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and the potential of apprentices**

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# Introduction

## Apprenticeships for greener economies and societies: state of the art and the potential of apprentices

© Philipp Gonon <sup>(5)</sup> <sup>(6)</sup>

### 1.1. Greenwashing, greenification and sustainability

As individuals we have many opportunities (and often get nudged) to act 'green' <sup>(7)</sup>. However, to act greener in this way does not guarantee that we (or humankind) will be successful, not knowing how much time and opportunities allow us to turn the wheel and really get a picture of the risks we are facing (Ord, 2020). It seems very likely that consumers and citizens do not modify preferences immediately and a single act cannot solve the problem of climate change or long-term sustainability: the economy still pays too little attention to social needs and nature.

This section, therefore, starts with a critical appraisal: the shift towards incentives and market-based instruments to encourage individuals, the economy and society to act greener seems positive at first glance; but it also serves to avoid important systemic, profound structural reform to our way of producing and living that are actually needed to promote sustainability.

Greenification and, even more, greenwashing are terms which are used not just to approve green issues. They also to hint that many measures promoted as for the environment are actually quite ambivalent in terms of making our world greener, i.e. of value also to the lives of future generations of humankind.

The market economy is counting on elements

which are the core of the system (prices, competition and incentives) rather than prohibition and constraints. Further, there is often a focus on consumers rather than producers, although it is more difficult to modify millions of consumer decisions, instead of improving production i.e. by making production less harmful for the environment.

In this context, greenification based on distracting the central role of producers is prone to pass the buck to others, especially to consumers (Ringger, 2020, p. 142). The general aim to turn green and for humans to act sustainably seems complementary and increasingly consensual. But the question 'what is greenification for' remains debatable, due to the fact that it has to be clarified what the most important measures are.

The discourse and the wording started changing in the 1970s. Today, executive board members, managers and owners of big firms, e.g. like Novartis or Nestle <sup>(8)</sup> seem to suggest that 'something' has happened in recent years, at least the compulsion to justify what has been done and the acknowledgement of a 'green' responsibility. There is a gradual recognition and critique that we still have a spirit of 19th century capitalism and industrialism, trying to make money out of natural resources and leaving a devastated landscape. Many measures, like producing dirty and offering a green tree afterwards, are, in this respect, greenwashing. Green acts and greenwashing as nominal support is not backed up by structural decisions; it equals doing something good for having done

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<sup>(6)</sup> This paper is based on the keynote speech delivered by the author during the 2021 Cedefop-OECD symposium on apprenticeships for greener economies and societies.

<sup>(7)</sup> For example, in a hotel we may be asked not to put towels in the wash prematurely, in order to 'save the planet'.

<sup>(8)</sup> See Hoffmann (2021) and Schneider (2021).

something bad. Other views in favour of consuming more ‘healthy food’ products, as opposed to past nutrition lifestyles (e.g. consuming meat), are also potentially greenwashing, admitting that 60% of those products are not really healthy. This is especially true if, at the same moment, companies defend selling luxury products as a right of the people who want to enjoy them, disregarding their production conditions.

All in all, is greenification sufficient? Do we have enough time? ‘Our house is on fire’: if this is true, the Greta-question and her urge ‘I want you to act, I want you to panic’ (Thunberg, 2019) is more than understandable. If we consider the whole range of urgencies, we have to admit that is difficult to act consequently green. Most developments like pollution and overuse of resources still are bound to a growing population and a growing economy <sup>(9)</sup>. Some expect progress in handling CO<sub>2</sub>-emissions, but technological miracles are not in the agenda. Regarding climate change, the Agenda 2030 is criticised as being unrealistic and based on a compromise, while the Climate Action Plan (CAP) aims at measurable results: zero emissions by 2030. But these are aims for nations and policy and not primarily a question of education.

So, the critical appraisal of this ‘green wave’ is expanded to how it is affecting VET. Many firms and also education policy try to be, and to appear, greener. The question is whether VET is helpful in ‘saving’ the planet or at least if ‘sustainability’, as an education aim, gives us a possibility to modify our behaviour in the long run. But is sustainability really learnable? And what is sustainability? <sup>(10)</sup>. The following critically discusses the role of apprenticeship, and VET in general, in this landscape and the potential role of apprentices as enablers of change.

## 1.2. Do ‘green’ VET or ‘green’ apprenticeship exist?

Green issues have also affected VET, and have become more present in conferences, public discourses, and websites of firms or associations related to VET. Some activities labelled as ‘green’ already take place in VET or apprenticeships. VET can benefit from and be part of the transformation towards greening economies and societies.

### 1.2.1. Greening to make VET more attractive

Greening is important for the (new) prestige of VET and apprenticeships. To appear green attracts attention and learners: in this way, greening is a selling factor. Thus ‘green’ is an incentive and an opportunity for repositioning VET, and defining skills and attitudes for the green transition, and identifying green skill gaps, becomes part of reforming VET.

Greening is also a possible strategy to redefine professions and make them attractive (again). For example, in the rural sector, the food production and all professions around agriculture can be seen as part of an old and new green economy <sup>(11)</sup>. For several sectors, greenification is a marketing strategy for the related professions and a tool to attract apprentices for them, as other examples show <sup>(12)</sup>.

Cooperation schemes between VET schools and businesses, typically strong in apprenticeships, present several chances to develop green elements and, in turn, make apprenticeships attractive to some young people.

<sup>(9)</sup> The trajectory of the so-called anthropocene is showing that most indicators in recent years (from the 1950s on) beside climate issues, show a dramatic increase in all aspects like pollution, acidification of water and sea, and urbanisation: tropical forest loss has taken place (Steffen et al., 2015). So, the urgency to get ‘greener’ is broadly recognised. It is difficult to say whether it is really too late. Some people said that in the 1980 it had been already too late to save the planet. As it turned out, it was not and perhaps new innovations and a ‘new’ behaviour of mankind help at least to stabilise this fragile situation.

<sup>(10)</sup> The classical definitions hint to the same meaning: development that ‘meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Brundtland Commission, 1987), ‘while safeguarding Earth’s systems, on which the welfare of current and future generations depend’ (Griggs et al., 2013). There are since two long-standing positions related to sustainability: one believes in a process of education and accommodation, the other seems to trust in technological solutions (Mann, 2018). It is necessary to say that critical appraisals of sustainability also imply a certain bias. The discussion about sustainable development follows the perspective of the global north: insofar as it seems to be a western construct, a floating signifier, but with a global reach. Sustainability includes a mix of economic, rights-based and environmentalist discourse on the one hand, and a gap between policy intentions and what is going on, on the other (Tikly, 2019).

<sup>(11)</sup> See, for example, [rural sector representation in the green apprenticeships advisory panel in the UK](#).

<sup>(12)</sup> (Digital) apprenticeship in construction features [lessons](#) identifying the latest sustainable materials, avoiding waste, plus aims such as how to comply with energy efficiency or constructing zero-carbon-buildings.

### 1.2.2. Greening VET and apprenticeships to address skill needs

Putting VET attractiveness aside, there is an actual demand for new or adapted skills to be developed in VET, including apprenticeships, to contribute to the realisation of the sustainability goals. Sustainability also has a technical side, therefore developing and practising<sup>(13)</sup> green skills and attitudes may be helpful. The overall consensus in the available literature is that skills for the green transition have to be furthered. While recent developments made a decisive contribution to the debate (particularly the GreenComp Framework and the ESCO classification of green skills, Box 1), it is still not easy to determine what skills, competences and attitudes for the green transition include and do not include.

#### Box 1. International sources about greening skills

- The ILO published a synthesis report based on 21 country studies in order to promote a green transformation, which needs new skills (ILO, 2011). The turn towards a greening economy is described but quite open: changing skills is dependent on environmental changes, regulations, green technology and market and consumer habits (ibid., p. 161). Existing skills are seen to be changed and new skills have to be upgraded to new occupations.
- Upskilling and reskilling in order to ease employment and career transitions in the context of the European Green Deal is also seen in a recent Cedefop publication as the way forward (Cedefop, 2021, p. 9). Greenification depends upon a transition to green economy and the workforce has to be adopted. That is why greening also needs to update teachers, students and apprentices in order to be prepared for this transition. Greening industry requires the knowledge and forecast

of what kind of skills will be in demand in the coming years (Aktor, 2020).

- Greening industry and production, therefore, also means to greenify VET. Many publications have resulted, often with such a specific focus: technical VET (TVET) and reforming teacher education for competences in sustainable development as one element (Maclean et al., 2018), for greening of economies in Asia, as well as offering resource books with a green focus for teaching and learning in Africa (Ramsarmup and Ward 2017).
- An appealing approach of responding to the perceived needs of green skills, competences and attitudes is provided by the Joint Research Centre, European Commission, Policy report GreenComp framework on sustainability, where 12 competences, including valuing sustainability, critical and exploratory thinking and collective action, are identified (Bianchi et al., 2022).
- A recently published technical report from the European Commission tries to identify and label existing skills and new affordances in the context of a green transition for a broad range of professions and activities in the workplace (European Commission, 2022).

Source: Author.

The focus on skills for the green transition is helpful but it has not yet been clarified what this really implies. Some identify skill gaps derived from environmental regulations and suggest an analytical and technical set of skills which have to be acquired (Vona et al., 2015). The focus should be to develop more skills for the green transition, which could be job-specific or much more oriented towards a general approach to VET<sup>(14)</sup>. Skills for the green transition are based on new occupations and occupational specialisations<sup>(15)</sup> but greening of existing skills is also needed<sup>(16)</sup>, including digital skills.

<sup>(13)</sup> Skills for the green transition are acted rather than learned; this is why cooperation with small and medium-sized enterprises is seen as important (European Commission, 2020).

<sup>(14)</sup> Greening economies and the redefinition of jobs need generic green skills for the green transition, which are based – as one specialist on issues in green VET is putting it – on a ‘weak anthropocentrism’, nevertheless including the personal development of learners (Pavlova, 2012).

<sup>(15)</sup> For example, domain-specific sustainability skills in certain branches, like in food craft and food industry occupations have to be developed (Fernandez et al., 2020).

<sup>(16)</sup> A literature review done by Sern et al. (2018) reveals that there is a broad list of skills which seems necessary in order to achieve greenification: starting with design skills, leadership skill, management skill and communication skills the range also includes waste management skills and financial skills (Sern et al., 2018).

Sustainability is a cross-sectional task, including environmental, economic and social aspects. For VET this includes how (school) teachers and (in-company) trainers as key actors shape the implementation of the modernised standard vocational training topic of ‘environmental protection and sustainability’ (BIBB, 2021). Reforming VET today means to open up possibilities, to act in a sustainable way. Along with the sustainability perspective, this includes a long-term perspective taking into consideration future consequences. VET and education policy now see the need and the opportunity, and try to follow a more systematic approach besides (important) grass root politics.

### 1.2.3. Greening: develop a full set of competences, address society’s needs

Education can be a pivotal element in greening economies and societies. Even within VET, small aspects of a cluttered green agenda are selected with a view to making a contribution towards more sustainability. Promoting green competences through VET seems to help make the future better, while polishing the image of a firm and of VET generally.

However, evaluations of what has been done so far show that education for sustainable development often does not reach a balance between economic, ecological and social interests; at the end of the day, economic concerns come first (e.g. Vollmers et al. 2014). It seems that small-scale, incremental updates of VET and apprenticeship curricula do not suffice. Transversal topics should be included in teaching and learning (Niebert, 2021, p. 16) and education should try to reach a concept of *Bildung*, which links self-development with the broader society, and therefore provides a better basis to not exceed the planetary load limits.

The field of ecological pedagogy offers surprisingly broad skills and competences labelled as green: 12 main competences are required for sustainable development, among them the attitude of forward-looking, gaining interdisciplinary knowledge, assessing risks and dangers, to plan and act together with others and acting upon the basis of justice, as de Haan programmatically stated (de Haan, 2010). Similar competences, skills and attitudes are also identified by the Green-

Comp Framework (see Bianchi et al., 2022). In this context, promotion of green competences can help a broad development of future workers and citizens with a deeply rooted understanding of their role and responsibility for greener economies and societies.

### Box 2. Reforms and greening VET on a national level

- The drive or drift towards a greener economy is very much based on regional or national problem sets. The contradiction between saving jobs in an economy based on carbon-emission and pollution, i.e. reducing greenhouse gas emissions, and providing social inclusion and justice, requires a broad set of competences, but is also hampering quick changes (Fien and Guevara, 2018, p. 264).
- Transition to a green economy requires the ‘right’ skills, as a UK country report is suggesting. This includes not only skills in the low carbons and environmental sector, but also in all businesses in order to use natural resources efficiently (HM Government, 2011, p. 3).
- A report for Germany identified as prior targets for greening VET the following sectors: renewable energy, installation, repair and maintenance of environmental plants, the solar sector and energy saving (Economix, 2010, p. 71).
- There are country-specific foci in presenting policy recommendations for greening industry and society through VET: for Australia, the coal mining and agriculture industries are focused (Rafferty and Yu, 2010).

Source: Author.

## 1.3. Greening apprenticeships and apprentices as greeners

The identified aspects of greenification and sustainability suggest different levels of (potential) reforms. But what happens today? Among the many initiatives that countries have been taking to ‘greenify’ their VET systems and apprenticeships in recent years, a few that deserve attention

come from German-speaking countries (Austria, Germany and Switzerland) with a strong tradition in dual VET/apprenticeship.

The examples presented below show some activity on a meso-level, i.e. in terms of regulations, syllabi and restandardisation with a green focus.

In Germany, in spring 2020, minimum standards were updated for all vocational training occupations (standard vocational training positions). In the future, competences in digitisation and sustainability will be taught in all vocational training courses, which are typically offered as apprenticeships. Several projects were launched in this direction, including the BIBB-project *Green competences for all apprentices* (BMBF, 2020). Whether the establishment of such sustainability standards is sufficient and relevant in VET is, however, very much dependent on the will of the teachers and trainers in adapting these concepts in everyday practice (Kaiser and Schwarz, 2022).

In Switzerland, the Swisscleantech association formulated recommendations to include in all curricula and all 230 vocational training regulations topics like renewable materials and energies, efficiency and storage of energy, efficiency of water management and eliminating waste (see Heinemann et al., 2012). The association was founded in 2011, including 500 members of different industrial branches, aiming at climate-neutral production and focused on technical occupations.

In Austria, in 2013, the initiative *Green skills for green jobs* launched a qualification barometer for eight branches. It analysed 172 VET and further education programmes in order to define greening elements (Wegscheider, 2015).

To date, there seems to be less activity in terms of comprehensive transformations. Even in the Swiss VET 2030 strategy (which involved many actors relative to the future of VET), sustainability and skills for the green transition have hardly been mentioned until now.

Nevertheless, researchers and specific branch interest groups are collaborating on developing specific models for greenification in specific occupations, as with commercial VET for implementing and evaluating new skill programmes (Casper et al., 2017).

### 1.3.1. Apprentices and learners in greening: pilot projects in Germany

For many young people, green issues are part of their everyday life. For example, critical opinions related to economic growth and post-materialist values are discussed in private and public lives. Also within the company context, apprentices would like to follow a regulative idea of sustainable development, as was revealed by a small German study of apprentices in commerce (Slopinski et al., 2020).

The *NAZUBI* project (*Nachhaltigkeitsaudits mit Auszubildenden 2015-19*) took further the active role of apprentices in relation to green issues (Zinn et al., 2018). The initial objective of the pilot project was to transform the participating companies into sustainable learning environments with educational training structures, which offer access to sustainability topics ensuring learn effectiveness; then to design and implement audits in the context of sustainability which are education- and training-related. A consortium of two universities, five companies, three vocational schools in Hesse and North Rhine-Westphalia, the German Federation of Trade Unions and the Chamber of Industry and Commerce and participating trainees developed sustainability audits and tested them in practice. The task of the companies was to identify company-specific audit events and prepare and accompany the apprentices in the further course of the auditing, so that sustainability can be identified, and measures and skills can be experienced.

Another project relying on the active role of apprentices comes from a region in the north of Germany. As in the other 49 VET schools in Lower Saxony, in Oldenburg an apprentices' union was founded and named *Kauflust* (shopping pleasure). The union, active in a VET school, organises a weekly event with seven firms, aiming at sustainability and a cooperative business-model in order to transform the local economy and learn more about resource conserving handling (Fairdays) (Jünke, 2020).

These projects focus first on domain-specific knowledge and then on integrating the two learning sites (companies and schools), as both play an important role. What is to the fore, however, is that the learners themselves have an important role, as agenda setters as well as auditors, who assess

the change which has been triggered.

The will to involve apprentices and to stress the participatory aspect of their roles in firms and schools opens up a new perspective in greening, which should be continued more systematically.

### 1.3.2. Coordinated and liberal market economies: what VET could do better

It is not clear if dual apprenticeship countries are really performing better related to green issues. One study is stressing the fact that these countries fail to innovate, or are not as flexible, with regard to new developing economic sectors like green energy (Steedman, 2011, p. 103).

Nevertheless, the green skills agendas and greening of occupations as an EU policy aim seem to work better in coordinated market economies (CME) with often typically higher apprenticeship-shares than in liberal market economies (LME) which emphasise school-based and higher education programmes.

The dual apprenticeship-countries Austria, Germany and Switzerland, with a high share of apprenticeships, are not per se better at innovation than other countries. But the deeper and more established tradition to cooperate between State, local authorities and interest groups, and especially schools and firms, helps to develop projects.

A comparative study is suggesting that, in the steelwork industry, greening seems to be more advanced in CME (Evans and Stroud, 2016). However, this identified better starting position depends very much on individual initiatives.

The following points of strength of dual apprenticeship countries, compared to others with predominantly school-based VET, could support the argument that promoting green transition seems to work better in CME than in uncoordinated education systems:

- (a) combination of vocational and general competences, which are linked with workplace learning, allows a combination and transfer of different and specific skills for greening;
- (b) two (or more) learning sites (workplace and school) as the basis of dual apprenticeships are often demanding for education policy and the learners themselves but are also incentives for learning from each other;
- (c) strong partnerships with social partners are

one of the core affordances of a dual apprenticeship which really works. Again, cooperation and coordination are indispensable;

- (d) didactical and pedagogical advantage of the orientation towards a broad professional profile is the result of a corporatist approach on VET;
- (e) support of the public is another important element which allows apprenticeship systems to develop VET further and adapt the system to new challenges.

It is the combination of these five elements which is the outstanding feature of dual apprenticeship systems and opens new opportunities for greening.

Other VET systems in liberal market economies with limited apprenticeship tradition could operate with the help of strategic alliances of different interest groups that promote green issues and set aims for them. This kind of alliance could also serve in solving some coordination problems in more liberal economies. The coordinating role of the State in CMEs can be substituted by a coalition of stakeholders.

## 1.4. Conclusion

Dual apprenticeship countries like Austria, Germany and Switzerland are not per se better at innovation related to green skills than other countries with a school-based vocational system. However, the combination of different learning sites is an advantage in promoting sustainability, and the potential is there, as long as firms are flexible and open for such challenges. A further advantage is an initiative like the pilot projects (as model testing) in Germany for greening VET (apprenticeships).

Pilot projects in Germany have shown that apprentice views on green processes bring a new perspective to firms; apprentices become the pioneers of greenification in industries, also, to some extent, bringing democracy in the workplace. There is a real potential here: apprentices must have opportunities to share their ideas, ask questions about how things are done in the business. This will help greenify firms and the economy as a whole.

In many cases, they are taught about greenification issues and processes at VET schools and

carry such knowledge on to the workplace too. Admittedly, often apprentices do not master green processes but have adopted green practices or are confronted with green issues at schools or in other fields of their personal lives, so they ask valuable and relevant questions. The firm culture is crucial for opening up spaces for greening to which apprentices may contribute.

But the role of VET schools is also important. Revising curricula and introducing green elements provides the basis for informed and active knowledge and skills. While working in firms, apprentices familiarise themselves with other questions and issues that businesses have to deal with, and

that knowledge also gets channelled back into VET schools. It is a two-way process, which helps to greenify education and work.

The paradox around greenification of the economy and skills for the green transition in VET and dual apprenticeships lies in the fact that we do not know exactly the future – whether we have enough time and possibilities – but, at the same time, we have to prepare for it. In such a situation, the concept of education for sustainability open to the future, counting on the continuing learning processes of the learners themselves, offers itself a perspective.

## 1.5. References

[URLs accessed 30.3.2022]

- Aktor, A. (2020). *Green industrial skills for a sustainable future*. Geneva: Unido. [https://www.unido.org/sites/default/files/files/2021-02/LKDForum-2020\\_Green-Skills-for-a-Sustainable-Future.pdf](https://www.unido.org/sites/default/files/files/2021-02/LKDForum-2020_Green-Skills-for-a-Sustainable-Future.pdf)
- Bianchi, G.; Pisiotis, U. and Cabreta, M. (2022): GreenComp – The European sustainability competence framework. In Punie, Y. and Bacigalupo (eds.). *JRC Science for Policy Report*. Luxembourg: Publications Office of the European Union. <https://publications.jrc.ec.europa.eu/repository/handle/JRC128040>
- BIBB (Bundesinstitut für Berufsbildung) (2021). *Berufsbildung für nachhaltige Entwicklung. Die Modellversuche 2015-2019 auf dem Weg vom Projekt zur Struktur* [Vocational training for sustainable development. The pilot projects 2015-2019 on the way from project to structure]. Bonn: BIBB.
- BMBF (2020). *Grüne Kompetenzen für alle Azubis* [Green skills for all apprentices]. Bonn: BMBF. <https://www.gruene-arbeitswelt.de/1002-gruene-kompetenzen-fuer-alle-azubis>
- Brundtland Commission (1987). *Our common future: world commission on environment and development (The Brundtland Commission)*. New York, Oxford: University Press.
- Casper, M. et al. (2018). *Berufsbildung für nachhaltige Entwicklung in kaufmännischen Berufen – ein Ansatz der Theorie- und Modellbildung aus der Modellversuchsforschung* [Vocational training for sustainable development in commercial occupations: an approach to theory and model building from pilot project research]. *bwp@*, No 33, pp. 1-29. [http://www.bwpat.de/ausgabe33/casper\\_etal\\_bwpat33.pdf](http://www.bwpat.de/ausgabe33/casper_etal_bwpat33.pdf)
- Cedefop (2021). *The green employment and skills transformation: insights from a European Green Deal skill forecast scenario*. Luxembourg: Publications Office. <https://www.cedefop.europa.eu/en/publications/4206>
- de Haan, G. (2010). The development of ESD-related competencies in supportive institutional frameworks. *International Review of Education / Internationale Zeitschrift Für Erziehungswissenschaft / Revue Internationale de l'Education*, Vol. 56, No 2/3, pp. 315-328. <http://www.jstor.org/stable/40928675>
- Economix (2010). *Skills for green jobs: country report Germany*. <https://economix.org/en/publications/e049.html>
- European Commission (2020). Apprenticeships and the twin green and digital transition. Meeting report of the *European Alliance for Apprenticeships, online event, 9 and 10 November 2020*. <https://ec.europa.eu/social/main.jsp?langId=en&catId=1500&eventsId=1746&furtherEvents=yes>
- European Commission (2022). Green skills and knowledge concepts. Labelling the ESCO classification – Technical report, January 2022. <https://ec.europa.eu/esco/portal/document/en/490c2095-85c0-49aa-96a8-264c260d2fc5>



- Evans, C. and Strout, D. (2016). Greening steel work: varieties of capitalism and the ‘greening’ of skills. *Journal of Education and Work*, Vol. 29, No 3, pp. 263-283.
- Fernandez Caruncho, V.; Kastrup, J. and Nölle-Krug, M. (2020). Berufsbildung für nachhaltige Entwicklung in Berufen des Lebensmittelhandwerks und der Lebensmittelindustrie [Vocational training for sustainable development in the food trade and the food industry]. *bwp@ Spezial*, No 17. [https://www.bwpat.de/spezial17/fernandez\\_kastrup\\_noelle-krug\\_spezial17.pdf](https://www.bwpat.de/spezial17/fernandez_kastrup_noelle-krug_spezial17.pdf)
- Fien, J. and Guevara, J. (2018). Skills for a green economy: practices, possibilities and prospects). In Maclean, R.; Jagannathan, J. and Sarvi, J. (eds.) *Skills development for inclusive and sustainable growth in developing Asia-Pacific*. Dodrecht: Springer, pp. 255-264.
- Thunberg, G. (2019). Our house is on fire [video]. *World Economic Forum, Davos, 20 September 2019*. <https://www.youtube.com/watch?v=U72xkMz6Pxx>
- Griggs, D. et al. (2013). Sustainable development goals for people and planet. *Nature*, No 495, pp. 305-307. <https://doi.org/10.1038/495305a>
- HM Government (2011). *Skills for a green economy: report on the evidence*. Policy paper, Ref: 11/1315. <https://www.gov.uk/government/publications/skills-for-a-green-economy-report-on-the-evidence>
- Heinimann, E.; Lachenmeier, P. and Stucki, R. (2012). *Cleantech in den Bildungsgängen der beruflichen Grundbildung. Schlussbericht im Auftrag des BBT*. [Cleantech in the courses of basic vocational education. Final report commissioned by the BBT]. Zollikofen: EHB. <https://edudoc.ch/record/107108/?ln=de>
- Hoffmann, A. (2021). Die traditionelle Form der Philanthropie hat versagt [The traditional form of philanthropy has failed]. *NZZ Magazine*, 16.10.2021. <https://magazin.nzz.ch/wirtschaft/roche-vizepraesident-andre-hoffmann-ueber-die-philanthropie-ld.1650715?reduced=true>
- ILO (International Labour Office) (2011). *Skills for green jobs. a global view. Synthesis report based on 21 country studies*. Geneva: ILO.
- Infras (2020). *Orientierungshilfe Nachhaltige Entwicklung in der Berufsbildung*. [Guidance on sustainable development in vocational training]. Bern: SBFJ.
- Jünke, P. (2020). Die nachhaltige Schülergenossenschaft „Kauflust“ an den berufsbildenden Schulen Haarentor der Stadt Oldenburg. [The ‘Kauflust’ sustainable student cooperative at the Haarentor vocational school in the city of Oldenburg]. Interview in *bwp@ Spezial* 17. [https://www.bwpat.de/spezial17/juenke\\_spezial17.pdf](https://www.bwpat.de/spezial17/juenke_spezial17.pdf)
- Kaiser, F. and Schwarz, H. (2022). Kritische Reflexionen zur Genese und aktuellen Verankerung der Nachhaltigkeit in den Mindeststandards der Ausbildungsordnungen [Critical reflections on the genesis and current anchoring of sustainability in the minimum standards of training regulations]. In: Michaelis, Ch. and Berding, F. (eds.) *Berufsbildung für nachhaltige Entwicklung – Umsetzungsbarrieren und interdisziplinäre Forschungsfragen* [Vocational training for sustainable development – implementation barriers and interdisciplinary research questions]. Bielefeld: wbv, pp. 115-131.
- Kamis, A. et al. (2017). Exploring green skills: a study on the implementation of green skills among secondary school students. *International Journal of Academic Research in Business and Social Sciences*, Vol. 7, No 12, pp. 327-346.
- Le, U.; Villao, D. and Ritoper, S. (2012). Green jobs or green careers: the role of apprenticeships to train workforce for energy efficiency retrofits. In: *ACEEE Study on energy efficiency in buildings*, Vol. 10, pp. 211-225.
- Niebert, K. (2021). Wir sollten fachliche Inhalte stärker entlang von gesellschaftlichen Trends ausrichten [We should align technical content more closely with social trends]. In: MVZ (Mittelschullehrpersonenverband Zürich) (eds.) *Quartalsinformationen*, Vol. 4, pp. 7-11.
- Mann, Ch. (2018). *The wizard and the prophet: science and the future of our planet*. London: Picador.
- Ord, T. (2020). *The precipice: existential risk and the future of humanity*. New York: Hachette.
- Pavlova, M. (2012). Generic green skills: can they be addressed through technology education? In H Middleton (ed.). *Explorations of best practice in technology, design and engineering education: pro-*

- ceedings of the 7th Biennial International Conference on Technology Education Research*. Brisbane, Australia: Griffith University. <http://hdl.handle.net/10072/52268>
- Rafferty, M. and Yu, S. (2010). *Skills for green jobs in Australia: unedited background country study*. Geneva: ILO. [http://www.ilo.org/wcmsp5/groups/public/---ed\\_emp/---ifp\\_skills/documents/publication/wcms\\_143079.pdf](http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_143079.pdf)
- Ramsarmup, P. and Ward, M. (2017). *Enabling green skills: pathways to sustainable development*. Pretoria: Department of Environmental Affairs.
- Ringger, B. (2019). *Das System-Change – Klimaprogramm* [The system change – climate programme]. Zürich: Denknetz Edition 8.
- Schneider, M. (2021). Die Frage ist ob Sie überhaupt einen Burger essen sollten [The question is whether you should eat a burger at all]. Interview in *Tages-Anzeiger*, 18.10.2021, pp. 8-9. <https://epaper.tagesanzeiger.ch/#read/20/Tages-Anzeiger/2021-10-18/1>
- Sern, L; Zaime, A. and Fong, L. (2018). Green skills for green industry: a review of literature. In *Journal of Physics – Conference Series*, Vol. 1019. DOI:[10.1088/1742-6596/1019/1/012030](https://doi.org/10.1088/1742-6596/1019/1/012030)
- Spangenberg, P. (2016). *Zum Einfluss eines Nachhaltigkeitsbezugs auf die Wahl technischer Berufe durch Frauen: eine Analyse am Beispiel des Windenergiesektors* [On the influence of a reference to sustainability on the choice of technical professions by women: an analysis using the example of the wind energy sector]. Detmold: Eusl.
- Slopinski, A.; Porath, J. and Krizan, G. (2020). Nachhaltigkeit in der Lebenswelt Betrieb- Verständnis, Wahrnehmung und Relevanz von Corporate Social Responsibility aus Sicht kaufmännischer Auszubildender [Sustainability in the work environment – understanding, perception and relevance of corporate social responsibility from the point of view of apprentices in commerce]. In: *bwp@*, No 38, pp. 1-20. <https://www.bwpat.de/ausgabe/38/slopinski-porath-krizan>
- Steedman, H. (2011). Challenges and change: apprenticeships in German-speaking Europe. In Dolphin, T. and Lanning, T. (eds.) *Rethinking apprenticeships*. London: IPPR, pp. 93-105. <https://iopscience.iop.org/article/10.1088/1742-6596/1019/1/012030/meta>
- Steffen, W. et al. (2015). The trajectory of the anthropocene: the great acceleration. In: *Anthropocene Review*, Vol. 2, No 1, pp. 81-98.
- Tikly, L. (2019). Education for sustainable development in Africa: a critique of regional agendas. *Asia Pacific Education Review*, Vol. 20, pp. 223-237.
- Vollmers, B.; Reichwein, W. and Effertz, P. (2014). Die wissenschaftliche Begleitung des Förderprogrammes BBNE: Evaluation, Moderation und Dokumentation eines Innovationsnetzwerkes in der beruflichen Bildung [The scientific support of the BBNE funding programme: evaluation, moderation and documentation of an innovation network in vocational education and training]. In: Kuhlemeier, W.; Mohoric, A. and Vollmer, T. (eds). *Berufsbildung für nachhaltige Entwicklung* [Vocational training for sustainable development]. Bonn: BIBB, pp. 157-170.
- Vona, F. Et al. (2015). *Green skills*. Cambridge MA: National Bureau of Economic Research. NBER working paper series, No 21116.
- Wegscheider, A. (2015). *AMS-Qualifikations-Barometer (17): Green jobs und green skills*. AMS-Qualifikations-Barometer 303/304. [https://ams-forschungsnetzwerk.at/downloadpub/AMS\\_info\\_303\\_304\\_2.pdf](https://ams-forschungsnetzwerk.at/downloadpub/AMS_info_303_304_2.pdf)
- Zinn, B.; Tenberg, R. and Pittich, D. (2018). Sustainability – Audits with trainees. *Journal of Technical Education*, Vol. 6, No 3, pp.13-24. <https://www.journal-of-technical-education.de/index.php/joted/issue/view/12>