



# Is education blithely producing unemployed graduates? A reflection based on a review of environmental skills initiatives (2016-2021)

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(Received: 27 February 2022; accepted: 1 September 2022)

## Abstract

A statement from the president of the Black Business Council (BBC) that “our education system continues to produce the unemployed graduates” (NewZRoomAfrika, 2021) because “the courses they are doing are not required by industry” reflects the perennial perception that South Africa’s education system is a cause of unemployment. In this paper, I explore aspects of this perception through a meta-review of environmental skills-related studies conducted over the past five years. Data used in these studies include graduation trends based on higher education, employer surveys, analyses of skills needs in the workplace compared to courses offered, and case examples of internships and teacher development. Using an ecological-systems model, I relate the findings, in a layered critical realist analysis, to the socio-cultural milieu in South Africa. I challenge the conception of relevant graduate education evident in the BBC’s statement.

### Keywords:

graduate unemployment, higher education, skills, green economy, sustainability, re-thinking development

## Introduction

Despite policies focused on reducing poverty and inequality, South Africa has become a more unequal society after 1994, rather than a more equal one. (Rosenberg, G., 2020, p. 4)

This paper was inspired by the theme of the 2021 Conference of the South African Education Research Association: *Education for Inclusivity and Sustainability in Times of Increasing Inequalities*. Its thrust was motivated by a statement from the president of the Black Business Council (BBC) (NewZRoomAfrika, 2021) suggesting that education providers are to blame for South Africa’s high unemployment figures. Pervasive unemployment is one of the main causes of income inequality in South Africa. For education providers, the view that students

are rendered unemployable by what we offer or fail to offer, has to be carefully interrogated—repeatedly if necessary. In this particular paper, I probe the relationship between employment and education (in particular higher education) through a meta-analysis of a recent review of a strategy to produce skills for the biodiversity sector (Rosenberg et al., 2021), while also drawing on related studies in the broadly defined field of environmental education. As a scholarly field, environmental education may well yield relevant contributions to long-standing deliberations on the relationship between employment and education (such as Allais, 2012) since it has consistently asked the question: What is education for? (Orr, 1992). Environmentalists have also consistently probed economic trajectories for the extent to which they can sustain both nature and human livelihoods (Raworth, 2017).

Allais (2012) explored the problematic alignment between social and educational policy in the South African macroenvironment, and, focusing in particular on vocational education, questioned “the assumption that bringing vocational education closer to employers will improve its relevance and quality.” Instead, she argued that “protecting vocational education from the immediate short-term needs of employers and from a narrow labour market focus may be the best way of improving it” (p. 640). Here, I explore aspects of this argument in the context of higher education. The analysis on which it is based brings to the fore diverse factors that contribute to unemployment. I show that both policy and education providers are responding to signals about which skills South Africa needs, but also that implementation is patchy and information on what exactly is needed is limited. It is also easy to misconstrue skills needs given the lack of clarity on what an inclusive, sustainable socio-economic development trajectory might entail. In conclusion, I caution against mistaken assumptions about the kind of socio-economic context in which graduates need to work and/or build a business and the mis-direction of educational programmes.

To explore the relevance of educational offerings in relation to graduate success, a useful lens to employ is that of (transitioning) systems models (Ramsarup, 2017). When learners move through educational spaces towards participation in society as active citizens, the relevance of what they study and learn is determined and shaped by a number of overlapping systems, that are, in turn, shaped by wider systems, with the macrolevel of the socio-cultural milieu of values, ideologies, resources, risks and opportunity structures infusing all others (Härkönen, 2007). Of particular relevance for this paper are economic systems, workplaces and attendant government systems, as well as educational systems, associated policies, and their enactment. These systems are graphically presented in figure 1 and figure 2 that are further explained in the Methodology section.

Using Figures 1 and 2 as a guide, this review follows the graduate moving through the overlapping systems of educational spaces and potential workplaces as shaped by various policy frameworks. One such policy framework is the National Biodiversity Framework of 2007 that noted a lack of transformation and skills shortages at a graduate level in the biodiversity sector. Only loosely definable as a sector (Vass et al., 2009), biodiversity employers include government, non-governmental organisations, industries, and private

companies working with and impacting on biodiversity and related natural resources such as water, as well as climate change, land degradation, and food security (South African National Biodiversity Institute (SANBI), 2010). To address the transformation and skills challenges and the delivery challenges in organisations responsible for the protection of natural resources, a Biodiversity Human Capital Development Strategy (BHCDS) 2010–2030 (SANBI, 2010) was produced in 2010, informed by a labour market analysis (Vass et al., 2009). The Mid-Term Review of the implementation of the BHCDS (Rosenberg et al., 2021) is a key resource in this (meta) review, hence highlighting it, but the biodiversity sector is only one sub-field in the broader field of environment-related skills and occupations. (For an overview of what the field constitutes, refer to Rosenberg & Ramsarup, 2020).

Among the institutions that need to consider environment-related learning outcomes are the educational role players: schools; community colleges; technical and vocational education and training (TVET) colleges; and universities while the Department of Higher Education and Training (DHET) and the National Skills Fund (NSF), among others, have related policy and provisioning roles (Mohamed & Ramsarup, 2020). Government agencies outlining environmental imperatives for South Africa and developing related policies include the Department of Forestry, Fisheries and Environment (DFFE), Department of Science and Innovation (DSI), Department of Water and Sanitation (DWS), and SANBI among others. Universities have a particular role in this space since, beside their own programmes, they also play broader system building or mediating roles through focused research, centres, and programmes (Lotz-Sisitka, 2020).

In the macrolevel milieu, water scarcity and the electricity crisis have worsened in South Africa in the past five years. These issues are significant, not only because they involve environmental sustainability, but because they exacerbate inequalities. Climate change has received attention in South Africa in relation to jobs, renewable energy, food security, and just transitions to a green economy (Satgar, 2018).

In some international contexts there has been, in the past five years, a greater recognition of the links between nature and economics. The United Kingdom Treasury, for example, commissioned a review titled *The Economics of Biodiversity: The Dasgupta Review* (Dasgupta, 2021) that identifies two of the most influential leverage points for addressing biodiversity loss as (1) reforming education and economics and (2) transforming the financial sector. In the intersection of these leverage points, sits an overhaul of economics education (see pp. 70, 76), a point that will become relevant in my discussion of the findings of this review.

## Methodology

The methodology I employed was a small-scale meta-review of selected environmental education and skills development studies that drew on the following theoretical frameworks:

- Ecological systems theory (Bronfenbrenner, 1979; Härkönen, 2007)

- Dialectical critical realism (Bhaskar, 2016; Rosenberg, 2020)
- Contradictions (Engeström, 1987) and absences (Bhaskar, 2016)

I used a systems perspective to look at a phenomenon as complex as the relevance of educational outcomes *as a whole* and that would guide me to focus on the *interrelationships* between the elements in the system.<sup>1</sup> Bronfenbrenner's theory of human development (1979) draws on the work of Kurt Lewin and, in its later iterations, on Vygotskian socio-cultural theory. It has been used in educational and workplace settings (Härkönen, 2007; Ramsarup, 2017) to foreground the *interactions* between learners and the layered contexts in which they find themselves, on an ever-increasing scale, and, in later iterations, has a time dimension as well. It is useful in explaining the *outcomes* of human development and is pertinent if one assumes that education is geared towards optimising human development (Härkönen, 2007).

Based on such a systems framing, the following are important dimensions for an analysis focusing on education and employment.

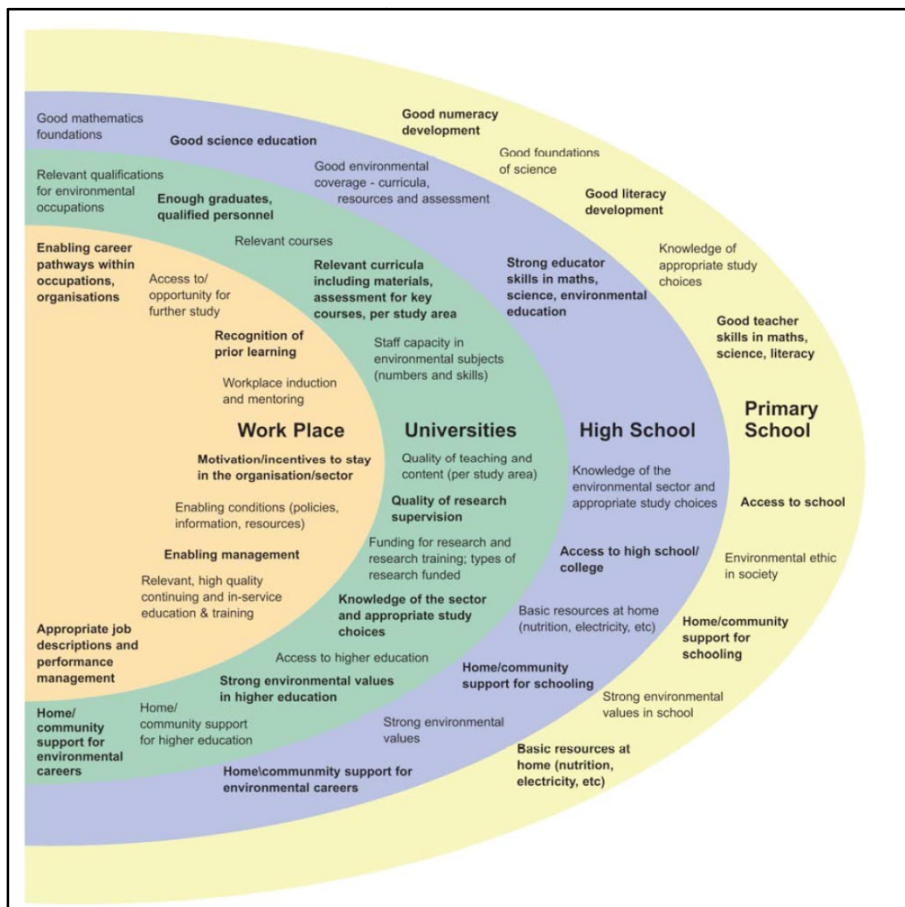
1. The individual learner with their particular capabilities, who needs both an education and a livelihood, i.e., the opportunity to access economic and other resources;
2. The home, family, and community context of the individual learner;
3. The primary and secondary schooling of the individual-in-their-context;
4. Further and higher education and workplace learning;
5. The economy (configurations and outcomes) of the country, region, and world;
6. The physical environment with its natural resources and their relationship with livelihoods and economies; and
7. Policies and related practices such as fiscal and other planning, that may or may not influence all of the above.

Two models of this system guide the analysis: I developed the first one (Figure 1), and this was published in the Biodiversity Human Capital Development Strategy 2010–2030 (SANBI, 2010). The second model (Figure 2) was originated by Ramsarup (2017) drawing on Bronfenbrenner (1979), and then further developed and published by Rosenberg and Ramsarup (2020).

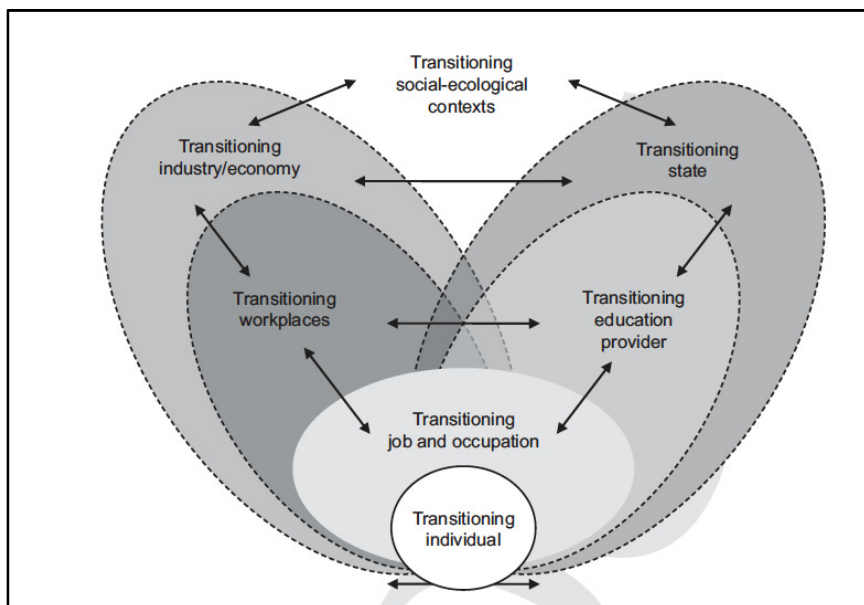
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<sup>1</sup> See Preiser (2019) for a useful outline of the features of complex systems.

**Figure 1**  
‘Expanded pipeline’ model of factors influencing green skills (SANBI, 2010)



**Figure 2**  
Green Skills Systems Map (Rosenberg and Ramsarup, 2020)



To interrogate critically the relationship between educational programmes and employment, the following questions related to each of these system domains, and the interfaces between

them, were used for the current meta-review. These questions were initially identified by an expert group informing the Mid-Term Review of the BHCDS (Rosenberg et al., 2021) and seemed pertinent also to guide the meta-review.

**Table 1**

The question sets guiding the meta-review

Question Set 1: Are environment-related education and training providers offering relevant programmes?

Question Set 2: Are employers satisfied with the skills of environmental graduates?

Question Set 3: Are learners aware of work opportunities, and the learning pathways required in the environmental field, and can they access these?

Question Set 4: Are the economy and the physical environment (dimensions of the macroenvironment) providing opportunities and resources?

Question Set 5: Are broader society and policies (further dimensions of the macroenvironment) providing opportunities, resources?

A systems lens, in itself, would not necessarily provide particularly new or deep insights; a more probing analysis becomes possible when we use additional theoretical lenses to better understand the system and what is happening in it. In the review on which this paper is based I use the lenses of contradiction (Engeström, 1987) and absences (Bhaskar, 2016): What is contradictory about the interrelationships between the elements listed in Table 1? What are the gaps or lacunae? What should be, that is not? Do these gaps also take the form of contradictions, e.g., there is a stated intent but an opposite action or outcome, or there is a stated intent but the imbedded assumptions about how the intent is to be achieved, thwart its achievement? These lenses complement the Bronfenbrenner (1979) framework; Engeström, too, draws on socio-cultural theory and Bhaskar's critical realism shares an ontological framing of layered reality and emergence with Bronfenbrenner's ecological model.

The data scrutinized for the meta-review were the environmental education and skills development studies (evaluations, reviews, and academic research by a range of scholars), conducted over the past five years. These studies are listed in Table 2. The methodologies used in each of these studies is described in more detail in the studies themselves. Table 2 provides a short summary of the approach followed in each of the studies. Table 3 lists other studies that were not subjected to the same level of analysis, but which nonetheless yielded findings relevant to the analysis while economic analyses outside the selection were perused for Question set 4. The selection of this sample was not made to inform a comprehensive systematic review, but aimed to be indicative, with the Mid-Term Review of the BHCDS (Rosenberg et al., 2021) being one of the most recent and comprehensive of the studies reviewed. None of these studies was designed to directly interrogate the relationship between education and employment beyond their particular scope and this puts some limitations on the generalisability of conclusions that should therefore be interpreted in context.

**Table 2**

Studies reviewed in depth

Study	Reference	Methodology in each study
Green Economy Needs Assessment, South Africa (PAGE, 2016)	Partnership for Action on the Green Economy (PAGE), 2016	I used a multi-leveled, mixed method methodology with focus groups, interviews, and case studies and policy review based on document analysis (see Rosenberg, 2020 for an overview of the methodology) as well as an online and web-based survey of provider offerings.
A multi-method, critical realist analysis of learning pathways using life stories and system data on environmental occupations with a transitioning systems framing (2017)	Ramsarup, 2017	PhD thesis elucidating and exploring green skills learning pathways for environmental scientists and engineers
An initial assessment of biodiversity related employment in South Africa (2019)	Driver et al., 2019	An estimate of existing and potential employment in direct and indirect biodiversity related jobs doing labour market analysis
Mid-Term Review of the Implementation of the Biodiversity Human Capital Development Strategy 2010-2030 (2021)	Rosenberg et al., 2021	Baseline comparisons of Higher Education Management Information System (HEMIS) data; employer surveys through online questionnaires; case studies based on interviews, focus groups, document analysis; meta-evaluations and a review of newer policies/policy revisions. The Biodiversity Human Capital Development Strategy (2010) and the Human Sciences Research Council (HSRC) research informing it (Vass et al., 2009) used interviews, particularly focused on transformation and scarce skills, a case study, HEMIS and labour market calculations to predict skills needs, noting that the necessary data was not always available
Fundisa for Change Green Economy Educator Course for Economics and Management Science and Business Studies (Environmental Learning Research Centre, ELRC, 2021)	(O'Donoghue & Rosenberg, in press)	Participatory observations and online engagements with course participants (teachers, lecturers, and education officials) as a course co-presenter

**Table 3**

Studies additionally considered in less depth

On career guidance and internship programmes	Analysis of the programmes offered by World Wide Fund for Nature South Africa (WWF-SA, Raven & Eksteen, n.d.); M.Ed. study evaluating the SANBI Groen Sebenza job creation programme (Fullard, 2021)
On training and skills development in environmental Expanded Public Works Programmes	PhD study: <i>Waste Management Knowledge, its Production, Recontextualisation and Circulation in Expanded Public Works Programme Training Programmes</i> (Giqwa, 2018)
On the national skills funding system	PhD study evaluating the environmental provisions of the National Skills Fund (NSF, Sauls, 2018); evaluation by Ramsarup (2017) of environmental skills planning and expenditure by Sector Education and Training Authorities (SETAs) as part of the evaluation of the implementation of the National Skills Development Strategy (NSDS) III 2011–2016 (National Skills Authority, NSA, 2021)

## Findings and analysis

Question Set 1: Are education and training providers offering relevant programmes?

Comprehensive (environmental) skills needs analyses are difficult to find, but the Green Economy Learning Assessment conducted for the Partnership on Action for the Green Economy (PAGE, 2016) is pertinent. Guided by various government departments, international agencies, employers, and education providers, this study explored employer and stakeholder perceptions of the broad generic skills that graduate level environmental champions need. These learning needs were, with some caveats, framed as technical, relational, and transformational competencies (Rosenberg et al., 2018). They ranged from technical skills such as how to maintain a water purification plant or conduct an energy audit to relational skills such as an energy auditor's ability to encourage maintenance staff to take care of retrofitted green buildings, or a graduate in one discipline to work with contributions from other disciplines using inter-disciplinary teamwork.

Transformational competencies included the ability to forecast what a system or organisation needs for the future, what a new, functioning system could look like, and how to achieve it. The introduction of South Africa's first public-private partnership-based renewable energy programmes had many of these transformational competencies in evidence since they involved not only the first attempt at scale to materialise renewable energy in the country, but also innovative institutional arrangements to make this possible despite an uncertain policy environment (Eberhard et al., 2014). Other studies that addressed the question of what employers need were green skills audits undertaken for the SETAs like, for example, the



Public SETA (Ward et al., 2016) and the Mining Qualifications Authority (Rosenberg, E., 2020).

Were universities attempting to produce these sought-after skills? By and large, yes, but with some caveats. Based on HEMIS data, the BHCDS Review (Rosenberg et al., 2021) found that 34,418 students graduated in 2018 with a degree in study fields of primary, secondary, or generic relevance to biodiversity, including in the computer and data processing sciences—a particularly scarce skill set in this sector (Vass et al., 2009). This is an 88% increase in relevant graduations in the 11 years since the baseline constructed by Vass et al. (2009, based on 2007 HEMIS data) for the BHCDS (SANBI, 2010).

The provider survey component of the Green Economy Learning Assessment (PAGE, 2016) found that universities and other providers do offer education and training programmes for the spectrum of learning needs identified in the assessment. However, some emerging and niche relevant courses were often not accredited on the National Qualifications Framework and therefore not eligible for Skills Levy funding; employers also found accessing SETA funding prohibitively onerous. Hence funding for relevant training was often an issue, and courses could not be offered on the scale at which there was a demand. Emerging graduate skills needs, involving, for example, mine pollution remediation, were also reported to be underfunded (Rosenberg, E., 2020). The steep rise in graduate numbers reflected in the HEMIS data, combined with reduced subsidies, left some university programmes significantly under-resourced.

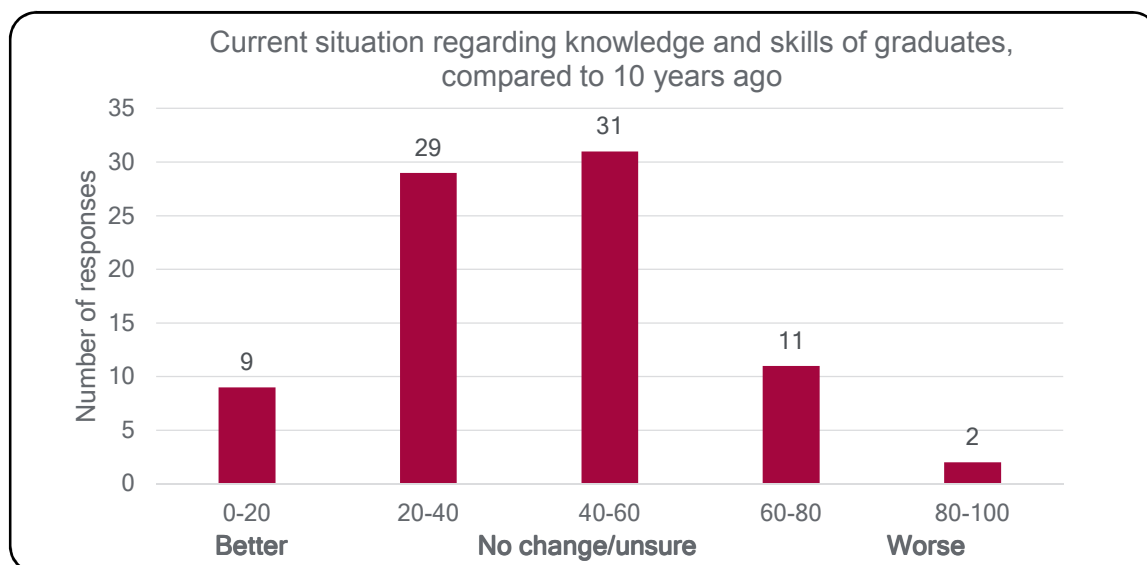
Noting that there was often not enough attention paid to relational and transformational competencies in the programmes on offer, respondents in the national Green Economy Learning Assessment also disagreed on whether universities, or at least in relation to a Bachelor's degree, *could* build the full scope of competences required in many environmental occupations. Some respondents indicated that further degrees were needed to develop these competences; others argued that they could be more fully developed only in the workplace. Post-graduate programmes that supported employees to develop leadership, reflexivity, and other transformational competencies in relation to challenging environment-related work, were regarded as important, but also oversubscribed and underfunded, with too few educators available to design and offer such courses (PAGE, 2016).

### Question Set 2: Are employers satisfied with the skills of graduates?

The Mid-term Review of the BHCDS (Rosenberg et al., 2021) included a questionnaire-based employer survey. This found that compared to 10 years ago, employers of environmental skills are now equally or slightly more satisfied with the skills of graduates (see Figure 3), and they are finding it easier to fill senior scientific positions, including with black and women graduates. However, some concerns remain (a high number report that the situation is unchanged, or that they are unsure), and the pattern reflected by employers is generally uneven, as it was when the BHCDS (SANBI, 2010) was developed. Some employers/tasks require specialisation and depth from graduates, others need greater breadth.

**Figure 3**

Biodiversity Employer Survey Data: Perceptions of current graduate skills and knowledge compared to 10 years ago (prepared by Jenkin in Rosenberg et al., 2021)



Several skills needs assessments showed that employers are also not necessarily clear on workplace skills needs. A study for the Mining Qualifications Authority (Rosenberg, E., 2020) noted that where a government official reported that his department had suitably qualified skills to process mining licenses, a former employee and sector stakeholders identified skills gaps. Employees processing license applications work with conflicting mandates that on the one hand, advance industrial development through mining, and on the other, protect environmental resources. They were inadequately equipped to perform this task under time and other pressures, despite their qualifications.

In summary,

- Employers in the biodiversity sector are somewhat more satisfied than they were 10 years ago with graduate level skills;
- Different employers need different things: some need more depth and others more breadth;
- Employers need a range of skills that can be described as technical, relational, and transformational competences, and some of these develop with time and experience;
- Employers are not always fully cognisant of what they need, or there may be contradictory views, linked in some cases to conflicting organisational mandates, on what is needed;
- There is generally a good match between what some institutions offer and what employers require; however, many of the most relevant courses are oversubscribed and under-resourced, with too few skilled staff or financial resources; and
- Further developing graduate competencies in the workplace seemed vital.

Based on these findings for environment related skills, it is clear that we cannot make unequivocal statements that the skills with which graduates leave an educational institution

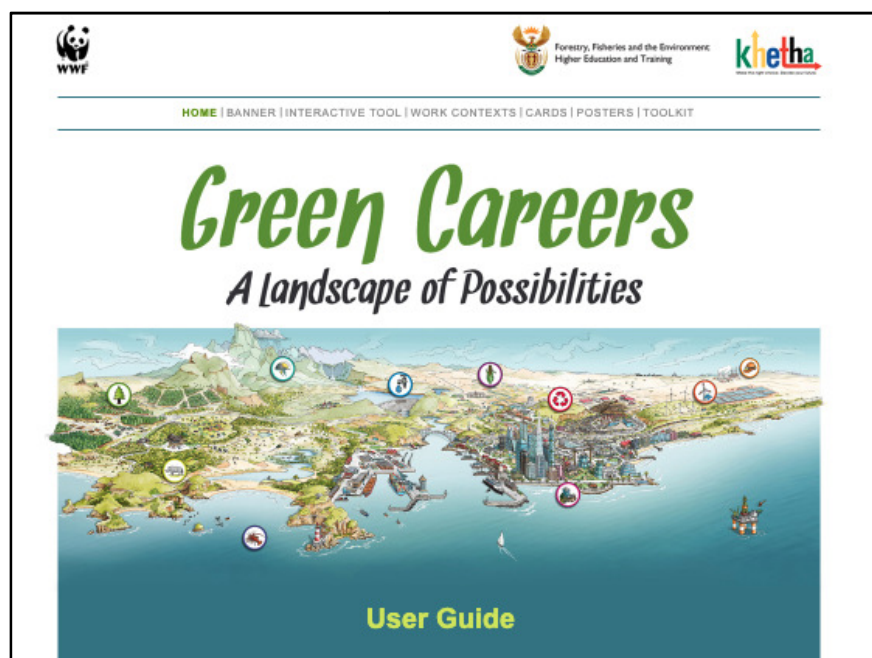
are uniformly irrelevant or not valued by employers. Some are highly valued, which explains why graduates were more sought after than non-graduates in all the positions in the scope of the studies in this meta-review, and why there is a high demand for graduate level training.

What then could cause a graduate to be unable to find a job? The next question set explores the issue of access that speaks directly to inequality and inclusivity.

**Question Set 3: Are learners aware of livelihood opportunities and the learning pathways required, and can they access these?**

In their research to inform the development and the evaluation of an environmental careers programme for universities, Raven and Eksteen (n. d.) of the World Wide Fund for Nature – South Africa (WWF-SA), found that students were often not aware of the environment as an employment sector, and that South African universities' career expos have little to no coverage of environmental careers. When Raven and Eksteen presented them with environmental careers information, students from a range of faculties e.g., resource economists (for economics graduates) or environmental engineers (for engineering graduates) expressed an interest in such careers. Noting the need for an accessible platform to promote environmental careers, the National Environmental Skills Planning Forum encouraged Raven to develop environmental careers resources for university students, which are now available on the WWF-SA website (see Figure 4). DHET's Careers Portal also flags green careers.

**Figure 4**  
Career Guidance Resources



Raven and Eksteen (n.d.) further found that the opportunities the annual WWF-SA internship programme offered were consistently oversubscribed; they received literally hundreds of applications each year for a handful of positions. The BHCDS Review, too, found that while young people need workplace-based opportunities to further develop their technical,

relational, and transformational competencies, organisations report not having adequate resources to take in and mentor (more) young people even though they had need for their skills. A shortage of workplace-based opportunities for graduates and school leavers was also noted in the national *Groen Sebenza* programme (Fullard, 2021).

Academic studies further reveal unequal access to the limited opportunities along with reasons for this. Black women, for example, are less likely to progress from a Bachelor's or Honours degree to a further degree; this is evident in HEMIS data (Rosenberg et al., 2021). Dotwana (2014) and Ramsarup (2017) both found that in order to access a supervisor and funding for post-graduate studies, or a job after earning a degree, graduates need networks and other forms of social capital. The first-generation graduate has less access to such social capital, and often less confidence with which to venture forth and build such capital and the black female student is most at risk of dropping out before completing sought-after further degrees. This was the rationale for the GreenMatter Fellowship (GreenMatter, 2020; Rosenberg et al., 2021) and the *Groen Sebenza* programme (Fullard, 2020), both of which introduce graduates to new networks and build networking skills. Thus, microlevel systems (in Bronfenbrenner's terms), of environmental and educational organisations and funders, are found to interact in order to transition *small* numbers of individual graduates into environmental jobs.

But the *levels* at which internship programmes are oversubscribed points to Question set 4, regarding whether the labour market can absorb the 34,000+ environmental graduates who graduated in 2018.

**Question Set 4: Is the economy providing opportunities and resources? Is the physical environment providing opportunities and resources?**

The question set on opportunities and constraints in the economic and physical environment takes the analysis to the outer circles of Bronfenbrenner's ecological model of human development. Here broader economic and environmental reports were read. This reading analysis suggests that these two dimensions of the macro-level system are intertwined.

South Africa's formal economy has been stagnant for some 40 years, with an average annual growth of 0.29% (Bhorat, 2021) in stark contrast to the growth in the population (the size of which not only increased by some 108% between 1980 and 2020, but also exploded in the 1990s when policy had to cater for the first time for the entire population, and not just a politically privileged elite). It stands to reason that labour absorption will be inadequate. A recent study by the Growth Lab at Harvard University (Hausmann et al., 2022) attributed around 25% of what they described as the degrowth in the South African economy to the shrinkage of commodity-based industries like mining (linked to physical depletion of the resource base), while 35% was attributed to failures in the utilities sector. Erratic electricity supply has impacts across the economy, as does an inadequate supply of water, for which demand is outstripping availability, with governance failures also creating inefficiencies on top of droughts linked to climate change. Growing uncertainty regarding economic and

regulatory policies has also reduced investment, according to the Hausmann et al. (2022) study.

Responding to the limits in the labour absorption capacity of the formal economy, government has both invested in public works programmes and called for the youth to start businesses so as to secure their own livelihoods and boost growth. Following our systems model we can then ask what livelihood and enterprise development opportunities the environment presents in South Africa's towns, townships, and rural areas. Taking care of the physical environment presents opportunity structures in the form of water quality monitoring, leaks preventions and the equitable provisioning of water, decentralized supply of clean and safe energy, sustainable transport, food security, climate change and air quality monitors, propagation of indigenous plants; and land, river and wetland rehabilitators.<sup>2</sup> The Expanded Public Works Programmes (Giqwa, 2018) have been a source of livelihoods on a large scale, with its most successful programmes being the Working for Water, Working on Fire, Working for the Coast, and Working for Ecosystems programmes, with even greater potential envisaged (Maia et al., 2011). This Green Jobs study calculated that 462,000 full-time, direct jobs could be created through a greening of the economy. More recently Driver et al., (2019) estimated that South Africa already employs 418,000 people in biodiversity related jobs, a figure comparable to the mining industry. In other words, the environment *is* already providing and could potentially provide *more* work opportunities. Why then the contradiction of large numbers of interns knocking on closed doors and unemployed graduates?

In the employer survey component of the BHCDS Mid-Term Review (Rosenberg et al., 2021) environmental employers indicated that they are underfunded and understaffed; they have been experiencing chronic budget constraints (see Figure 5), and they could readily employ more people if they were more adequately resourced.

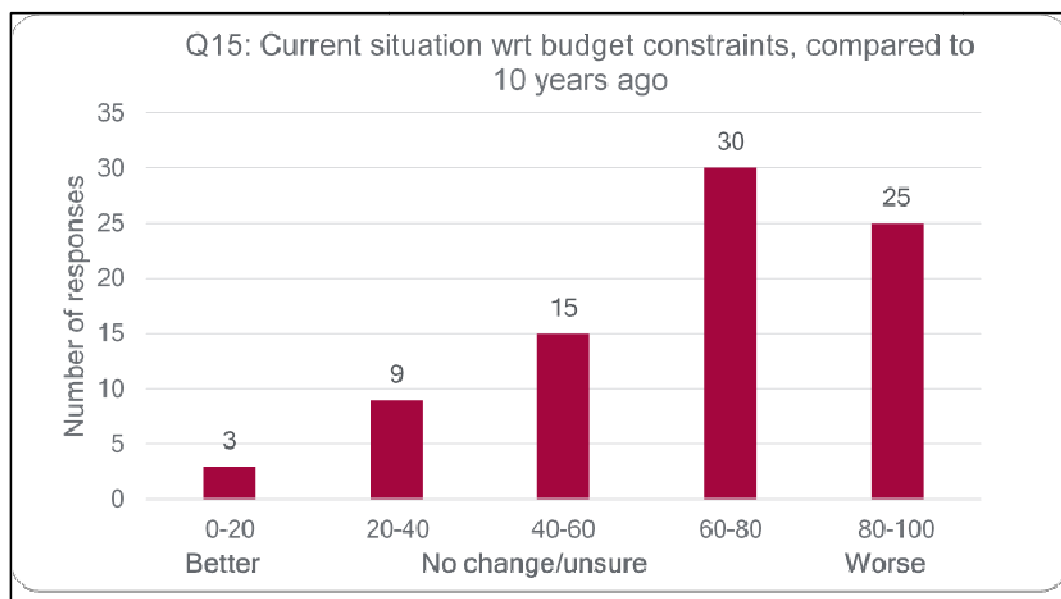
Budget constraints were reported to be one of the most significant issues affecting organisational effectiveness in the biodiversity sector. This emerged as a contradiction: organisations that could potentially grow the green economy, and associated employment, are under-resourced, and have been for at least a decade. Reflecting back across the systems components to Question sets 1 and 2, there is also a contradiction between the scale at which the need for environmental protection and rehabilitation could be creating employment, and the scale at which there is an investment in the development of such skills. The roots of these two sets of contradictions may be found in the final set of questions asked in this meta-review.

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<sup>2</sup> See <https://restory.co.za/>

**Figure 5**

Biodiversity employers' perception of budgetary constraints in their organisations



Question set 5: Is broader society, with its policies, providing opportunities, resources?

Many national policies make provision for environmental education and training, starting with the *White Paper on Education and Training* (RSA, 1995) that indicated that environmental education should be an integral part of education and training at all levels in the system. Environmental content and related learning outcomes feature in the school curriculum and teacher development initiatives.<sup>3</sup> Such educational responses indicate some alignment with a plethora of environmental policies, from the National Water Act of 1998 to the more recent Climate Change Adaptation Strategy, all of which have skills implications (Mohamed & Ramsarup, 2020). The National Development Plan 2030 dedicates a chapter to environmental sustainability and notes not only the links between a healthy environment and the economy, but also the importance of a capable state (in which skills are key) to govern South Africa's natural resources. The National Biodiversity Framework's Strategic Objective of human capital development and transformation remains a priority in *South Africa's Second National Biodiversity Strategy and Action Plan 2015-2025* (Department of Environment Affairs, 2015). The Green Economy Accord (Economic Development Department (EDD), 2011) signalled awareness of the possibility of and need to create jobs on what it has termed a clean, green and inclusive development path.

But between these policy level intentions and implementation on the ground a glaring gap was identified. In her analysis of SETA expenditure on green skills as part of an evaluation of the implementation of the National Skills Development Strategy (NSA, 2021), Ramsarup found that SETAs fund research into green skills, which then appear as priorities in Sector Skills Plans, but seldom invest in related training. Similarly, Sauls (2018) found that despite

<sup>3</sup> See <https://fundisaforchance.co.za/>

policy directives, the National Skills Fund (NSF) does not fund environmental education and training on a significant scale.

What about the school curriculum? The Mid-Term Review of the BHCDS included an analysis of the *Fundisa for Change* programme<sup>4</sup> for building environmental education capacity among educators. Here, in the final part of the meta-review, an analysis of a *Fundisa for Change* educator course focused on Green Economy, Sustainability and Entrepreneurship<sup>5</sup> in which I was a co-presenter (see Rosenberg & O'Donoghue, in press), adds a micro-perspective that speaks back to the macro-context, following the layered systems analysis deployed for this meta-review.

In Grade 7, the compulsory subject Economics and Management Sciences (EMS) features a major project titled Entrepreneurs' Day (Department of Basic Education 2011a) or what some teachers referred to as "Market Day". Teachers on the course described how learners bring cupcakes or buy large packets of treats and re-package them to sell at a profit (production and retail as economic activity). Others wash cars for a fee. Some schools' approaches to Entrepreneurs' Day stand out because of their context-sensitive approach to economics. In these schools the learners, under teachers' guidance, advertise the event in the surrounding community weeks in advance to drum up support. They propagate plants in discarded tins that are decorated, crochet pencil cases from plastic packets, and repurpose old jeans into shopping bags. These regenerative activities are impressive in themselves. In some cases, part of the profit is used to cook a meal for the elderly and unemployed members of the schools' feeder community (O'Donoghue and Rosenberg, in press). Several primary school teachers did resonate with these examples and they had their own versions to share. But when high school teachers were asked how the green economy or sustainability features in Business Studies, they had no examples. Their teaching was strongly focused on the development of a business plan and pitch, and aspects like outsmarting the competition and maximizing profit growth were prominent. While the Grade 8-12 Business Studies curriculum (DBE, 2011b) required learners to consider the environment (e.g., "How will you manage the waste") and to "create business opportunities, creatively solve problems and take risks, respecting the rights of others and environmental sustainability" (p. 8) creating business by or while taking care of the environment or community, did not feature in any of the participating high school teachers' teaching activities.

## Discussion: Who or what is producing the unemployed graduates?

From the analysis of studies pertaining to the biodiversity field, the following emerged:

Universities cannot be singled out and blamed for unemployment. According to the HEMIS analysis and employer surveys in the BHCDS review, universities are producing graduates with environment-relevant qualifications. According to the

<sup>4</sup> See <https://fundisaforchange.co.za/>

<sup>5</sup> See <https://course.greenskills.co.za/>

policy context outlined above, as well as our socio-material realities of water and energy shortages, climate change and biodiversity loss, South Africa needs such graduates. Sector Skills Plans confirm this (NSA, 2021). However, the *level* of training and work-based learning opportunities provided, and the resourcing of such opportunities, is inadequate compared to the scale of the need and the associated opportunities. The BHCDS and related studies also suggested that graduates have unequal access to the knowledge and social networks that provide access to the limited further study and employment opportunities. And unfortunately, environmental agencies who have work that these graduates could do, often carry unfilled vacancies for years, in the context of at least a decade of chronic underfunding.

The contradiction of not adequately funding a stated national priority might well be linked to ideological tensions: Death (2014) and Cock (2018) among others have argued that there are ideological tensions, flaws, and contradictions in the way government approaches the green economy. The Green Economy Accord (EDD, 2011) has not seen concerted implementation efforts, and the general thrust of discussions about economic opportunity remains in the realm of industrial development.

Is the economy to be blamed for creating the unemployed graduates? The loss of revenue as a result of state capture, inefficiencies, and bailouts described in the Hausmann et al. (2022) study has certainly reduced the fiscus. A lack of growth has been noted earlier (see Bhorat, 2021), but economic growth might not necessarily be the answer since it is not always a clear contributor to either employment or well-being (Fioramenti, 2017; Raworth, 2017). Thus, if we are to look to the economy for employment creation, it could well be that a different kind of economy is needed. This was to some extent envisaged in notions of a green economy that would be inclusive, low-carbon and job intensive (EDD, 2011). However, there have been policy inconsistencies (Death, 2014; Eberhard et al., 2014) and little follow-through. This makes targeted green skills development very difficult (Mohamed & Ramsarup, 2020).

In such an incoherent policy context it is challenging and could be entirely misdirected to tie education tightly to employer needs described as “what industry needs” (NewZRoomAfrika, 2021, n.p.). Allais (2012) and others (e.g., Gamble 2004, 2011, quoted in Allais) argued that vocational training should not be tightly tied to specific employer needs. This study, focusing on graduate education, bears out this observation, in a number of ways. Employers require diverse skills, e.g., some require more breadth, some more depth from graduates. There are also different opinions on what employers need in the context of complex and contradictory mandates. And employers are not always clear on what skills they need, with the uncertain and inconsistent regulatory and policy environment a considerable factor in this regard.

Furthermore, the work and livelihood opportunities of the not-too-distant future may not yet be known today. A generic green education, in which issues and sample solutions (Hoffman, 2021) are explored, as well as ideological tensions, along with the development of basic academic life, learning, and research skills, could be valuable.



The review also suggests that not all educational programmes on offer are necessarily appropriate. In the *Green Economy Learning Assessment* (PAGE, 2016) employers and sector stakeholders noted that while technical competencies were important, education and training providers tended to give much less attention to the relational and transformational competencies that complement technical know-how. Transformational competencies speak to graduates' ability to envisage and (co)create 'what is not yet there' and would be an important part of a future-creating curriculum, that is, a curriculum with the power to create livelihoods *despite* and in fact, *in response to*, the intractable social-environmental problems of our context.

A germ cell of possibility exists in the way in which some primary schools work with the Entrepreneurs' Day component of the Grade 7 EMS curriculum (O'Donoghue & Rosenberg, in press). Here teachers worked with the environmental content in the curriculum, the schools' feeder community, and their learners in creative and context-appropriate ways. Their approach to entrepreneurship, in which profits are shared with the community, thus sustaining the cycle of production and profit-making year after year, is environmentally and socially sustainable, builds community, and develops academic skills (literacy, numeracy, budgeting, accounting, crafting, and communicating) in one curriculum activity that is apparently also fun. As one teacher on the Fundisa for Change course noted, and others echoed, "The learners look forward to be[ing] in Grade 7 because of Market Day."

This socio-environmental approach to enterprise development stands in stark contrast to entrepreneurship training observed by Rosenberg, G. (2020) who critiqued programmes that prioritise individualism, competitiveness, and the pursuit of growth for its own sake as the *de rigueur* business model, as being inappropriate for South African township contexts. It also seems not to be used by Business Studies teachers in high school (although the data is perhaps too limited for me to make this claim). While I could not locate many studies on environmental entrepreneurship training, an evaluation of the Green Matter programme (GreenMatter, 2020), like the preliminary work by Rosenberg, G. (2020) suggests that approaches to entrepreneurial training outside of the school context tend to follow a conventional approach to the analysis of market forces and profit growth models. The training modules provided in EPWP programmes in a bid to turn beneficiaries into business owners, were found by Giqwa (2018) to be inefficient and costly in financial terms and in fading human hopes.

Conventional approaches to business development may need an overhaul. Dasgupta (2020) advised that the most important leverage points for social-environmental change are reforms in the financial and education systems. In the contexts outlined in this paper, programmes in economics, business studies, and entrepreneurship development would seem to be key among those needing a new orientation. Thus, while education cannot be blamed for creating the unemployed graduates, education is probably not yet doing enough to support graduates to create a new future, including new economies and livelihood options.

In the field of entrepreneurship education, there is the danger of approaching it with the fixed idea of the high consumption, profit, and growth model in mind that has been critiqued for its

flawed assumptions of trickle-down benefit (Fioramenti, 2017; Raworth, 2017). A different approach takes the form of green work and social enterprises for creating work and livelihoods.<sup>6</sup> Environmental economists argue that the environmental challenges of our time, such as energy and water failures or land degradation, present better opportunities to create livelihoods (Crookes & Blignaut, 2019). There are regenerative, inclusive green economy livelihoods and business opportunities in restoring, repairing, remediating, and regenerating environmental resources. Such economic forms have been explored, and exist in pockets (Fioramenti, 2017; Raworth, 2017).

Individual studies reviewed here, and the meta-review overall suggest, however, that despite policy directives, key role players in the skills system do not invest in environmental skills at the scale required. Perhaps the role-players in the skills system are ironically *too closely* led by the vision that industrial growth will eventually benefit all. With this observation, the caution to not tie education and training too closely to perceptions of what industry needs, is borne out in a context in which there is contestation of what form(s) of economic development will actually benefit people and planet.

## Conclusions: Implications for education

By 2030, as much as 42% of the world's young people may be living in Africa (United Nations, 2015). This raises the spectre of many more unemployed graduates. South Africa's formal economy cannot absorb the growing youth population. It is not doing so in its current contracted state, and it could also not do so from 1997 to 2007, when it experienced "remarkable economic growth" (Hausmann et al., 2022, p. 0). Along with far more accountable governance, and policies that effectively foreground societal needs (Boraine, 2021), new forms of economic activity and livelihoods creation are needed. However, education cannot be let off the hook. As Dasgupta (2021) noted, new forms of education are also needed. The recently released *Education Futures* report (UNESCO, 2021) asks us to envisage new ways to educate under current realities, towards greater abundance for all, rather than increasing scarcities. What do we learn from the multi-level meta-review in this paper, that informs how we think about education?

First, the macro-context is one of dire social needs and environmental degradation, with policy that signals a desire to address these issues, but also contradicts itself in many ways, including with internal inconsistencies across policies and mandates (PAGE, 2016; Rosenberg, E., 2020), lack of aligned implementation (Boraine, 2021, Eberhard et al., 2014; PAGE, 2016) and failure to show results.

In this context, education providers, policy makers, and funders would find it difficult (and would be unwise to try) to tie educational programmes tightly to perceived employer (industry) needs. What these needs are, and whether they will lead to the desired outcome of well-being for all, are unclear and contested (Cock 2018; Death 2014; Fioramenti, 2017).

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<sup>6</sup> See <http://restory.co.za/>

What we can consider is to have education equip the youth with transformative knowledge and skills to work out new solutions and pathways to sustainable futures. Education is shaped by, but also feeds into, the socio-cultural macrosystem that permeates all other systems, sensu Bronfenbrenner—the beliefs, values, ideologies, resources, risks, opportunity structures, and life options that are imbedded in the systems (Härkönen, 2007). Environmental and social sustainability teaching is already taking place in schools and universities, although seemingly at far too small a scale. The vignette of teachers (re) orienting Entrepreneurs Day into a Market Day that responds to their prevailing conditions and the aligned values of social well-being and environmental sustainability, is, in my view, an example of responsive education that ask learners to think in socially and environmentally responsible ways about business and how to sustain themselves and others within those communities and environments.

In conclusion, I challenge the opening statement by the Black Business Council that presents a narrow view of industry needs as the aim of graduate education and call for a more careful and transformative take on what we are educating for.

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