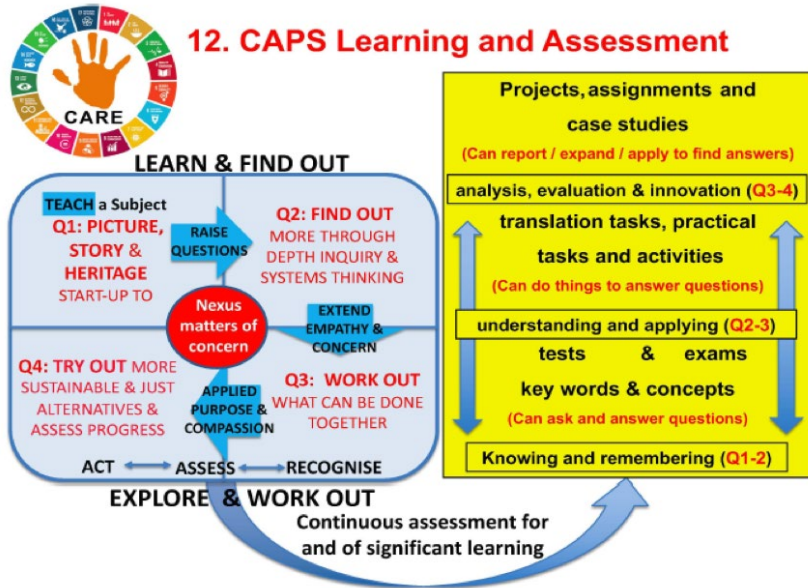

Fig. 4.4.3: Active learning framework developed further via expansive learning sequence (after Edwards 2014, see below) by O'Donoghue (2020) for the Fundisa [Teaching] for Change programme where curriculum and assessment praxis need to work 'in tandem'

4 Demonstration of grasp of key concepts and ways of enquiring	1 Introduction of key concepts and modelling of ways of engaging with key concepts
3 More open tasks which enable learners to apply key concepts and ways of enquiring	2 Tightly structured tasks which demand engagement with key concepts and ways of enquiring

Fig. 4.4.4: Learning sequence (Edwards 2014)

To follow the 'updated' ESD transformative learning work done by O'Donoghue (i.e. advancement of the original active learning framework from 2001, 2013, 2014, 2019; 2020), it is useful (in part) to return to the original Edwards (2014) learning sequence. Working with a Vygotskian learning sequence, she describes how Figure 4.5.4

is an attempt to point to the advantages of taking time to enable learners to both acquire and use, i.e. internalise and externalise, the substantive and syntactic knowledge of the subject-based curriculum; while also developing higher order thinking and taking control over their own learning through tasks given in quadrants 2 and 3 (S. 7).

She emphasises (2014, S. 7ff.) the importance of what she calls induction into an area of study via a 'courteous conversation' with learners in Quadrant 1 which in part inducts learners into the language and forms of representation to be used in the learning interaction, in part demonstrates the use of 'syntactic and substantive knowledge', and in part informally diagnoses how learners are interpreting the knowledge being introduced. Quadrant 2 proceeds 'when learners have started to make connections between what they already knew, and what is being introduced'. She goes on to say that in this quadrant tasks should be highly structured so that learners have time to rehearse and practice working with the syntactic and substantive knowledge introduced in the first quadrant, noting Vygotsky's (1998) point that imitation is an important part of the learning process. The tasks should challenge the learners, teachers should carefully guide learners and assess *for* learning (not of learning). Quadrant 3 is, according to Edwards (2014) the most challenging for learners, as this is the point at which learners move into open ended problem solving activities, they deal with 'ambiguity and risk' and deal with challenging tasks. Here the role of the teacher 'changes yet again', this time they are positioned as 'knowledgeable resources' for learners to draw on as they make their way through the open-ended problem solving tasks that have been set for them. Edwards (2014) states that this is often the most 'transformative stage' for the teachers. In Quadrant 4, teachers and learners engage in summative assessment, and can also review where they are, in order to plan new and extended learning sequences.

As can be seen, the work of Edwards (2014) in conversation with O'Donoghue's (2014; 2019; and the O'Donoghue/Misser/Snow-Macleod 2020) work, offers a model of transformative learning for teachers in training to work through, and via this develop a more in-depth understanding of a transformative learning sequence for learners, while at the same time transforming their own roles and experiences as teachers. This model is also useful for steering away from superficial interpretations of learner-centred education which have plagued many curriculum reforms, and as stated by O'Donoghue (2014, S. 21), the work of Edwards shows "how good teaching appears to emerge through situated teaching for concept acquisition with a transition to more learner-led participation", thus making nonsense of dualist notions of 'content teaching' vs. 'learner centred teaching'.

Applied to environment and sustainability education or ESD O'Donoghue (2014, S. 18) develops this argument through the type of onto-epistemic pedagogical engagement outlined above. Reviewing expansive learning research in southern Africa, he states that

[t]he research projects [referring to a range of expansive T-learning re-search projects – referenced above] also show that [expansive T-learn-ing] requires the introduction of new knowledge juxtaposed with and/or brought into dialectical reflexive engagement with existing knowledge and an experience of socio-historically situated risk.

He develops the Edwards (2014) sequence with an emphasis on heritage and heritage-based knowledge, as earlier research illuminated that in African con-texts much of the (colonially inspired) schooling system has been a process of alienation from home and community cultures (O'Donoghue et al. 2007; cf. also Masuku 2019; Chikunda 2018). As a consequence, there is a need to support learners in making connections dialectically between 'what is' or the existing context and their experiences thereof, and new concepts and experiences that may be offered via formal learning opportunities (ibid.; cf. also O'Donoghue 2014). Hence O'Donoghue's version of the Edwards sequence for ESD starts with pictures, stories and heritage (Quadrant 1) which are focussed on matters of concern in the environment or context, depth inquiry (Quadrant 2), approach-ing problem solving with care ethics together (Quadrant 3), and assessing more sustainable alternatives (Quadrant 4) (cf. Figure 3).

In the Fundisa for Change programme, this model has been applied in teach-er education programmes with over 1000 teachers, and much is being learned about how to support transformative learning from this work (cf. in-depth re-search-based examples of classroom practices in Nkhahle 2021; Schudel et al. 2021). Notwithstanding difficulties at the level of implementation, revealed also in Zodwa's case above, teachers and teacher educators have indicated appreci-ation for the way in which the Fundisa for Change programme gives attention to learners life experiences and worlds (heritage, story start ups), the content knowledge of the curriculum (concepts and structured depth inquiry), and prob-lem solving and shared activity that contribute to sustainability alternatives and practices while also giving attention to assessment (Songqwaru 2020; Nkhahle 2021). As such, these are not just 'lessons' or 'lesson sequences' but transform-ative learning processes that are also processes of 'cultural change towards fu-ture sustainability" and one is then able to interpret transformative education or ESD as "a process of praxiological dialectical reflexivity and social change" (O'Donoghue 2014, S. 21). O'Donoghue's reframing of the Edwards (2014) sequence below (Figure 4.4.5) shows his nuanced and careful interpretation of this process framework in a southern African ESD context.
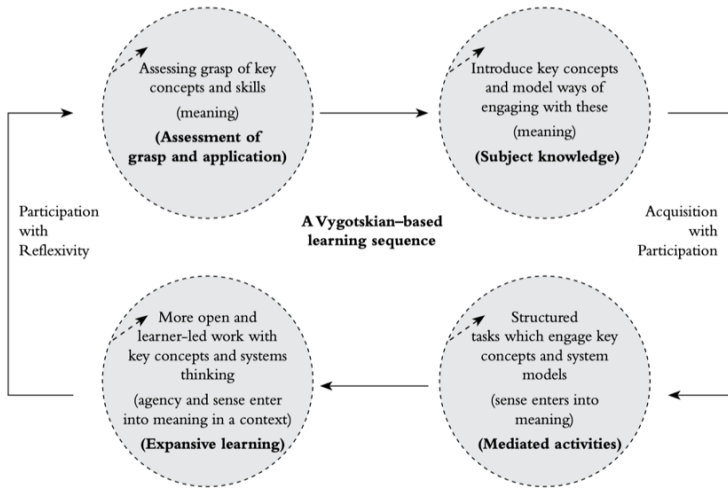
Fig. 4.4.5: A lesson sequence with acquisition for participation with reflexivity (O'Donoghue 2014 adapted from Edwards 2014).

Fundisa for Change research by Lambrechts (2021) drawing on this model, shows that involvement of the teacher (i.e. via the roles in the learning sequence outlined by Edwards 2014) is *crucial* for enabling transformative learning. She found that, where there was little involvement of the teacher (e.g. when the teacher just 'leaves' the children to do tasks), there was not enough knowledge in the group to take control of the tasks, and the expansion towards transformative alternatives and assessment thereof did not take place. Where teachers were involved, learners *were able* to take control of the tasks, transforming their own competences, and transgressing by putting aspects of more sustainable alternatives in place. Related to teachers involvement, Brundit's (2021) research into the acquisition of teachers environment and sustainability Pedagogical Content Knowledge (PCK) the Fundisa for Change Programme found that "opportunities for active and collaborative learning [in the professional development programme] appeared to be an amplifier for the transformation of professional knowledge into personal PCK for teachers on the course and acted in a general way across PCK components" (S. 311).

Evaluation research by Songqwaru (2020) which undertook in-depth research across five Fundisa for Change sites, shows that opportunities for active learning and fieldwork amongst teachers and teacher educators, enabled teachers to see the relationship between theory (content as specified in the curriculum) and practice (sustainability practice *as well as* teaching practice), thus supporting *change oriented (transformative) learning* amongst teachers and teacher educators. She states, "Participants shared how they would do things differently in their personal lives, demonstrating that what is valued influences actions."

(2021, S. 326) Other outcomes such as improved understanding of environment and sustainability knowledge, teaching and assessment methods expansions, development of teaching praxis, and abilities to relate environment and sustainability content knowledge to broader issues were also obtained in the programme (ibid.). This has also been confirmed in an in-depth study into teaching practices in the Fundisa for Change programme by Nkhahle (2021) whose research found that, despite extremely challenging classroom contexts, teachers were both willing and able to advance aspects of environment and sustainability education via the professional development programme through changed practices at classroom level. However, as shown across all of our work, this requires careful contextualisation, and ongoing support for teachers. Like Nkhahle (2021) and Schudel et al. (2021), Songqwaru (2021, S. 328) argues, "importantly, professional development programmes must be institutionalised within professional development directorates so that funding can be made available for the delivery of the programmes on a more sustainable basis."

Case 3: Sustainability Starts with Teachers: UNESCO Regional Office for Southern Africa teacher educators course

The models and approaches developed above, are also applied, and being elaborated at SADC regional level with teacher educators (including TVET educators), not just teachers in the UNESCO Sustainability Starts with Teachers programme, that seeks to address the need for institutionalisation of professional development initiatives as recommended by Songqwaru (2020). Teacher educators are supported to try out transformative learning processes in their colleges and/universities to seed curriculum innovations, or teaching practice innovations with their students, or college-community engaged innovations. Teacher educators are being exposed to the active learning inspired T-learning sequence that promotes situated start-up in context, exposure and depth inquiry drawing on new knowledge, carefully structured mediated activity and assessment of changes towards sustainability in a reflexive learning process (O'Donoghue 2014) that contributes to ethical engagement that stimulates cultural changes in institutions and their communities, and provides platforms for further T-learning as outlined in Figure 2. These are typically called 'ESD Change Projects' (Lotz-Sisitka/Chikunda 2020). Team leaders in this programme have also been encouraging teacher educators to assess the value that has been created for themselves and their communities of practice where the T-learning innovations have been tried out following Wenger, Traynor and De Laat's (2011) concept of the value creation framework that helps to assess and evaluate what emerges from a T-learning process. This is offering insight into the nature of the T-learning processes that are emerging for course participants in the Sustainability Starts with Teachers programme as they work on and with transformative learning orientations to their own praxis. Evidence from the most recent evaluation on this programme

(Lotz-Sisitka/Chikunda 2020) shows for example (drawing on Figure 4.2.2) that the T-learning processes emerging included:

- *Transformative* dynamics in the sense that there were cognitive, socio-emotional and behavioral/action outcomes for example teacher educators stating: "I now have a new perspective on waste management and science teaching." and "There is also a noticeable growing interest in students in designing their own teaching material using local resources rather than waiting for government or parents to buy them."
- *Transgressive* in the sense that taken for granted or embedded institutional/cultural norms that were holding unsustainability and social injustice in place were challenged for example college lecturers stating: "Through this Change Project, we are reconsidering the criteria of measuring success in learning, which is assessing significant learning and the integration of cultural knowledge and Science in the project through soap making with our students. We also plan to assess whether the problem of waste oil would be solved through this change project" and "new perspective on the engineering course moving from repairing to redesigning old engines that produce fewer emissions. The process of developing this change project has helped me to develop an in-depth understanding of the significance of sustainability."
- *Transdisciplinary* in the sense that multi-disciplinary actors and communities were working together to transform human activity in more sustainable directions, for example college lecturers stating, "We now have this unity of purpose on environmental challenges and we come together in looking for solutions to the issue." and "we now have institutionalized sustainable practices on plastic bottles."
- *Together* i.e. collective expansive social learning was taking place which catalysed transformative agency not just at the individual level, but also in teacher education communities of practice (intra-institutional) and between Teacher Education institutions and communities or local stakeholders (inter-institutional), for example, "As a community of practice, we establishing a network with schools and local community elders to give input on traditional gardening methods".

4.4.5   Conclusions: some implications for teacher education research and praxis

Our earlier studies, as well as most recent data sets show that the T-learning approaches as conceptualised and reported on in this paper, are leading to real changes in practice and community towards more sustainable alternatives. These are occurring in some of the world's most complex and difficult circumstances when it comes to dealing with sustainability challenges and possibilities for transformative education through teacher education praxis as discussed in the context section above. These gains have not been without their challenges, and we are

not proposing an 'over-hopeful' narrative or proposing that social and cultural change can 'easily' take place via educational interventions, as we are highly conscious of the many deep seated structural and historical legacies that need to be traversed. But, we *are* pointing out a key finding that permeates all of this work over the past 20 years: *when teachers, learners, teacher educators and communities are given the space to conceptualise and engage in transformative learning processes around their matters of concern, they readily engage with these processes, and while confronting complex difficulties, also rapidly advance local level sustainability alternatives and teaching practice innovations that matter to them and those they are involving. Embedding and orientating these processes meaningfully in curriculum requirements brings relevance to education.* This same finding is reported on elsewhere in a large number of our studies (cf. cases reported on in Lotz-Sisitka et al. 2016; 2017; Schudel et al. 2021). The principles of transformative learning that have slowly been emerging from our collective research as outlined above, appear to be offering an orientation to transformative learning that is meeting teachers' needs and catalysing their interest in sustainability praxis and quality education, as envisaged by the 2021 ICFoE (2021) Re-imagining our Education Futures report, and their call for a social contract to renew the purposes and praxis of education. It is indeed the possibility of actualising local social contracts for education that are grounded in peoples matters of concern, experiences, and the demands of the curriculum, that seem to be of catalytic value for enabling transformative learning as conceptualised via our progressive work. And centering the role(s) of the teacher in this process is vital.

Across our ongoing work, we have found that giving attention to transformative learning must, necessarily, give equal attention to situated knowledge(s) and experience (i.e. heritage), systemic and deep engagements with existing knowledge on offer (e.g. scientific, social and other forms of documented knowledges), pedagogical praxis that mediates abilities to engage in local level problem solving and collaborative inquiry into shared matters of concern, and innovation in assessment (cf. Wilmot 2017; Shumba/Mandikonza/Lotz-Sisitka 2021). The latter i.e. more meaningful assessment for and of transformative learning as conceptualised here, remains under-researched.

As indicated above, as a teacher education research community, we have been working for several years on developing the meaning(s) of transformative learning in and for teacher education. This has taken place at three interconnected levels where transformative learning principles and philosophical underlabouring *in principle,* has been productively applied in 1) the teaching practices of teachers to enable transformative learning of children in schools and in school-communities. 2) At the same time, transformative learning has been modelled and supported in the teacher professional development programmes by teacher educators and tutors, who have applied the same basic principles to their teacher education praxis (cf. Schudel 2013; O'Donoghue et al. 2021; Songqwaru 2020; Tshininganyamwe 2016; Lotz-Sisitka et al. 2020; Nkhlahle 2021; Lambre-

chts 2021; Brundit 2012; Schudel et al. 2021 amongst others, cf. also case studies in Lotz-Sisitka et al. 2017, S. 3) The same principles of T-learning have also been applied are being evaluated at the level of teacher education ESD innovations (Lotz-Sisitka/Chikunda 2020), where teacher educators are applying these principles and approaches with teachers-in-training, who in turn were also learning to apply these via teaching practice as they were preparing to become teachers of the future. This shows that transformative learning in ESD, when considered in the context of teachers as proposed by UNESCO, must by necessity be *a multi-levelled endeavour,* as the teacher educators working with teachers-in-training or practicing teachers all (often together) need to develop their understandings of transformative learning for sustainability and a more socially just world order.

Our research shows that working on principles and core methodologies for transformative learning offers a 'centre point' or 'pivot' around which these different levels of the teacher education system can coalesce in advancing ESD and transformative education as per UNESCO's interest, and as needed in the southern African region (cf. Lotz-Sisitka/Lupele 2017).

From a theoretical perspective, our research confirms the value of underlabouring active learning and transformative learning approaches with the critical realist dialectic which grounds learning in 'what is' and enables learners, teachers and teacher educators to consider what is absent or 'not yet there' and then consider what is possible, and what could be there (from an ethical and practical perspective) and then advance their agency to contribute to more sustainable alternatives and assess these together (cf. Schudel 2013; 2017; O'Donoghue 2014; Songqwaru 2020; Tshininganyamwe/Lotz-Sisitka 2021; Lotz-Sisitka in press). As shown above, this also requires careful work with good quality learning theory (e.g. O'Donoghue's work drawing on Edwards, 2014 which in turn draws on Vygotsky's work; cf. also Lotz-Sisitka in press) to avoid superficial interpretations of for example learner-centred education and to avoid dualism between content-based teaching and learner-centred methods. Importantly, it also requires innovations in assessment practice that are aligned with the intents of transformative education as pointed to by Wilmot (2017), O'Donoghue (2014), O'Donoghue et al. (2020), and Shumba et al. (2021).

From a policy perspective, our recommendation would be that UNESCO and nation states that are working with the Futures of Education new 'social contract' to re-imagine education as a common good that *is* addressing the planetary challenges at all levels consider the insights in this paper so as to not just reproduce the discourse of 'transformative education'. Rather, we would wish for more practical support for the forms of engagement that are required for transformative education to take root (as shown in our studies above). This requires adequate investment in supporting teachers, *and* teacher educators to develop practically grounded expertise in ESD *as* a transformative learning process, that is also transgressive, transdisciplinary and enacted collectively or together with others in institutions and communities.

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