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A landscape view of emerging sustainability responses within VET

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ABSTRACT

With evidence of global climate change and ongoing ecological degradation, there is an urgent need to give more attention to sustainability within VET to ensure that VET does not remain complicit in reproducing the unjust and unsustainable trajectories of current economic and development pathways. At present, the VET literature does not adequately address these issues, hence the need for this special issue. In response, this paper offers a meta-reflective 'landscape view' of the sustainability within the VET 'field of knowledge' as it is emerging. Here, we use landscape review as a multi-dimensional, 'outside-in' view that provides a basis for understanding the broad context and helps to inform actionable next steps. This analysis we believe helps to highlight the key emerging priorities as well as what paths VET is taking on the journey to sustainability. The analysis shows that while some progress has been made in policy and practice related to the 'greening' of VET, much of the current response within VET to the environmental challenge reflects a minimalist reformist approach, characterised by 'bolt-ons' to existing institutional structures and curricula whilst leaving the fundamental beliefs in productivism, industrialisation and growth in place. Yet, as argued by researchers working on green economy, these beliefs are often complicit in co-creation of the environmental crisis.

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Introduction

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After establishing the evidential base on which we build this paper, we proceed to offer a brief critique of VET and its problematic grounding in the very beliefs and processes that have caused the climate and environment crisis. We then go into literatures that are poorly reflected in VET academia regarding green skills, growth and economy, drawing both on policy literatures on greening and their broader (non-VET) critiques. We then move into the environmental and sustainability education literature, and specifically the work of Sterling (2004) to find an analytical tool for considering and critiquing the nature of VET greening. Drawing on the limited empirical literature (which is almost entirely 'grey'), we ground this analysis in what we can say about progress in Africa in particular. We argue that the shift towards global sustainability, the greening of work, and the emergence of just transitions towards sustainability require fundamental epistemological shifts and requires a framing of new approaches to learning vocationally. The paper illuminates the 'double learning challenge' (Sterling 2004) VET is facing, a paradigmatic challenge as well as a pedagogical one, as reflected in UNESCO's commitment to transforming VET as well as supporting VET that is responding to wider transformations in the world of work and the life-world. Finally, a systems-based approach is offered as a possibility for thinking about the deep change that is needed within VET as it transitions towards supporting more sustainable futures.

Orientation and methodology

This discussion has global significant, and hence we draw on international VET policy guidance, mainly produced out of UNESCO/UNESCO-UNEVOC to track trends towards the greening of VET and a more recent (re)positioning of the greening of VET within Just Transitioning discourses. To offer grounded case examples of these trends in order to iteratively consider their implications, we

draw on examples of VET policy and practice from Africa and from South Africa in particular, as this is where most of our empirical work is grounded. In noting this, however, we emphasise here that our account is not primarily empirical, rather it is meta-reflective offering a 'landscape view' of the field as it is emerging.

We begin by offering a critique of the state of VET discourse, policy and practice from the vantage point of VET and sustainability. This is followed by a deliberation on the shifts in political economy discourse as it alters via encounters with ecological dynamics and debates around green economy, just transitioning and sustainability more broadly. We then consider how these discourses are also linked to educational thinking, with a view to developing a mechanism for reviewing the greening of VET over time. While the paper overall is not an empirical paper, to develop insight into some of the shifts in the greening of VET we draw on data that is drawn primarily from a project carried out with others for UNESCO as part of a review on Greening and Digitisation within TVET in Africa conducted together with UNESCO BILT (Allais et al. 2022). This involved a review of 223 questionnaire responses from TVET stakeholders in 34 countries in Sub Saharan Africa as well as 21 strategic interviews. Beyond this, we also draw on insights from two recent major research projects in which we were all involved (one on South Africa; the other on South Africa and Uganda: Rosenberg, Ramsarup, and Lotz-Sisitka 2020; VET Africa 4.0 Collective 2023).

Our analysis shows that VET is being reshaped by an emerging political-economy-ecology conjunction that ultimately requires a whole systems approach to understanding the sustainability transition within VET if it is to be meaningfully embraced with a commitment to radical transformation and social and ecological justice (Lotz-Sisitka et al. 2024). We offer this as a contribution to the VET literature, which, overall, has been slow to engage with the question of what skills are needed (and how will they be developed) for sustainable futures, notwithstanding earlier challenges made by Anderson (2008) and McGrath (2012).

A brief critique of VET: why a shift is needed to embrace sustainability

In framing this critique of VET we derive it from the object itself and frame the critique from the foundations of VET itself hence we begin with a very brief overview of skills formation in Europe and the global South as this is crucial to how we understand VET. With the arrival of industrialisation, previous vocational learning approaches developed into 'modern' forms, often linked to public vocational providers (the archetypal VET institutions) through day or block release schemes, and sometimes grounded in tripartite agreements between state, employer and trade unions (e.g. Deissinger and Gonon 2021; Fuller and Unwin 2009); typically the outcome of complex process of

contestation and compromise. Whilst the Germanic and Anglophone traditions, for instance, are very different, they share a common core of preparing (predominantly male) youth for the world of work. This world of work was shaped by the wider process of industrialisation and had a particular focus on preparation for key industrial sectors such as mining, metals and motors.

In the colonised South, the development of formal VET initially was heavily conditioned by the feasibility of large-scale colonisation. Formal VET programmes developed most rapidly where climate conditions allowed for large-scale white settlement, leading to a form of 'settler VET' (McGrath et al. 2019; VET Africa 4.0 Collective 2023). This saw growing local white populations receive training to replace imported white labour with indigenous populations excluded from access to certain trades and occupations. For instance, South Africa's model of 'racial Fordism' (Gelb 1990) led to massive investments in parastatal industries such as steel and railways, as well as the arrival of automobile production in 1923, with a concomitant growth in public VET (Badroodien 2004; Gamble 2021). Similar strong development of formal VET can be found in the Latin American experience of import substitution (Castro 1998).

Elsewhere in the colonised territories, climate and disease mitigated against large-scale white settlement. Extractive industries here relied more on small numbers of white overseers and large amounts of indigenous labour, with little attempt made at formal skilling. In several such settings, many of which achieved independence in the second half of the twentieth century in Africa and South Asia in particular, there was typically initial dependence on expatriate skilled workers, followed by a growth in local skills development around extractive industries and some heavy industry.

In a number of places, North and South, formal vocational education remains tightly linked to the same old sectors, even though there may be few new jobs being created in them. Moreover, at a discursive level, the heterodox VET literature remains largely located within earlier political economy thinking and has not yet engaged sufficiently with the political-economy-ecology move. Whilst it has addressed extractive effects on human labour, it has not extended this to nature and remains largely in a productivist bind (Anderson 2008; Lotz-Sisitka, McGrath, and Ramsarup 2024; McGrath 2012) in which the rationales and processes of capitalism are seen as inevitable, indeed almost natural. This approach is seen as having problems. First, it has an impoverished understanding of what the full purpose of VET is. Second, it avoids the issue of unsustainability. Third, it is based on an inaccurate account of actually existing labour markets, especially in the global South and lastly it continues to reproduce workers, consumers and citizens who meet the needs of neoliberal capitalism.

This critique has not been seriously engaged in the mainstream VET literature, which takes it as self-evident that VET is about skills for production. Indeed, even less radical accounts of sustainability are rare in the major VET journals.

Prior to this special issue, in the past 20 years, only eight articles have been published that address sustainability issues across JVET, the *Journal of Education and Work*, the *International Journal of Training and Development*, the *International Journal of Training Research* and *Vocations and Learning* (Brown 2013; Brown, Sack, and Piper-Rodd 2013; Coll, Taylor, and Nathan 2003; Comyn 2018; Draper et al. 2014; Evans and Stroud 2016; Liu et al. 2020; Pavlova 2018; Sack 2012). Most are small-scale empirical studies about attitudes, with very little engagement with theoretical debates regarding what is meant by 'green' or 'sustainable', let alone an engagement with political-economy-ecology arguments, and there is little in the way of engagement with wider learning and sustainability challenges (as discussed elsewhere in this special issue by Suhonen et al. 2024; Weijzen et al. 2024).

Building a theoretical toolbox to understand greening of VET

In this section, we present two strands of literature that we used to frame our thinking, one explores emergent greening responses and then secondly we turn our attention to education and draw on Sterling (2004) to understand how we could potentially characterise sustainability educational responses within VET. We use the concepts of 'green skills' and 'green work' judiciously in this paper, drawing on the metaphorical framing of the concept developed from Rosenberg, Ramsarup and Lotz-Sisitka (2020) whose conceptual and methodological framework allowed for considering green work, the greening of work and green jobs to be understood within a critically constituted framework that embodies an explicit commitment to just transitions. Their framing addresses anthropocentric limitations in research and praxis, while maintaining a strong commitment to social, epistemic and environmental justice, and allows for situated and ethically constituted dialectical options for the emergence of transformative praxis.

Unpacking the emergent ideas on greening, sustainability and just transitions within VET

In the section that follows, we outline how sustainability research within VET appears to have emerged in the development agendas. While this precipitated educational responses, it has evolved from a theoretically eclectic base. This base has evolved into a fragmented educational landscape as VET researchers tend to borrow from other theoretical domains. Interrogating these shifts can help to frame the nature of the sustainability response and can help VET educators and researchers to better frame their efforts towards supporting the greening of VET or VET work for climate action, circular economies and/or Just Transitions.

Although the green jobs movement can be traced back to the 1970s, and its socio-political roots have been traced to various environmental, social, economic, and political goals, there has been a renewed impetus for its support since the financial crisis of 2008. In the skills development space, some of the earliest work on greening the economy came from UNESCO-UNEVOC. In 2010, UNESCO-UNEVOC released a 'Greening TVET Practical Guide' which included five approaches to sustainability in TVET: greening the campus, greening the curriculum, greening research, greening the community and workplace, and greening the institutional culture (UNESCO-UNEVOC, 2010). In 2012, this was built upon by the wider UNESCO VET community when the Third International Congress on TVET made environmental considerations one of three lenses through which to view future VET policies and practices (UNESCO 2012).

In 2014, UNESCO-UNEVOC noted that 'GTVET contributes to the transition to green economies and green societies by providing green competencies in a holistic approach including formal, non-formal and informal learning environments' (UNESCO-UNEVOC 2014). More recently UNESCO-UNEVOC have been emphasising green TVET for circular economies and climate action.

As the argument for a green and sustainable economic transition grows, more institutions have become involved in defining the VET agenda, and increased pressure is being placed on the VET sector to orient programmes, relations, curricula and institutional cultures towards sustainability. This is, however, not an easy task, as there are often internal contradictions with other programmes in the VET institutions (e.g. supporting VET for the fossil fuel industries). Added to this is the fact that the green economy discourse is in itself complex and rapidly shifting, as are the issues that the environment and sustainability sector seek to respond to (e.g. climate change has shifted from a science to a policy to a technology to an ethical concern affecting all sectors of society).

The global impetus for VET and sustainable futures has been amplified by the proclamation of the Sustainable Development Goals in 2015. Since then, the SDGs appear to provide a potential platform for reintegrating economic and sustainability aspirations, although there is much critique of the limits to their radical potential (Ramsarup and Ward 2017). While the emergence of sustainable development discourses heralded an important turn, it quickly became clear that sustainable development remains vague and imprecise, and is often critiqued for being a 'floating signifier' (Ferguson 2015; Ramsarup 2017), a concept that can be made to mean almost anything, in keeping with the discursive histories of the two component words. While the SDGs have offered considerable impetus and resources, framing educational responses around them has not helped VET researchers, as the SDGs are not useful as an analytical tool.

This 'floating' continues when we come to look at green jobs and the green economy. These are concepts that are potentially crucial to VET as the educational sector preparing young people for the world of work.

The discourse of greening really took off after the financial crisis of 2008, as a discursive space emerged regarding what capitalism needed to do to sustain itself. This became interpenetrated with more radical ideas about an environmental response, leading to an argument that capitalism could 'green' in order to resolve contradictions and end the systematic exploitation of nature, whilst still retaining core aspects of its previous rationality. Indeed, it became common to argue that environmental sustainability could be a driver of economic growth, far from earlier environmental positions about the 'limits of growth'.

While there is no agreed definition of green jobs, the ILO describes them as decent jobs that improve efficiency in the use of energy and raw materials, limit greenhouse gas emissions, minimise waste and pollution, protect and restore ecosystems, and support adaptation to the effects of climate change (ILO 2016). This includes work in agricultural, manufacturing, research and development, administrative and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but non-exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, material and water consumption through high-efficiency strategies; decarbonise the economy and minimise or altogether avoid the generation of all forms of waste and pollution (UNEP 2008, 36). Unsurprisingly, this definition has been widely critiqued as being driven by corporate and political interests and being about the sustainable economic growth of capitalism rather than any notion of a 'just' sustainability (e.g. Gibbs and O'Neill 2014).

In supporting her thesis that the green economy discourse is a 'wolf in sheep's clothing, the "wolf" being green neoliberal capitalism', Cock (2014, 2) raised two critiques that are useful: she argued that the emerging green discourse does not sufficiently engage with working class and justice issues, thus the evolving notions of justice are neglected or naïve. Secondly, the creation of green jobs is being viewed as something distinct and as an add-on to the 'real economy'. This, she argued, represents a compartmentalisation of the green economy discourse.

Adding his critical voice to support the arguments put forward by Cock, Death (2014) described the dominant green economy discourse in South Africa as a 'green growth' discourse. Green growth discourses present 'green markets as an economic opportunity' (Death 2014, 7). Hence, the Green Economy Accord (Economic Development Department 2011) presents four principles: opportunity, innovation, responsibility and partnership. Opportunity and innovation indeed suggest a green growth intent.

Similarly, the Green Economy has largely been a descriptive and normative discourse used by policy analysts and often emerges as an empty signifier when

Table 1. Typologies of the green economy.

Four discourses of the Green Economy (Death 2014)	Discourses related to the Green Economy (Faccer, Nahman, and Audouin 2014)	Discourses related to the Green Economy (Ferguson 2015)
<i>Green Revolution:</i> radical, revolutionary transformation on economic (and hence social and political) relationships to bring them in line with natural limits and ecological virtues.	<i>Transformative Discourse:</i> incorporates critical perspectives calling for a more radical review of society's economic and broader developmental objectives.	<i>Strong Green Economy Discourses:</i> embody post growth or limits to growth as central to their macroeconomic trajectory and encompasses measures of welfare as a critical indicator.
<i>Green Transformation:</i> explicit focus on social justice, equity and redistribution (including intergenerationally) where economic growth is a means rather than an end.	<i>Reformist Discourse:</i> diverse agendas for a green economy, with an emphasis on the right combination of actions and long-term planning to achieve environmental benefits as well as stronger economic growth.	
<i>Green Growth:</i> green markets provide economic opportunities representing a recasting of the relationship between environment and economics with an emphasis on new markets, new services and new forms of consumption.	<i>Incrementalist Discourse:</i> defined by a broad acceptance of the prevailing macro-economic paradigm and a focus on greater use of market-based tools to drive a green economy transition.	<i>Transformational Green Economy Discourses:</i> reflect elements of selective growth often encompassing green consumerism and modified GDP as an indicator. However, both these categories still utilise GDP as a signifier of socio-economic development.
<i>Green Resilience:</i> essentially reactionary and cautious with an emphasis on environmental scarcity, climate change and resource depletion and the need to implement technological solutions to build local self-sufficiency/resilience.		<i>Weak green economy discourses:</i> have a macroeconomic trajectory of green growth and encompass unmodified GDP as an indicator.

Table 2. Comparing social and educational responses to sustainability (Sterling 2004.).

Sustainability transition	Response	State of sustainability	State of education
1. Very weak	Denial, rejection or minimum	No change (or token)	No change (or token)
2. Weak	'Bolt-on'	Cosmetic reform	Education about sustainability
3. Strong	'Build-in'	Serious greening	Education for sustainability
4. Very Strong	Rebuild or redesign	Wholly integrative	Sustainable education

agencies argue that 'green skills are becoming a part of almost every job' (CEDEFOP 2019). The work of Death (2014), Faccer, Nahman and Audouin (2014) and Ferguson (2015) (cf. Table 1) provide typologies of green economy discourses that can enable more critical engagement with these in VET research and practice, with the most radical of these being 'green revolution', 'transformational' or 'strong' green economy' discourses that signal a deeper commitment to sustainable futures that move beyond sustaining the existing economic model of (neo)liberal capitalism and its ecologically destructive/extractivist

tendencies. Weaker forms of green economy are typically referred to as 'green growth', 'green resilience', or 'incrementalist', and signify reactionary, or even greenwashing approaches to sustainable futures.

Death's typology is based on a focus on national strategies from the Global South, with his overall argument making a strong call for the model of economic growth to be transformed in ways that involve explicit political interventions geared to transforming the structure of the economy. Facer, Nahman and Audouin present three emerging agendas around the green economy. We have also focused on Ferguson's typology, as we believe that it represents an evolution of the 'weak/strong' dichotomy from sustainability definitions, thus providing a useful basis for a framework of green economy visions. A significant rearticulatory move in Ferguson's argument is to attach notions of well-being to economic security rather than to economic growth. His argument enables a continuum so that 'transformative articulations of green economy provide the basis for a shift from the currently dominant weak green economy to a future strong green economy' (Ferguson 2015, 27).

A prevailing critique of general green economy discourses are that they are too closely aligned to current systems. It is suggested that they do not consider potential limits to growth. Moreover, they are characterised as oversimplified and overoptimistic. All concepts relating to the green economy place the economic sphere at the centre of any debate on future viability. According to this view, we can only save the planet with the economy, not against it. From these descriptions of transformative greening discourses, we can see that an inclusive green economy is much more than an economic growth agenda which sees new prospects for economic activity using natural resources, thus representing new forms of green capitalism or ecological modernisation. Rather, it raises significant challenges to the idea that environmental issues can be resolved within the current political economic system without fundamental social, economic and political change, hence differentiating meanings within green economy discourses is important. Also important is to not lose a focus on the intentionality, which is to reframe current systems towards sustainable futures.

Skills approaches within the green transition are often critiqued for being conceptualised as skills for green jobs, framed through 'skills gap' and 'skill deficit' arguments, reminiscent of human capital approaches. The critical challenge with this position is that it presents a linear relationship between education, skills and the economy. Its neoliberal framing defines the purpose and relevance of education and skills in terms of how it serves the market and hence locates skills within the traditional economic discourses (Ramsarup and Mohamed 2022).

Moving beyond a narrow focus on the 'skills gaps' rests on an assumption that skills should not be determined by business interests and concerns only, as this negates the importance of understanding community needs, worker needs,

skills, career interests and aspirations, as well as the salience of specific socio-economic contexts in which skills are embedded.

Ramsarup and Mohamed (2022) have argued that it is necessary to view green skills along a continuum, at one end of the continuum these skills are understood as technical skills that are directly linked to jobs and occupations and as such central to green jobs, the jobs at the core of transitioning the economy. At the other end of the continuum is more transformative skills and competencies that are meant to be more disruptive of the status quo. But along this continuum nestled between these two ends are the generic life skills that are central to the transition. VET needs to shift focus beyond a jobs narrative, unless it does it will remain dislocated from a strong sustainability foundation and imperative.

It is especially climate change and the associated energy transition away from fossil fuel that has raised questions around justice connected to the notion of the transitions that societies need to undergo to become more sustainable and less damaging of the earth systems. Early transition discourse was shaped primarily by the idea that solutions would arise from technology, hence a strong emphasis on socio-technical transitions (Ramsarup 2017). However, this was critiqued, mostly from the global South, and from the trade union movements, for lacking inclusivity and a justice dimension, hence the centralising 'justice' into green discourses and the emergence of 'just transitions' as a new framework for driving the wider societal shift towards more sustainable futures (Rosemberg 2020). Research to inform the development of skills for sustainable futures must be transformative in orientation, skills research simply followed the economic development logic of the past, it will fail to remove the deadlock of jobs versus environment.

The just transitions framing provides a way to move beyond the jobs versus environment argument and intersects with the environmental, social and economic justice and climate justice movements to provide a broad framing that supports an expanded scale of considerations across economic, social and environmental dimensions. The Just Transition also links political economy discourse with political ecology and brings a political-ecology-economy lens into focus in skills planning and development, including in and for VET (Ward 2018).

The following quote summarises some of the key threads of discussion in this section:

while the concepts of greener economies, a just transition and green job creation are prominent in the global agenda, we do not yet have a full understanding of the likely employment impacts of different policy options. Many questions remain unanswered, including how many, where and what kinds of jobs will be created (in terms of occupations and job quality), which skills these will require, and how best to prepare workers for labour market changes and minimise adjustment costs. It is, however, clear that promoting a just transition to greener economies requires comprehensive

strategies, with coordinated and complementary measures including social dialogue as a foundation for a just transition for all; macroeconomic policies; sectoral and industrial policies; support to enterprises; education and skills development; as well as social protection policies to mitigate adjustment costs. (Barcia de Mattos 2018, 8)

The body of literature reviewed here offers us useful conceptual tools to understand how to characterise skills for green jobs, the next body of work helps us to frame an assessment of VET education and sustainability ideas.

Analysing VET education and sustainability responses

While there has been an emerging emphasis on skills for green jobs in VET as can be seen from the above discussion, there is as yet not much research that considers the emerging trends in greening of VET critically to the demand for sustainable futures. The Environment and Sustainability Education literature shows more evidence of engagement with especially more radical, transformational implications for education and skills development than the VET literature. This literature does a better job of thinking about educational providers and sustainability more systematically and transformatively, so we will briefly consider the work of Sterling (2004) here as it offers a good analytical tool for analysing the greening of VET programmes and policy from an education and training sector perspective (Table 2). He suggests there are four predominant types of sustainability responses (that resonate with the typologies in Table 1) and that are useful for considering implications for education system change.

Sterling explains that the first level 'response' is no response (or if there is some awareness, minimum educational response); the second level is accommodation: a 'bolt-on' of sustainability ideas to the existing educational system, which itself remains largely unchanged. Through this response, the dominant paradigm maintains its stability, the third level is reformation: this is a 'build-in' of sustainability ideas to the existing system, through which the system itself experiences significant change. This is critically reflective, adaptive response, or second-order change, where paradigmatic assumptions are called into question and the fourth level is transformation: this is a deep, conscious reordering of assumptions which leads to paradigm change.

The relationship between these and the three sets of green discourses above is apparent in the evolution or development of green skills discourses in VET guiding documents and practices over time, a period of twenty/thirty years, as also briefly introduced above. In the next section we will review these trends drawing on the Sterling framework. As can be seen above, definitions of green economy and the means of moving towards sustainability are contested. They are, however, useful to consider, as typically they involve recalibrating an introduction of new ways of thinking. In institutional terms, this is about

a new logic being applied to economic and social policies, practices and systems in order to support economy, ecology and equity.

Below we examine briefly how these have been applied and/or are developing within VET systems in Africa. To do this we draw on data from our studies and work in VET in Africa and present it in two analytical pointers. As indicated above, this offers an iterative tool for reviewing the emerging VET greening practices.

Reflection on greening reforms: predominance of 'bolt-on' reforms

There are some encouraging developments that are pointing towards the conceptualisation and development of more transformational approaches to greening of TVET for sustainable futures. Key amongst these are UNESCO's new strategy for TVET (UNESCO 2022). In this, there is a further evolution of UNESCO's conceptualisation of greening VET. The earlier focus on three lenses (UNESCO 2012) or pillars (UNESCO 2016), continues with three 'strategic priorities' (see below). However, from notions of greening being only an element of one lens at Shanghai in 2012, and constituting one pillar of TVET strategy in 2016, green language now has spread to all three priority areas and is more prominent in the overall title. As noted above, the strategy is now explicitly about 'Transforming TVET for successful and just transitions'. Although the language of just transitions is not explored further in the short document, this represents a significant shift in language. The three strategic priorities are:

- (1) Skills for individuals to learn, work and live
- (2) Skills for economies to transition towards sustainable development
- (3) Skills for inclusive and resilient societies (UNESCO 2022, 7).

The first of these reflects much of UNESCO's VET policy concerns over recent decades in which employability, productivity and entrepreneurship are emphasised but within a UNESCO framing of inclusion, citizenship and life-long learning. Noteworthy under this heading is a statement that 'Training will need to be reoriented towards ... occupations that expand as all sectors shift towards environmentally sustainable production processes' (UNESCO 2022, 7). The second, of course, is the most obvious 'green priority', framed here in terms of anticipation of skills needs caused by job destruction and creation in the context of just transitions. The third reflects the longstanding UNESCO concern with skills for inclusive societies but, strikingly, adds in the environmental framing of 'resilient'. The draft strategy argues that: 'Climate change and other facets of environmental degradation will increasingly represent a major threat to the stability and resilience of societies. TVET

and skills development can play a part in alleviating these concerns' (UNESCO 2022, 8).

All of this reflects the slow deepening of UNESCO's green skills discourse over the past decade. However, it is striking that subsequent UNESCO policy work with member states does not appear to reflect even green growth or green resilience, and at this point fails to adopt a systemic or wider transformational approach to VET and sustainable futures.

Indeed, Allais et al. (2022, 3) suggest that 'greening is a strongly expressed policy priority for economies and TVET systems, but with limited systemic implementation to-date'. They find lots of examples of policy intention. For instance, Lesotho Second National Strategic Development Plan notes an aim to 'introduce climate change into the curricula at all levels [of VET]' (Government of Lesotho 2018, 111) and to promote VET for ecotourism (p. 97).

In reviewing the greening responses within African VET, Allais et al. find four predominant types of sustainability responses:

- institutional greening responses that included elements like greening campus, curriculum, community, research, culture. There were no interventions studied that included all the elements. For instance, Kenya, South Africa, Mauritius reflected efforts linked to greening campus and attempts at greening curriculum.
- introduction of short courses around an 'employable skill', e.g. instal, repair and maintain solar geysers, rather than around a whole occupation.
- integration of generic 'green' skills into traditional VET programmes, for instance, in hospitality that integrate the generic sustainability skills and knowledge that industry will require,
- integration of training packages (for instance, a whole qualification on Renewable Energy Technologies) into college curricula, with curriculum packages and training of lecturers.

In Sterling's terms, this amounts to a 'bolt-on' of sustainability ideas to the existing system, while the system itself remains largely unchanged. Moreover, Jebungei (2020) points to the very serious limitations of many of these initiatives, which too often are under-resourced or poorly implemented. Any achievements made are largely adaptive, first order change. While necessary as a key starting point for changes towards sustainability, through this response, the dominant paradigm and the institutional/system maintains its original stability despite key efforts to the contrary.

The research also highlighted that there has been a lot of policy energy on qualifications development for new sustainability programmes within VET. Two issues emerged around qualifications. First, curriculum for VET tends to be centrally controlled, when the adaptive needs may be locally shaped. In the UNESCO study, Allais et al. (2022), found that 67% of respondents indicated that

VET curricula for their qualifications are nationally prescribed and they follow these national curricula. This poses a constraint on responsiveness to local emerging issues.

Second, new qualification development is emerging as the most popular response. To gain a more nuanced understanding we did a deepdive into the qualifications data, and analysed VET courses across 4 countries in Africa: Mauritius, South Africa, Zambia, and Zimbabwe. We focused on energy provisioning in the VET colleges due to the energy sector being under immense pressure to transition in Africa. We examined energy qualifications being offered by VET institutions to understand the type of courses on offer (qualifications or short courses) which would affect learning pathway outcomes. For this analysis short courses were taken to be any courses with a duration of less than one year, while qualification courses were those with a duration of one year or more. We found that South Africa has 225 energy linked qualifications (year and longer) in VET institutions, Mauritius has 13, Zambia has 90 and Zimbabwe has 32. It was difficult however to follow the qualifications into any pathway to understand the entry and exit – so it appeared more ad hoc and fragmented.

Sterling's argument helps us to see that the addition of qualifications into systems that are largely untransformed reflects a sustainability response that can be viewed solely in terms of product (courses/materials/qualifications/educated people). There remains minimal effect on the institution, and the values and behaviour of educators and learners. This, he argues, is a content oriented response and is often characterised by incoherence. This type of response, Sterling argues, traps us in a transmissive methodology and doesn't display 'systemicity: that is, internal connection, relatedness and coherence' (Sterling 2004, 62), which are all essential parts of a transformative methodology.

Furthermore, the types of green skills approaches studied within the VET can also be critiqued for being conceptualised within a 'skills for jobs', framing itself on skills gap and skill deficit arguments reminiscent of human capital approaches. In studying the energy examples in South Africa it is clear that the transition within VET is being interpreted as a technological one, with VET being viewed as producing the skills needed to implement a technological change-with analyses continuously highlighting fulfilling the requirements of an emerging green job. The critical challenge with this position is that it presents a linear relationship between education, skills and the economy. Its neoliberal framing defines the purpose and relevance of education and skills in terms of how it serves the market and hence frames skills in traditional economic discourses. Moving beyond a narrow focus on the 'skills gaps', which rests on an assumption that skills should be determined by business interests and concerns, negating the importance of understanding worker needs, skills, career interests and aspirations, as well as the salience of specific socio-economic contexts in which skills are embedded and community needs. Stroud et al. (2014) also argue that these economically framed skill responses places little

emphasis on systems holistically, with skills development and training usually left to private providers who operate on limited contracts that usually leave workers with few formally recognised transferable skills, thus limiting the ease with which such regions can shift to a low-carbon economy.

The discussion above indicates that there is emergence of greening of VET taking place at policy, and curriculum levels in the African countries involved in our studies. However, these are mostly following the ‘bolt-on’ interventionist approaches outlined by Sterling (2004) and mainly focus on education about sustainability in specific sectors. Few of these are systemically oriented towards wider transformation of the VET system itself. While necessary, such interventions may not be sufficient if VET is to become a strong sector contributing to sustainable futures. We turn now to a second analysis, where we examine some thinking and research that are leaning more towards the ‘build-in’ and ‘reframe’ approaches in Sterling’s framework that also reflect stronger and more radical commitments to sustainability.

Towards transformational approaches within VET

In recent work, we have been involved in developing an approach to VET that gives more attention to sustainability within VET to enable a move away from the underpinning modes of productivist thinking that are implicit within it (Rosenberg, Ramsarup, and Lotz-Sisitka 2020; Ramsarup, McGrath, and Lotz-Sisitka 2023; VET Africa 4.0 Collective 2023; Lotz-Sisitka et al. 2024). We have done this through conceptualising a political-economy-ecology approach that reviews how conventional VET is deeply embedded in the wider ‘Capitalocene’ (Moore 2016) system. Outlining the limited, adaptive response from VET to sustainability, as also outlined above, we offer some pointers on a way forward.

This literature highlights the complex interconnections of the political economy tradition (which is dominant in heterodox accounts of VET) and that of political ecology (e.g. Bond 2002; Di Munzio 2015; Forsyth 2003; Malm 2016; Moore 2016; Satgar 2018; Scoones 2016). For instance, Malm’s account of ‘fossil capitalism’ highlights the centrality of the relationship between carbon-centric development and capitalist accumulation. Much of the literature highlights the close relationship between controlling natural resources and controlling labour that was central to the emerging logic of industrialisation. This had a particular, highly racialised inflection in imperial settings and continues in postcolonial forms of extractivism. This political ecology literature seeks to offer ‘a social response to the oblivion of nature by political economy’ (Leff 2015, 33, cf. Lotz-Sisitka et al. 2024).

VET needs to be understood as existing in a particular moment in time and space and as having a history that reflects the interplay of systems of learning and working, themselves grounded in wider cultural, economic, political and social arrangements. Expanding the conventional VET account outlined above

in our critique of VET, is a small and growing literature based on our earlier research (e.g. Ramsarup, McGrath, and Lotz-Sisitka 2023; VET Africa 4.0 Collective 2023; Lotz-Sisitka et al. 2024) that is beginning to move towards a political-economy-ecology approach to VET.

This body of work (including McGrath et al. 2019; Rosenberg, Ramsarup, and Lotz-Sisitka 2020; Ramsarup, McGrath, and Lotz-Sisitka 2023; VET Africa 4.0 Collective 2023; Lotz-Sisitka et al. 2024) argues that taking the sustainability challenge seriously means disrupting conventional VET assumptions about skills for employability/productivity/growth (cf. also McGrath and Yamada, 2023). As an emergent body of heterodox literature, it suggests that VET research needs to begin addressing questions of how vocational learning can 'promote decent work that contributes both to sustainable livelihoods for individuals and communities, and to wider efforts to restructure work and economic activities so that we live within our planetary boundaries' (McGrath 2020, 8).

The directionality of the Just Transition which seeks to ensure distributive, reparative and justice participative in and through VET, indicates that we need a more radical/disruptive whole system approach rather than the fragmented approach that is currently evident. We conclude this review with some suggestions on how we can move to a more proactive, transformative praxis oriented system and what the implications of this will be for the underpinning institutional, social and economic conditions that enable/constrain VET. In other words, we offer ways forward to move beyond the 'bolt-on' approach to sustainability in VET, instead seeking out more 'wholly integrative' approaches as in Sterling's (2004) framework above.

Seen in this light, sustainability is not just another issue to be added to an overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organisational change, of policy and particularly of ethos. As we have argued above, the effect of patterns of unsustainability on our current and future prospects is so pressing that the response of VET should not be predicated only on bolt-on approaches to 'integration of sustainability' into VET, because this invites a limited, adaptive, response.

An innovative example surfaced on transformative learning within VET is the Amanzi for Food programme (see <https://amanziforfood.co.za>). This innovation offers two important lessons, a co-engaged approach to learning and curriculum design, which focused on the generative development of learning networks and five iterative mediation processes supporting social learning network formation and co-learning in the network. The five mediation processes were generatively identified, developed and used to sustain the VET learning network:

- co-engaged needs analysis and learning network formation;
- boundary crossing change laboratories;

- course activated engagement around new knowledge of rainwater harvesting practices;
- productive demonstration site development; and
- expansion of knowledge engagement via use of social media and radio (Lotz Sisitka with Pesanayi, 2020).

Moreover, the approach offers lessons on the idea of using a 'productive demonstration site', which means a site where one can model and co-learn a practice with others, which offers a very good transformative-learning option for TVET. It also involves the learning sequence of situating the issues in context and subject, exposing or examining options using systems thinking, and undertaking co-engaged inquiries into how problems can be solved, with reporting and suggesting how the practical demonstration can be improved. In this way students learn both theory and practice together.

In our view, and based on our emerging body of research, we propose that a whole system approach to VET starts with purpose, instead of VET being viewed solely as preparation for economic life, it becomes: a broader education for a sustainable society/community; sustainable economy; sustainable ecology. This expanded sense of purpose needs a shift in what we view as the VET system, a response that includes the following:

- At macro levels, we would need to examine national policies (social, environmental, economic), regulatory frameworks and industrial plans to understand environmental risk and the implications they would have for transitioning VET (Rosenberg, Ramsarup and Lotz-Sistka, 2020)
- At the sector level, we need to examine global changes (e.g. water security, climate change, etc.), innovation trends and industrial planning, and how sustainability-oriented skills and occupational changes could be integrated and planned for as a core part of this change. Three lenses have emerged in our research to re-examine value chains: innovation; risk and regulation, applying these lenses have allowed us to identify potential areas that the value chain could shift and then we could identify transitions in jobs (Rosenberg, Ramsarup and Lotz-Sistka, 2020)
- Occupational levels of analysis of occupational change and skills, at one level this will mean understanding the lock-ins in the value chain (e.g. the predominance of monoculture agriculture) and how they can be overcome in relation to local realities (e.g. the predominance of small-scale farmers in Africa) and what implications this has for the changing nature of work. On another level, this will mean understanding how occupations will and are changing (will it need a shift in knowledge; a shift in tools used in work or the products and processes that are produced?). As we have argued above,

a more nuanced idea of how the transition will impact occupations will assist in making more relevant educational decisions about how VET can work with occupational change (Ramsarup 2017, Ramsarup 2020)

- Training and educational provisioning which will involve mapping qualifications, curriculum analysis in relation to sustainability transition needs; examining learning pathways, articulation opportunities, upscaling and re-educating training providers to embrace more systemic principles of education as sustainability (cf. Sterling 2004), and curriculum innovations that cross boundaries and reframe education (Lotz-Sisitka and Pesanayi 2020; Rosenberg, Ramsarup and Lotz-Sistka, 2020). In these contexts of risk, VET needs new ways to think about learning. It requires a view of learning that is radical and disruptive, and that moves beyond social reproduction of the status quo. Lotz-Sisitka (2017) expands on four ways of engaging in transformative and transgressive learning approaches all of which are relevant for VET: first, multi-stakeholder learning involving diverse voices, perspectives and actively engaging deliberation; secondly, embodied and empathic learning that encompasses inner reflection and listening, an ethic of care and empathy; third, learning that identifies and confronts contradictions, that frames new solutions and tries them out; and finally, fourth, learning that helps to identify what is not there and what could be there and working to open new possibilities and put new practices in place. All of these present possibilities for how VET can reorientate its educational practices.
- At a micro level, thinking about learning and work transitioning, transformative learning in VET contexts (e.g. Lotz-Sisitka and Pesanayi 2020) and how young people can move within streams of work (laterally and vertically) (Rosenberg, Ramsarup, and Lotz-Sisitka 2020).

Furthermore, in VET Africa 4.0 Collective (2023), we argued for two important cross cutting points:

- (a) It is important to consider the relationship between the levels. The central role of ministries in driving a whole system approach doesn't mean that one size fits all. Approaches cannot be top down but also need an understanding of a bottom-up approach. This could be a place based approach that relates to local possibilities for employment and livelihoods.
- (b) We need to move beyond thinking about and inclusion of economic actors only. This requires getting beyond the unhelpful market-state dichotomy and thinking about place-based social skills ecosystems in which VET providers act as part of viable networks with other actors, including industry and local government but also a range of community stakeholders, such as those involved in using VET for livelihoods

construction, especially in contexts where informality is a key feature of the VET landscape.

Conclusions

Our landscape view confirms that whilst there are many policy statements about the importance of greening more generally and greening VET in particular as part of this, there is both a fragmentary response on the ground and a paucity of robust academic research that either evaluates this or suggest alternative approaches.

Using Sterling's framework, we argue that most of what we currently see in practice and policy amounts to little more than 'bolt ons' to existing practices, incapable of engaging with the scale and complexity of the existential challenge faced. That this is based on limited robust empirical work is itself a sign of the bigger problem of too little action on VET for sustainability. Hence, we argue for both more radical action and more thorough theorisation towards a skills approach to just transitions. We suggest that the latter requires a deeper engagement with political economy ecology accounts (VET Africa 4.0 Collective 2023; Lotz-Sisitka et al. 2024). This must engage with wider debates about VET's purpose (e.g. McGrath 2012) that have already sought to put people rather than economy at the heart of VET thinking. We argue that a consideration of the planet must also be added.

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