Received: 16 August 2021 | Accepted: 3 February 2022

DOI: 10.1111/dpr.12624

ARTICLE

WILEY

# A green skills framework for climate action, gender empowerment, and climate justice

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**Funding information**
The Malala Fund, Grant/Award Number: N/A

## Summary

**Motivation:** As governments move in earnest toward a green economy, few countries are considering education policy that can facilitate the development of green skills for such transitions. Where policy discussions are happening, green skills are often conflated with science, technology, engineering, and maths (STEM) skills, with little attention to the breadth of green skills needed to achieve climate justice.

**Purpose:** We present a green skills framework to help support policy stakeholders imagine a continuum of green skills for a just transition.

**Methods and approach:** This article applies a critical feminist lens to understand how green skills have been conceptualized across the gender and adolescence, greening and sustainability, and education fields. It also integrates the perspectives of stakeholders from climate, education, and gender-focused multilateral, government, and non-governmental organizations working on green skills.

**Findings:** The analysis finds that green skills coalesce around three distinct but overlapping paradigms. The first understands green skills through a technical lens as the specific capacities needed for green jobs. The second and third paradigms understand green skills through a sociological lens, seeking to tackle the behaviours and social structures driving the climate crisis. As such, they centre on cross-cutting generic capacities and transformative capacities, respectively. Taken together, the article offers a new definition of green skills for policy stakeholders.

**Policy implications:** The three approaches to green skills outlined in this paper constitute the pillars of a new green learning agenda for climate action, climate empowerment, and climate justice. This green learning agenda fills a significant void in both climate policy and education policy, and could help governments address current capacity building needs while setting their populations up for the long-term social transformations required to achieve a just transition.

KEYWORDS

climate change, education, gender, green skills, just transition

## 1 | INTRODUCTION

As the window of time to reduce greenhouse gas emissions and keep global temperature rise between 1.5 °C and 2 °C rapidly closes (Intergovernmental Panel on Climate Change, 2021), governments around the world have begun to explore in earnest what it will take to transition society to a "green economy"—here defined as a low-carbon economy driven by principles of sustainable development and environmental justice. Countries like the United States and the United Kingdom have focused on addressing existing and future skills gaps to build a green workforce that does not leave behind low-income communities, rural communities, communities of colour, indigenous peoples, and women (Biden, 2021; Green Jobs Taskforce, 2021). And countries like Cambodia, the Dominican Republic, and the Marshall Islands have highlighted the importance of skills development and capacity building to adapt to the effects of climate change while achieving sustainable development, especially for the most vulnerable populations, such as adolescent girls and women (Gobierno de la República Dominicana, 2021; Kingdom of Cambodia, 2020; Republic of the Marshall Islands, 2018).

Yet, despite this growing recognition by governments of the need to attend to the skills required to support green transitions, few countries have attempted to widen climate policy discussions on green skills beyond a narrow set of competencies in science, technology, engineering, and mathematics (STEM). An analysis of countries' Nationally Determined Contributions (NDCs, strategies for reducing greenhouse gas emissions and adapting to the impacts of climate change) reveal that countries are heavily biased toward green skills like renewable energy technologies, water resource management, livestock management, risk management, vulnerability mapping, or project design (Kwauk, 2021). These specific skills are framed as necessary to increase the capacity of countries, especially low- and lower-middle income countries, to engage in priority climate actions.

While important, such a focus on specific capacities may lead education and training efforts to focus only on reskilling and upskilling adults for jobs that are specific to the green sector, missing an opportunity to transform education systems around the world to ensure all adolescents and young adults leave basic education prepared to address climate change through any industry. For instance, only 24% of NDCs reference education in the context of children and youth, and only 8% of references to training and capacity building do so (Kwauk, 2021). A tiny handful of NDCs reference skills like critical thinking and problem solving, and even fewer reference skills that address underlying vulnerabilities to climate change like gender inequality (Kwauk, 2021; see also UNESCO, 2021, for similar findings from education sector plans and national curriculum frameworks).

Organizations like the European Centre for the Development of Vocational Training (Cedefop), the International Labour Organization (ILO), and the Organisation for Economic Co-operation and Development (OECD), have attempted to include "generic skills" or "core skills," like communication and negotiation in green economy discussions (Cedefop, 2010; Strietska-Ilina et al., 2011). Analyses of job skills data have also pointed to the rising importance of "foundational skills" like reading comprehension, interpersonal skills like active listening, and higher-order cognitive skills like analytical thinking (Consoli et al., 2015; Kochhar, 2020). And the UK's Green Jobs Taskforce (2021, p. 7) even notes that both "specialist and transferable skills" are needed for green jobs. Yet, despite such attempts to reference a breadth of skills, discussions rarely go beyond STEM fields and undefined placeholders to "other key subjects" (Green Jobs Taskforce, 2021, pp. 55–56). It seems green skills have nearly become synonymous with STEM skills.

But for countries to achieve a just transition, this article argues that governments must go beyond conceptualizing green skills as STEM skills for green jobs to a broader continuum of green skills for building climate empowerment, enabling climate action, and achieving climate justice. Indeed, equipping vulnerable, marginalized, or historically excluded populations with green STEM skills can only go so far in addressing underlying systems of inequality and inequity that have structured their vulnerabilities, marginalization, and social or economic exclusion in the first place. This goes for women and girls as much as it does for displaced coal workers or indigenous peoples. Not to mention, such an approach echoes the oft critiqued "add women and stir" approaches characteristic of early gender and development efforts that failed to consider the influence of gendered relations of power

and gender norms on the achievement of gender equality (Datzberger & Le Mat, 2018). Rather, alongside more progressive policies targeting structural change, governments must target building the knowledge, competencies, and attitudes of all learners to tackle unequal relations of power and inequitable socioeconomic realities that have structured different populations' vulnerabilities to and capacities to respond to the climate crisis along lines of social privilege and economic status.

This article attempts to move forward discussions on a just transition by providing policy stakeholders with a green skills framework, informed by a critical feminist lens, to align more holistically and inclusively countries' education and training systems to their climate mitigation and adaptation priorities. By expanding green skills beyond STEM skills, this article helps to open climate policy engagement with education systems to all levels (from pre-primary through tertiary and vocational), across all types (formal, nonformal, and informal), and across curricular and disciplinary areas (from science to social science, arts, and humanities, and from technical to social sectors). Importantly, this catalyses opportunities to orient education systems toward green skills development that achieves a multitude of social, economic, and climate justice outcomes.

In the sections that follow, we elaborate on this green skills framework and how it can be leveraged by policymakers to ensure that the needs and experiences of those most vulnerable to the impacts of climate change are prioritized—with a special emphasis on adolescent girls. Specifically, the framework coalesces around three distinct yet overlapping discourses on green skills, synthesized from the literature and from stakeholder interviews (see Appendix for an overview of our methodological approach). Section 2 introduces the first of these discursive approaches: skills for green jobs—the more technically oriented of the three approaches. Section 3 shifts to introduce the more adaptive approaches, beginning with green life skills (Section 4) and then moving to skills for green transformation in Section 5 (see Figure 1). Finally, Section 6 argues that, when all three approaches are taken together, they constitute a "new green learning agenda" that can be implemented through gender-transformative green technical and vocational education (green TVET), critical climate change education, and transformative learning for climate action (Kwauk & Casey, 2021).

## 2 | SKILLS FOR GREEN JOBS

As discussed in the introduction, a "skills for green jobs" approach—one espoused by many multilateral agencies, development institutions, and green sector organizations—is the predominant paradigm that frames green skills as a set of specific skills and capacities needed to fill green jobs that will drive transitions to a low-carbon green economy. While there is no single definition—in fact, Maclean et al. (2018) suggest that countries should define green skills in ways that can be operationalized in context—what definitions do exist are often vague. For instance, the Platform for Advancing Green Human Capital (2017) defines green skills as the "professional knowledge, abilities, values and attitudes needed in the transition to a green economy" (p. 5). Ashoka's Green Skills Innovation Challenge (n.d.) takes Cedefop's (2012) definition word for word as "the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society." Martinez-Fernandez et al. (2014, p. 16) go one step further in specificity to define green skills as "the skills needed by the workforce, in all sectors and at all levels, in order to help the adaptation of the products, services and processes to the changes due to climate change and to environmental requirements and regulations."

Given these broad definitions, the conflation of green skills as STEM skills under this first discourse paradigm may not come as a surprise if we understand that it emerges from the dominant, albeit narrow, conceptualization of the climate crisis as a *technical* challenge. That is, the problem of climate change is rooted in an excessive amount of greenhouse gases that have been released in the earth's atmosphere. The solution, then, is a practical one: reduce the amount of greenhouse emissions. To get there, economic systems must adapt by becoming "greener" (i.e. fuelled by cleaner, more sustainable, "greener" renewable energies) and education and training systems must fill the demand for a "greener" workforce by equipping diverse (adult) learners with "greener" skills

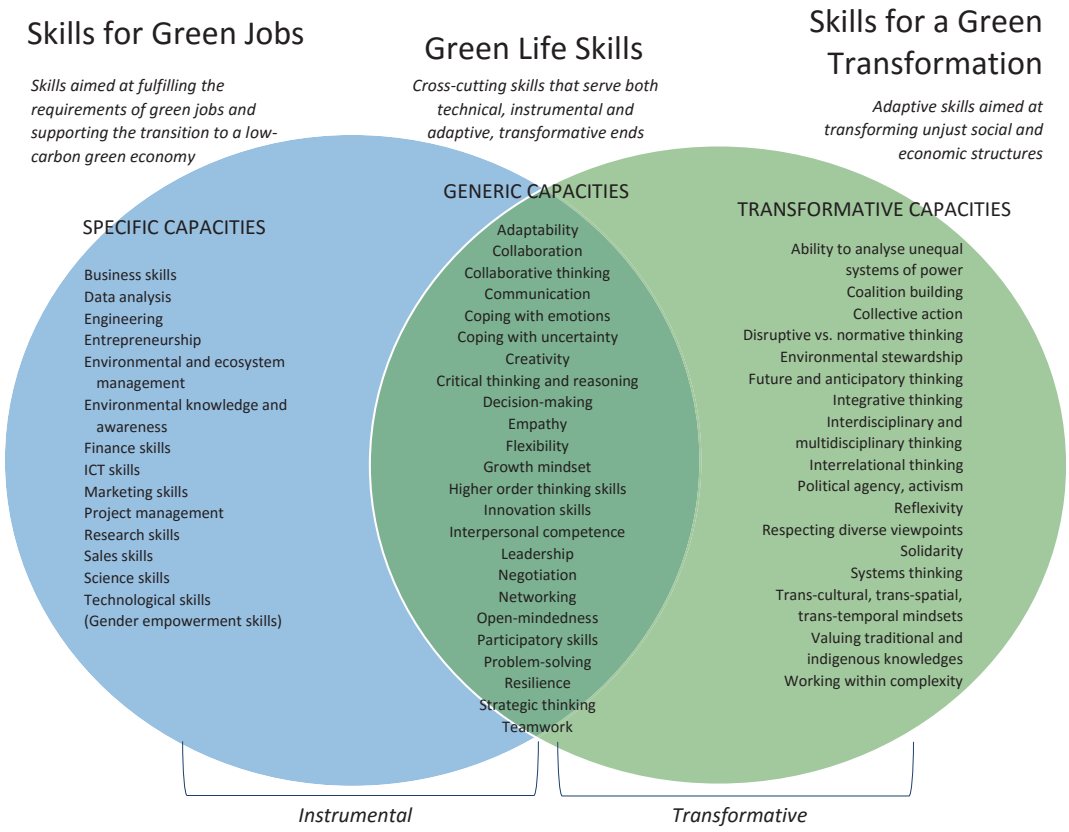


**FIGURE 1** A green skills framework
Source: Kwauk and Casey (2021).

needed by "greener" jobs (Environmental Justice Leadership Forum, n.d.; Novello & Carlock, 2019). Such an approach relies upon and aims to build technical expertise in the STEM fields that are expected to drive technological innovations in the STEM-related renewable industries that will presumably close the emissions gap (Smith & Watson, 2019; Vona et al., 2015).[1]

Notably, the literature from which a "skills for green jobs" approach emerges also encompasses a breadth of non-STEM skills needed for success in green economic transitions. Often referred to as core green skills, these skills include transferable workplace skills like entrepreneurship, business skills, sales and marketing skills, and customer service skills (ILO, 2019). Because of their job-oriented nature, we have listed these technical skills alongside industry-specific skills like data analysis and engineering in the left column of specific capacities in Figure 1. In addition, the literature also references more generic capacities like innovation, leadership, problem solving, analytical thinking, communication skills, and the ability to work in teams, which because they are also referenced within the "skills for green transformation" paradigm discussed later in Section 3, are listed as overlapping generic capacities in the middle column of Figure 1 (O'Brien, 2012). These generic green skills stand in contrast to—but are nonetheless complementary to—the STEM skills, "core green skills," and industry-specific capacities categorized here as *specific* green skills that may mirror and respond to changes in labour market demands associated with green structural economic adjustments (GGGI, 2019; ILO, 2019).

[1]The emissions gap is the difference between the projected level of greenhouse gas emissions under "business as usual" and the level of emissions needed to achieve the targets set out by the Paris Agreement (United Nations Environment Programme, 2020).

The outcomes associated with investing in "skills for green jobs" are often highly economic—such as maximizing economic growth and poverty reduction, but within the context of achieving environmental sustainability. Increasingly, on the heels of calls for a just transition, global leaders and organizations such as the ILO and Cedefop (ILO, 2019) have widely advocated to ensure green jobs are equitable, inclusive, and decent with fair wages, adequate working conditions, workers' rights, and social protections. Indeed, across the organizations invested in the "skills for green jobs" paradigm, a variety of weight and attention has been placed on achieving economic, ecological, and social outcomes.

## 2.1 | Limitations to a "skills for green jobs" approach under business as usual

It is in this attempt to address issues of equity and justice that a "skills for green jobs" paradigm falls short—at least in its predominant execution. Specifically, critics have argued that the green growth ideologies underlying this paradigm are rooted in the neoliberal values, technocratic mindsets, and patriarchal thinking that have produced our present unequal and unsustainable systems of power across economic groups defined by gender, race, and geography (Brown et al., 2014; Mies & Shiva, 1993; Raworth, 2017). For instance, global actors concerned with skills for green jobs rarely attend to the social exclusion faced by girls and women or the institutional racism experienced by people of colour that may limit their opportunities to build required skills. Nor do actors seek to actively address the significant economic power imbalances or the inequitable geographic distribution of key industries that exist between high-, upper-middle, lower-middle, and low-income countries as a result of centuries of colonialism and economic imperialism defined by capitalist exploitation and resource extraction (Eberle et al., 2019; Hickel & Kallis, 2020; Lyons et al., 2014).

Moreover, the heavy emphasis on technical skills rooted in STEM fields means that girls and women are disproportionately excluded by and from a "skills for green jobs" approach. Gender gaps in STEM can be observed across the entire spectrum of educational levels, from early childhood education to higher education, which translates into their underrepresentation in the STEM-related workforce (UNESCO, 2017a; UNESCO-UNEVOC, 2020). Globally, girls represent 35% of students enrolled in STEM-related fields of study, with some sub-fields experiencing even greater gender disparities (UNESCO Institute of Statistics, 2016). This is despite studies that have demonstrated that girls' STEM performance is similar to if not better than that of boys in most countries (Stoet & Geary, 2018). Gender gaps in STEM are only expected to increase as most green job growth, especially those in mid-skill level occupations, is expected to occur in currently male-dominated sectors (ILO, 2015, 2019).

Yet, the answer is not simply to add more women to STEM fields. While greater participation is vital, access is only part of the problem. Gender stereotypes about women's STEM competencies create persistent challenges for those women who "make it" in STEM fields, including the devaluation of their work (Light et al., 2022). Indeed, researchers have found that a lack of STEM skills was the lowest-ranked barrier by women in renewable energy industries for women's engagement in green jobs (International Renewable Energy Agency [IRENA], 2019). Instead, cultural and social norms were reported as the most common barrier, followed by a lack of gender-sensitive policies, and a lack of gender-sensitive training opportunities (IRENA, 2019). This suggests that global leaders' calls for including women and girls in a just transition to a green economy will fall short if their efforts do not address the structural barriers to girls' and women's full participation in education, training, and the workforce, green or not.

## 2.2 | Toward a gender-transformative approach to green skills for green jobs

In spite of these critiques, the "skills for green jobs" paradigm still offers an important element of a continuum of skills needed to address the climate crisis. But for a green economy to achieve systems change for people and the planet, technical and vocational education and training (TVET)—which has emerged as a key focal point for

stakeholders interested in upskilling and reskilling workers to meet the demands of a green economy—will need to abandon a business-as-usual approach for a more gender-transformative one. That is, an approach that seeks to "[address] the causes of gender-based inequalities and [work] to transform harmful gender roles, norms and power relations" (UNFPA et al., 2020, p. 1). This process can be kick-started in two ways.

First, TVET institutions—alongside the broader education system—must problematize the paradigm's conflation of green skills with STEM skills. Rather, these skills must be positioned within a broader set of sustainability competencies that help not only to make all jobs green, but also gender-transformative. This means "core green skills"—those that are not industry specific—should be expanded to include gender empowerment skills and competencies.[2] These include girls' and boys' ability to act upon their social environments in empowering ways; the ability to build partnerships and coalitions of solidarity; and the ability to self-advocate and to advocate for others—skills that the field of girls' life skills education has often focused on (Kwauk & Braga, 2016). Other skills important to building girls' and boys' sense of autonomy and agency include self-awareness, self-determination, self-efficacy, emotional intelligence, and critical perspectives on resistance and power (DeJaeghere et al., 2016; Kwauk, 2022; Sidle, 2019). Conceiving skills for green jobs in such a way will help decision-makers prioritize the achievement of gender equality alongside the reduction of carbon emissions.

Second, TVET institutions—and the broader education system—must be supported to address root causes of gender-based inequities in the green economy. At minimum this means addressing the gender norms, policies, and practices that have historically segregated girls out of STEM and other related technical fields of training and work. But more importantly, it also means openly challenging how green jobs are defined and how the nature of green work and its required skills and competencies are conceived in the process of forecasting and designing TVET programmes. Take for instance the ILO's (2019, p. 201) definition of green jobs as "jobs that reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable." While such a broad definition for green jobs creates room for attention, investment, and opportunities to be directed at a broad range of sectors, the focus on the "reduc[tion] of environmental impact" directs attention to carbon-intensive industries, overshadowing other key industries that are already "low-carbon" but will require equal investment and development to play a stronger role in a green economy.

For example, jobs in education and healthcare—or more broadly, the care economy—can help to shape the behaviours, attitudes, and values toward social equality and environmental sustainability held by society. Jobs in the care economy, like teachers or community health workers, can nurture within us a capacity to care for the well-being of others and for the health of the environment and its natural resources. And they can develop our individual and collective capacity to respond to climate change, whether it be strengthening our ability to cope with the health effects of heat waves and air pollution, or through the development of more comprehensive and equitable climate policy, or through the development of regenerative food supply chains. Such work is essential not only for a climate-empowered workforce and a climate resilient society, but also for catalysing structural transformations and social change at scale necessary for the survival of humanity. These jobs are already "low carbon," and they also happen to be female-dominated.

We suggest, as others have also called for (Novello & Carlock, 2019), a definition of green jobs that includes "any job that contributes to the well-being and flourishment of present and future generations; upholds human rights, including women's rights and the rights of indigenous populations and peoples of colour; and supports the regeneration of the natural world, its resources, and its interdependent socio-ecological systems on which our human economies rely" (Kwauk & Casey, 2021, p. 38). Such a redefinition not only seeks to value care work in the green economy, it also aims to decentre green jobs that offer techno-fixes without transforming underlying drivers of social and economic inequities, including gender and racial inequality. Importantly, such a redefinition

[2]While gender empowerment skills are noted in parentheses in the left-hand column of Figure 1, these are also interlinked with generic and transformative capacities listed in the middle- and right-hand columns.

also attempts to break down gender stereotypes that have traditionally marked care work for women and (green) technical work for men.

## 3 | FROM TECHNICAL TO ADAPTIVE APPROACHES

As growing discussions among youth, indigenous groups, and feminist climate justice activists have highlighted (Sharma, 2021; Whyte, 2019; Wilkinson & Johnson, 2020), the climate crisis is not just a technical challenge but also an *adaptive* challenge (O'Brien & Selboe, 2015). In this context, the problem of climate change is rooted in social and economic systems that are inequitable, unjust, unsustainable, and exploitative. These systems are supported by unquestioned *beliefs* about unfettered economic growth that have driven economic systems beyond planetary boundaries; *values* that promote and reinforce overconsumption and have created a culture of disposability and planned obsolescence; patriarchal *worldviews* that have rendered the labour performed principally by women and people of colour in the care economy as worth less than the labour performed by men; and anthropocentric *paradigms* that have positioned humanity against and above nature. Gluing these systems in place are vested interests that benefit from the status quo and are intent on sustaining systems driven by social and economic relations of unequal power, including patriarchy, racism, colonialism, and capitalism (Leichenko & O'Brien, 2020; O'Brien & Selboe, 2015; Pirgmaier & Steinberger, 2019). Together, these harmful ways of knowing, being, and doing have put human civilization on a runaway train toward ecological destruction.

The solution is an adaptive one: to transform the underlying beliefs and behaviours that perpetuate the status quo. To get there, education and training systems cannot only focus on the nevertheless vital STEM skills, but must also target the wholesale transformation of mindsets to help catalyse more equitable, just, sustainable, and collaborative social and economic systems. Such an approach is centred on nurturing behaviours, competencies, and attitudes that are foundational to closing the education gap alongside the emissions gap, both of which inhibit the achievement of environmental justice, gender equality, and social equity.[3] While STEM skills are part of this, they are not the only kind of green skills that matter.

## 4 | GREEN LIFE SKILLS

The first of two adaptive approaches to green skills, the "green life skills" approach, assumes that the root of the climate crisis lies in unsustainable individual behaviours and actions, including one's consumption patterns, energy usage, and food choices, for example. Focused on the individual as the agent of change, this paradigm—promoted by many environmental conservation advocates and climate change education programmes—aims to teach learners about climate change, its causes, and its solutions. It follows that such knowledge will lead to an environmental awareness that generates "greener" ways of thinking, being, and doing in the world (Cordero et al., 2020; Williamson et al., 2018). The overarching goal within this approach is for education to open minds and to catalyse pro-environmental behavioural changes that enable the achievement of more sustainable and low-carbon forms of economic development.

The skills that fall under this approach can be viewed in two ways. The first is that, practically, they are skills referenced by both ends of the green skills continuum. For example, under the "skills for green jobs" paradigm, they are "core skills" like teamwork and leadership that are necessary for success in the workplace (ILO, 2019).

[3]In addition to traditional education gaps structured along intersecting lines of gender, class, and geography, the education gap is here defined as the difference between our understanding of climate change, its causes, impacts, and solutions under "education as usual" and the level of understanding needed to address equitably the biophysical and sociological dimensions of the climate crisis (McCaffrey & Ottoboni, 2019)

Under the "skills for green transformation" paradigm, they are skills like strategic thinking and collaborative thinking, which are foundational to efforts to work collaboratively to transform entire systems (O'Brien, 2018). Thus, these skills sit in the middle in a space of overlap on a continuum of green skills.

The second is that, on their own, these skills represent a distinct approach to green skills centred on enhancing the generic capacities of individuals to adopt more sustainable and low-carbon behaviours and actions across a variety of contexts in life. As such, we refer to this framing as "green life skills," but they can just as easily be characterized as cross-cutting skills, transversal skills, a breadth of skills, or 21st-century skills. They include cognitive skills like critical thinking and strategic thinking; socioemotional, affective, and interpersonal skills like empathy and collaboration; and beliefs or attitudes like a growth mindset or civic mindset (UNESCO, 2017b). Importantly, they are assumed to result in greener behaviours that are observable, measurable, and trackable (O'Brien, 2018).

Together with specific capacities and in conjunction with greater knowledge of climate change and environmental issues—and as we discuss later, greater attention to climate justice issues—these skills function as important building blocks to greener problem-solving and greener decision-making. For example, young women across sub-Saharan Africa through the support of CAMFED (n.d.) have been able to cope better with the uncertainties exacerbated by climate change in their countries by applying life skills to securing more sustainable, climate resilient livelihoods. Specifically, these young women have learned to orient their critical thinking, sustainability thinking, and leadership to address climate-related challenges in agricultural productivity and food security. By adapting climate-smart agricultural techniques and aquaponics technologies (specific capacities developed through technical training opportunities) to their local contexts and by creatively using locally available resources, these young women have helped to increase the climate resilience of their communities. In essence, these green life skills have helped to build their green "lenses" through which to view their world, identify their community's climate vulnerabilities, and develop climate solutions that build resilience while improving their overall well-being.

## 4.1 | Limitations to an instrumentalist approach to "green life skills"

While the example above illustrates the transformative potential of green life skills, it is in the desire to achieve quantifiable behavioural change through green life skills education that this approach can end up instrumentalizing education as a means to a greener end without sufficiently addressing the structural change needed to achieve a just transition and a more sustainable future. Critics point out that the predominant focus on individual behavioural change allows this approach to be co-opted by neoliberal logics, greenwashing the status quo without tackling, for example, the underlying drivers of unsustainable consumption or the systemic barriers preventing marginalized groups from participating in certain kinds of climate solutions (Jickling & Wals, 2008).

Moreover, an instrumentalist approach also ends up homogenizing individuals into a single category comprising those who need to be rendered more sustainable. Rarely do those promoting an uncritical approach to green life skills question *who* should take on what type(s) of behavioural change *where*. In this paradigm, the assumption is that all behavioural change is equal and equally possible, when it is not. Those who act and how they act are often a result of historic socioeconomic, political, and geographic privilege—or lack thereof. Homogenizing the doer functions to render invisible the fact that some populations contribute a greater share of emissions or have a larger environmental footprint than others, and therefore have a greater responsibility to take more high-impact actions than those populations that have contributed the least to present-day emissions and who have the smallest environmental footprint. At a global scale, for instance, this would mean countries with higher levels of education, higher levels of economic wealth, and higher levels of greenhouse gas emissions would pay greater attention to behavioural change strategies than low emitting countries. Unfortunately, studies suggest that this is not the case (Kwauk et al., 2019).

Homogenization of the doer also renders invisible the gender dynamics of certain kinds of behaviours, thus obfuscating who is more likely to do what (Thoyre, 2020). In this context, caring for the environment, being environmentally conscientious, or expressing concern over natural resources might become misconstrued as feminine behaviour; while behaviours typically associated with physical labour, like caulking windows or changing furnace filters to improve the energy efficiency of a house, may become characterized as masculine (Boudet et al., 2016; Brough et al., 2016; Swim et al., 2019). Such gendered worldviews go on to enable the cognitive dissonance necessary to compartmentalize extractive capitalism from environmental destruction, toxic masculinity, and gender-based violence (Onwutuebe, 2019). And gender stereotypes go on to help reinforce gender biases around technical solutions to climate change.

Finally, research tells us that knowledge of climate change and environmental awareness do not always lead to behavioural change (Kollmuss & Agyeman, 2002; Schultz et al., 2005). Indeed, behavioural change is complex and hardly a linear process, suggesting that an instrumentalist approach to green life skills is a rather inefficient means to a greener end. Research suggests that deeper engagement with the sociopolitical and psychosocial dimensions of climate change are critical to developing green life skills like empathy, reasoning, evidence-based decision-making, and the ability to communicate a position, all of which are important for generating feelings of personal responsibility and motivating pro-environmental behaviours (Bouman et al., 2020; Karpudewan & Roth, 2018; Monroe et al., 2019). Importantly, such an approach aims to develop green life skills in conjunction with greater awareness of social and economic systems, not in isolation. This opens the door to more critical approaches to green life skills development, to which we now turn.

## 4.2 | Toward a more intersectional approach to green life skills

The malleability of green life skills is what gives this approach a second life. Indeed, depending on the context in which they are nurtured and the outcomes toward which they are directed, life skills can be developed for neoliberal ends (e.g. to draw down emissions students work together to decrease their community's home energy use), or they can be oriented toward more transformative ends (e.g. to draw down emissions students mobilize a campaign advocating for their school to divest from fossil fuels). That is, green life skills like higher-order thinking can be applied either way, increasing the importance of the approach to their development.

Research suggests that there are five design elements that can help create the right conditions for green life skills to be leveraged for transformative outcomes: (1) begin with a *cognitive* entry point, (2) enable an *affective* or emotional connection to that entry point, (3) create a safe space for *existential* reflection that challenges one's existing paradigm through critical inquiry, (4) develop a sense of *ownership*, or personal responsibility, and (5) bridge to opportunities for *empowered* action or dissent (Cordero et al., 2020; Kwauk & Casey, 2021; O'Brien et al., 2018; Sterling, 2010). While all five design elements are important to green life skills education, the cognitive and existential elements are particularly important for aligning green life skills with a more transformative, justice-oriented agenda. Next, we explain why.

First, the cognitive entry point opens the door to intersectional approaches to green life skills education that recognizes that different people have different levels of exposure to climate risks and vulnerabilities depending on different interconnected aspects of who they are: their race, their caste, their gender, etc. The cognitive entry point enables intersectional analysis when learners are encouraged to draw upon two types of knowledge: effectiveness knowledge and social knowledge. Effectiveness knowledge, which builds consequential thinking, enables the learner to consider the intended and unintended outcomes of any particular action (Frisk & Larson, 2011). When combined with critical discussions about individual and collective impact, effectiveness knowledge allows the learner to attend to the differential weight of individual action as compared to collective action or policy change. It also paves the way for the learner to consider the costs and

benefits of certain actions for different populations based on constraints and opportunities structured by their gender, status, or age, for example.

Social knowledge is knowledge of the social desirability of certain behaviours or, alternatively, the social cost of transgressing conventional norms. Such knowledge fosters social awareness and emotional intelligence and can serve as a launching point for critical discussion on the equity and fairness of actions (Frisk & Larson, 2011). For instance, it can help incite critical reflection on the beliefs and values that motivate specific actions or non-actions, and allow the learner to examine whether these actions are constrained by certain social identities defined by gender, race, socioeconomic status, or age; by certain social norms, such as gender norms; or by structural circumstances like women's and girls' lack of access to financial or political capital.

However, the predominant approach to climate change education is heavily focused on two other types of knowledge: declarative knowledge (i.e., the facts about climate change, its scientific components, and its solutions) and procedural knowledge (i.e., know-how and how to—how to separate recyclables, how to maximize energy efficiency, how to conserve water). Such a focus enables and is enabled by an instrumentalist approach to green life skills education aimed at recalibrating behaviours. While engagement with all four types of knowledge is necessary to shape new behaviours, developing effectiveness and social knowledge can help teachers and learners develop new behaviours in socially conscious and intersectional ways that lead to transformative outcomes, like those achieved by CAMFED beneficiaries in the example above.

Second, an existential component to green life skills education that challenges the individual's sense of self and way of living and being can help learners see the incompleteness of their worldview and help them begin to critically question what may previously have been taken for granted—from the incompatibility between a commitment to sustainability and to unfettered economic growth, to the immutability of an individual's circumstances in terms of their socioeconomic status, gender identity, or even climate vulnerabilities. UNESCO (2019) describes this as a process of behavioural transformation. Once students perceive this gap in their worldview, they are "awakened to a new reality and to facts/situations that were formerly part of their lives and about which they were not aware" (UNESCO, 2019, p. 94). As they work cognitively and emotionally to understand not only their own gaps, but also the gaps of others, they are brought closer to action and behavioural change.

Importantly, it is the point at which green life skills education shifts from being about individual behavioural change to collective awareness and understanding interrelated thinking that a green life skills approach becomes an important stepping stone between the behavioural realm of climate action and the political realm where systems transformation and climate justice can be catalysed.

## 5 | SKILLS FOR GREEN TRANSFORMATION

As with "green life skills," a "skills for green transformation" approach situates the educational response to climate change and a just transition in the need to think differently and be different in the world. But where "skills for green transformation" branches from "green life skills" is in its focus on competencies and mindsets that can help to create more sustainable and equitable systems. Collective action is the path to change in this paradigm. To achieve a just transition, this approach to green skills extends the need for self-awareness and individual behavioural change to the need for social and ecological awareness and the transformation of one's relationships with others, including the natural world. At scale, such transformed relationships can help to create new economic, social, and political structures to which to transition on the "other side" of a just transition.

This third and final adaptive approach in our green skills framework starts with the assumption that social, economic, and political systems must be critically interrogated as to their role in exacerbating climate change and structuring its unequal impacts. Through such interrogation, self-work begins in which "individual and collective ideas about what is just, desirable, and sustainable" are themselves critically deconstructed (O'Brien, 2018, p.

157). As learners begin to disrupt the boundaries of their worldviews and their identities, they must be supported through feelings of grief, hopelessness, despair, trauma, and anger that may accompany coming to terms with the social injustices of the climate emergency (Boström et al., 2018; Cunsolo & Ellis, 2018; Usher et al., 2019; Willox, 2012). From here, learners can begin to actively and collectively transform the rules and goals of the structures around them, in which they are also embedded.

While green life skills are foundational, additional cognitive and socioemotional skills are important to achieve more transformative outcomes (see the right-hand column in Figure 1). This includes cognitive skills like systems thinking, futures thinking, and disruptive thinking (Frisk & Larson, 2011; Staufer et al., 2015; Tilbury, 2007; Wiek et al., 2011). It also requires a level of social and political awareness that enables the recognition and critical interrogation of the systems, processes, and institutions that benefit from—and attempt to sustain—unequal relations of power across different groups of people (Henderson, 2019; Kaijser & Kronsell, 2014; Resurrección et al., 2019). Additionally, emotional intelligence, a high tolerance for risk, and interpersonal skills for engaging in collective action are important, including relational and participatory competencies like trust building, coalition building, and enrolling others in a common cause (Frisk & Larson, 2011; Lotz-Sisitka, 2018; Lotz-Sisitka et al., 2017; Ziervogel et al., 2016).

For example, in Plan International's *Youth Leadership in Climate Policy* curriculum (Pettee & Kwauk, 2021), adolescent learners are guided through a stakeholder mapping activity to better understand how different population groups in their country may be differently affected by climate change and/or differently impacted by and/or engaged in climate decision-making, depending on their location on two intersecting continuums of vulnerability and power. Such an exercise introduces learners not only to the concept of power and its fluidity, but also to how power can be held by and/or extended over certain populations in ways that can be empowering or harmful. Learners are then guided through an exercise to reflect on culturally appropriate ways of engaging with climate decision-makers in their home countries and of communicating key messages that can build trust and a coalition of actors committed to addressing underlying issues of climate justice that learners identified earlier in the curriculum.

While developing green life skills can be likened to building green lenses through which to view the world, developing skills for green transformation can be thought of as building a "feminist planetary consciousness"—that is, a sense of awareness of how power and patriarchy undergird our greatest planetary challenges (Kwauk & Casey, 2021).[4] Such an awareness aims to put in perspective how the health of the planet is intricately tied to the health of human society, and how an excess of greenhouse gases can be as destructive to life on the planet as an excess of power concentrated in the hands of a few. A feminist planetary consciousness takes issue with a "dominion over" worldview that positions the earth (or vulnerable groups) as a resource to exploit for economic growth (Ziervogel et al., 2016). Instead, it aims to move toward a justice-oriented worldview of "care for" and "compassion toward" that strengthens the social bonds between people, and thus the possibility for structural change. In this context, green skills are viewed as transformative capacities that foster global and planetary citizenship; environmental stewardship and an ethic of care for humanity; civic engagement and political action (Kwauk & Casey, 2021; Ziervogel et al., 2016).

Girl Rising's Future Rising Fellowship, established in 2021, is an example of an initiative aimed at fostering such a feminist planetary consciousness among programme Fellows (young activists who are in their late adolescent years to early adulthood) and the broader public (Girl Rising, n.d.). First, the programme builds Fellows' specific capacities (from cinematography to journalism) to strengthen the techniques that Fellows use to tell stories about climate and environmental justice as experienced by girls and women. Second, Fellows engage in a series of virtual critical dialogue circles (Sahni, 2017), where they deepen their understanding of the intersectional nature of

[4]This concept of a "feminist planetary consciousness" is a synthesis of Laszlo and the Dalai Lama's (1996) conceptualization of a planetary consciousness with Sahni's (2017) conceptualization of a feminist consciousness (see Kwauk & Casey, 2021, pp. 54–55, for a more detailed explanation).

climate change while building solidarity with Fellows from around the world. Together, they interrogate issues of care and compassion in the green economy alongside the values and ethics shaping the politics of climate solutions. By the end of the fellowship, Fellows' film, art, written or spoken word output are expected to go on to inform the broader public about systemic issues of injustice and inequality that must be addressed in the fight against climate change.

## 5.1 | Limits to transformation without also opportunity structures and political agency

Notably, a feminist planetary consciousness, systems thinking, or any other transformative capacity is insufficient on its own for transformational change to happen. Green skills are a prerequisite. In addition to an individual and collective desire to affect change, these green skills must also be accompanied by *opportunities* to engage in action that can affect change and by an individual and collective sense that one *can* affect change—or at least take on the risk of trying. Such opportunity structures and political agency act as important mediating factors in the translation of green skills into empowered climate action and the achievement of a just transition (Kwauk & Braga, 2017).

First, opportunity structures are the policies, institutions, social networks, and social norms and expectations that can constrain or enable the translation of green skills into empowered, transformative action (Kwauk & Braga, 2017). For example, the existence of CAMFED's Climate-Smart Agriculture Guides serves as an enabling opportunity structure that provides young women across the African continent with a mentoring network and space for professional development and career success in green agribusiness. Similarly, the Girl Rising Fellowship provides young activists from around the world with a global platform through which to amplify their climate justice activism. Alternatively, historic discriminatory practices by lending institutions might function as a constraining opportunity structure, preventing marginalized groups from accessing the capital needed to engage in regenerative agriculture, to participate in renewable ventures, or to spearhead low-carbon innovations. Whatever form they may take, opportunity structures mediate the transformative potential of green skills and address who is truly served by a just transition. Such mediation is something that policy stakeholders of a "skills for green transformation" approach to green skills must bear in mind as they seek to realize a just transition.

Second, political agency enables individuals to engage in systems change (O'Brien et al., 2018). Specifically, political agency extends personal agency—or "the ability to see and make choices and to exert control over one's own life" (Kwauk & Braga, 2017, p. 8; see also Sidle, 2019)—to the realm of power and politics. In the context of climate change, political agency must be oriented to making ethical choices within planetary boundaries and in pursuit of what will sustain humanity on earth (O'Brien, 2015). But how does one build political agency? Like personal agency, one cannot "deposit" a sense of self-efficacy or a sense of possibility in an individual. Rather, "it develops and fluctuates over the life course and across life situations through an iterative and dialogical process of building upon past achievements, learning, and patterns of action" (Kwauk & Braga, 2017, p. 16). That is, agency (political or personal) is temporal, dynamic, and emergent. It is not something one possesses, but something that one achieves, and its impact depends on context. Finally, agency is not only individual, but also relational and distributed. Its state depends on whether others recognize one's agency, as well as the degree of agency achieved by others (Kwauk & Braga, 2017; Lotz-Sisitka, 2018). For instance, the Future Rising Fellows might not have the degree of political agency that they have done since 2021 had young Swedish activist Greta Thunberg not had the impact she had in 2018, helping to propel the political currency of youth voices in global climate advocacy ever since.

Together, opportunity structures and political agency influence the transformative potential of "skills for green transformation." Such a mediating effect is an important reminder that solving the climate crisis while achieving a just transition cannot be left to the individual alone. Indeed, the individual must be viewed in relation to social structures, not separately, and as acting in concert with others, not alone. Such a perspective places increased value on pedagogical approaches that focus on *transgressive* social and individual learning rather than *transmissive*

social or individual learning (Macintyre et al., 2018; Lotz-Sisitka et al., 2015). This means approaching green skills development as a potentially uncomfortable co-constructive process of sitting in tension that also incorporates the possibility of producing new ethical ways of thinking, being, and doing, together (Lotz-Sisitka et al., 2015; Sterling, 2010).

## 6 | CONCLUSION: TOWARD A NEW GREEN LEARNING AGENDA

Each of the three approaches to green skills discussed above was identified by attending to the ways in which different discourse communities conceptualize and frame green skills and their associated outcomes. Notably, these framings closely correspond to the ways in which each community understands the nature of the climate crisis and, by extension, what types of green skills are needed to address it.

A "skills for green jobs" paradigm frames the climate crisis primarily as a technical problem and sees green skills as a specific set of capacities, often STEM skills, that are required to support climate action—in this case, an economic transition to a low-carbon economy. But for this transition to be just and equitable, we must expand the definition of green jobs to include sectors like health and education. We must also expand this paradigm's conceptualization of green skills to include gender empowerment skills, like the ability to read, decode, and act upon one's social, economic, and political environment.

A "green life skills" paradigm approaches the climate crisis as an adaptive problem of unsustainable individual behaviours. The antidote is perceived to be the development of a set of generic capacities that can be "worn" like a pair of green-tinted glasses, empowering individuals to engage in greener behaviours and to make greener decisions in a variety of contexts. But such an instrumentalist view of green skills does not lend itself to equitable outcomes, so we suggest cognitive and existential entry points that engage multiple ways of knowing and being to help direct these green lenses toward more justice-oriented ends.

Finally, a "skills for green transformation" paradigm sees the climate crisis as an adaptive problem. But rather than focusing on the individual, this paradigm focuses on confronting underlying structures of inequality that drive the climate crisis and create climate vulnerabilities. As such, green skills are conceived as capacities that not only can transform mindsets, but also the very social fabric of our relationships that go on to constitute our social, economic, and political systems. Under this paradigm, the development of a feminist planetary consciousness, along with an awareness of opportunity structures and the achievement of political agency, are critical to achieving the social transformations necessary for a just transition and climate justice more broadly.

Taken together, this green skills framework defines green skills as "the specific, generic, and transformative capacities needed to contribute to a socially-, economically-, and environmentally-just human society that cares for the human and non-human world and reduces the impact of human activity on others" (Kwauk & Casey, 2021, p. 5). Indeed, this definition suggests that the paradigms included in this framework should not be viewed as being in opposition, but rather as a continuum for conceptualizing the skills and capacities society needs to achieve a just transition to a low-carbon economy. That is, all three paradigms are integral for climate action, climate empowerment, and climate justice.

The predominance of STEM skills as green skills, however, has limited the policy imagination of countries when it comes to education and training. Indeed, at the time of writing, only four countries' NDCs reference green skills that are transformative in nature: Barbados, the Marshall Islands, Namibia, and Tunisia (Kwauk, 2021).[5] Where green skills are referenced, the predominant approach is through a technical lens. The

[5]These "skills for green transformation" include the capacity to address gender inequalities (Republic of the Marshall Islands, 2018; République Tunisienne, 2021), intersectionality and transversality (République Tunisienne, 2021), the ability to define a vision (Republic of Namibia, 2021), and "transformative capacity, the ability to mitigate the impacts of shocks through a transformation of social and economic systems" (Government of Barbados, 2021, p. 11).

general lack of policy ambition in the NDCs of nearly 100 countries is hampered further by roadblocks within the education sector (Kwauk, 2020) and within our institutions of governance (Sabin Center for Climate Change Law & Climate Science Legal Defense Fund, n.d.). Together these barriers ultimately handicap our collective capacity to face the long-term impacts of climate change. Once we have exhausted all politically plausible short-term technical fixes, we will be stuck with the same beliefs, values, worldviews, and paradigms that brought us to our present crisis.

In many ways, we (the authors) seek to offer a counter-vision to the dystopian view above—or at least a pathway to an alternative future. By expanding our understanding of green skills as outlined in this article, and by leaning into the policy examples of countries like Barbados, the Marshall Islands, Namibia, and Tunisia, we (as society) can begin to more consciously orient our education systems to achieve the technical capacity building, sustainable behavioural change, *and* transformative mindset shifts needed to address the climate crisis and achieve just transitions. Specifically, this green skills framework provides policy-makers with a starting point for a "New Green Learning Agenda"—a policy vision that steps into the void between climate policy and education policy and focuses on equipping society with the breadth of green skills needed to respond to climate change—and its associated social injustices—as the existential threat that it is. While in no way the only agenda seeking to move forward more progressive discussions on education in the context of the climate crisis and just transitions (cf. The Alternatives Project, n.d.), it joins a growing chorus of voices demanding greater alignment between climate action and the achievement of climate justice.

## ACKNOWLEDGMENTS

This article has been adapted from a report originally published by the Brookings Institution. The authors would like to thank Malala Fund for their generous support of the original research underpinning this article, as well as the anonymous reviewers for their thoughtful feedback and recommendations.

## FUNDING

The research was supported by Malala Fund.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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**How to cite this article:** Kwauk, C. T. & Casey, O. M. (2022). A green skills framework for climate action, gender empowerment, and climate justice. *Development Policy Review*, *40(Suppl. 2)*, e12624. https://doi.org/10.1111/dpr.12624

## APPENDIX

The literature review underpinning this study included nearly 300 pieces of grey and academic literature identified through a search of key terms on Google Scholar, Google search, and within bibliographic databases like the Education Resources Information Center (ERIC) and GreenFILE. Key terms included terms across three broad categories: (1) gender and adolescence (e.g., adolescent, gender sensitive, girls); (2) greening and sustainability (e.g., green, just transition, sustainable development); and (3) education and educational outcomes (e.g., life skills, training, competencies). Additional literature was identified by searching the reference lists of selected articles and websites of prominent global actors in the green skills landscape. Literature was purposively selected based on relevance to the guiding research questions, and then coded in Dedoose for their definitions and conceptualizations of green skills as well as the intended outcomes and impacts associated with green skills development.

Stakeholder interviews included 24 individuals from a variety of climate, gender, and education-focused multilateral, government, and non-governmental organizations working on green skills. Interviewees were purposively identified to ensure diversity both geographically (i.e., across high-, low-, lower-middle and upper-middle income countries) as well as by institutional type (e.g., multilateral organization, government ministry, non-governmental organization, professional working groups, etc.).