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Vocational Education and Training for Sustainable Development in Berlin's „Flagship Schools“: A Transformative Design-Based Research Project

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Abstract

Context: A network of three vocational schools in Berlin partnered with Humboldt-University, the NGO EPIZ – „Center for Global Citizenship Education” and the Senate Department for Education, Youth and Family, Berlin, which is responsible for in-service teacher training. As „Flagship Schools for Sustainability”, they aim to develop innovative school-specific curricula and learning settings for sustainability in their respective vocations, which are: Social security clerks at Hermann-Scheer-School, gardeners at Peter-Lenné-School, and industrial mechanics at Georg-Schlesinger-School. The diversity of these vocations (administration, „green”, and industrial domain) represents that sustainability is indeed relevant in all vocations, but with very different aspects. It also offers the possibility to research similarities and differences in curriculum development, aiming at generalizable knowledge such as transferrable design principles, to be applied to other vocations and schools in the future.

Approach: The network operates under a design-based research paradigm, aiming at pragmatic change and local developments while generating theoretical understanding and transferrable knowledge (cf. McKenney & Reeves, 2018). The school-specific curriculum development strategy follows the competency matrix approach proposed and by Casper et al. (2021) and Kastrup et al. (2021).

Findings: The results presented here include the three vocation-specific competency matrixes developed by the „Flagship Schools” and comments on both general and vocation-specific insights.

Conclusion: The paper concludes with an outlook on prioritizing vocation-specific climate change education.

Keywords: vocational school, curriculum development, sustainability, competence framework, design-based research

1 The importance of education for sustainable development

With the „European Green Deal”, environmental degradation and climate change gain increased political and public attention in Europe (European Commission, 2023). Many institutions and enterprises have implemented ‘sustainability’ activities, although tending to



oversimplify ‘sustainability’ by reducing it to environmentalist terms, efficiency of resources, or even counterproductive ideas of ‘continuity’, which might lead to self-assuring instead of necessary transformative practices. In contrast, this paper follows the transformational understanding of ‘sustainability’ of the United Nations’ Agenda 2030 and its 17 Sustainable Development Goals (SDGs), which aim to „stimulate action [...] in areas of critical importance for humanity and the planet” (<https://sdgs.un.org/2030agenda>). Thus, the UNESCO defines education for sustainable development as the endeavour to „give learners of all ages the knowledge, skills, values and agency to address interconnected global challenges including climate change, loss of biodiversity, unsustainable use of resources, and inequality. It empowers learners of all ages to make informed decisions and take individual and collective action to change society and care for the planet.” (UNESCO, 2023) Sustainability in this sense is an existential personal and global affair in the long run.

However, organizations and companies both small and large also need to address today’s economic, social and environmental requirements to be ‘sustainable’ in the sense of long-term success and responsibility. On the one hand, demand for alternative resources and products is rising, leading to changes in business models and market approaches. On the other hand, social movements such as „Fridays for Future” emphasize the changing value systems of young people, indicating that true corporate responsibility (both ecological and social) will be of increased importance for attracting qualified and motivated apprentices across Europe and beyond. The ongoing demographic change in Europe (cf. Prskawetz, 2007) puts young people in a good bargaining position: The next generation wants to - and will largely be able to - choose employment according to their personal values and purposes (cf. van den Bergh & Wulf, 2017). Sustainability in the UN sense thus becomes an employer branding factor and an objective of vocational education and training, as well.

2 The role of vocational schools’ internal curriculum development for sustainability education: The case of Berlin’s „Flagship Schools for Sustainability”

In Germany, education is understood to enable competences and sustainable structures (cf. Deutscher Bundestag 2017). Especially „vocational education and training for sustainable development” (VET-ESD) is promoted as a key factor, since a qualified workforce drives innovation and transformation. One example: the German transition to renewable energy („Energiewende”) is significantly executed by qualified vocational workers such as electricians, who plan, install and maintain necessary technologies (cf. Hemkes et al., 2013). Considering the scope of the United Nations’ 17 Sustainable Development Goals (<https://sdgs.un.org/goals>), every vocation can contribute to sustainability in specific ways according to its products, services and fields of expertise. Every step of a value chain offers possibilities to promote – or impede – sustainable developments, from raw materials, production and logistics to services and waste/disposal tasks.

How can these complex and domain-specific capabilities be identified and operationalized for vocational education curricula? In German VET, a multi-stakeholder approach to deriving vocational curricula is applied. Whenever official curricula for a certain vocational domain are developed or updated, a group of representatives of different stakeholders such as employers, employees, teachers, labour researchers and sometimes NGOs, enters the discussion, managed by the Federal Institute for Vocational Education and Training („Bundesinstitut für Berufsbildung”, BIBB). While arguing in the interest of their stakeholders, the representatives in such committees draw knowledge from work research, current expertise, and pilot projects. Due to this discursive mode, modernizing official vocational curricula can be a long and cumbersome political process. In some cases, it takes two decades for an official vocational curriculum to be modernized.

Such a time span would not allow companies and schools to address state-of-the-art processes and technologies. In consequence, official vocational curricula in Germany are rather abstract and tend to have some degrees of freedom content-wise. In this sense, in 2021, a new standard for ‘sustainability’ has been announced for all apprenticeship courses in Germany (cf. BIBB, 2021), however, it is very general and lacks specifics for individual vocations. Identifying, formulating and promoting vocation-specific competences and contents for sustainability is thus delegated to vocational educators with the respective field competences.

Since vocational schools have to address students’ and apprentices’ needs in a changing world as immediately and specifically as possible, developing specific internal curricula is a part of their educational mission. This is a great chance for innovation and subjectively relevant teaching and learning, but it is also a challenging task, considering that teachers need time, expertise and other resources to perform this kind of analytical and transformative work. In order to address these challenges, a network of three vocational schools in Berlin partnered with Humboldt-University, the NGO EPIZ – „Center for Global Citizenship Education” and the Senate Department for Education, Youth and Family, which is responsible for in-service teacher training. As „Flagship Schools for Sustainability”, they aim to develop innovative school-specific curricula and learning settings for sustainability in their respective vocations, which are:

- social security clerks at Hermann-Scheer-School,
- gardeners at Peter-Lenné-School, and
- industrial mechanics at Georg-Schlesinger-School.

The diversity of these vocations (administration, „green”, and industrial domains) represents that sustainability is indeed relevant in all vocations, but with very different aspects. It also offers the possibility to research similarities and differences in curriculum development, aiming at generalizable knowledge such as transferrable design principles, to be applied to other vocations and schools in the future. With this aim, the academic partners in the network structure these development processes as design-based research projects (cf. McKenny & Reeves, 2018) with a continuous flow of information, knowledge and feedback. This paper delineates the applied curriculum development strategy, which is based on successful prior projects in different domains such as trade and logistics (Casper et al. 2021) and food production (Kastrup et al. 2021). The core results presented here are three competency frameworks which serve as thematical curricular overviews. They show how the three participating schools understand and specify sustainability competencies in their respective vocations.

3 Design-based research and the framework for identifying vocation-specific competencies for sustainable development

The „Flagship Schools”-network follows the pragmatic methodology of educational design research as suggested by McKenney & Reeves (2018). The project partners equally pursue empirical understanding, theory formation, and pragmatic changes in the interwoven process of designing (Kretz, 2020). With this understanding, the analysis and active guidance of local cases of innovative development is assumed to lead to overarching, generalizable theoretical findings from and about practice. The three schools and their respective development projects are such local cases from which area-specific theories (i.e. models of sustainability-related vocational competencies), situation-specific solutions (i.e. learning tasks) and transferrable design principles are developed. Since all partners in the network are actively involved in developing, it is not a mere case-study, but a true design project in progress.

The well-tested strategy applied here for identifying sustainability-related vocational competences emerged from prior German projects in other vocational domains (commerce/trade: Casper et al., 2021; food: Kastrup et al., 2021). It follows six steps:

1. Associatively **COLLECT** aspects of sustainability in the given vocation.
2. **DEFINE** domain-specific tasks and process profiles concerning sustainable development and use these to specify the competence framework blueprint.
3. **STRUCTURE** the collected aspects by assigning them to slots of a specified VET-ESD competency matrix.
4. **FORMULATE** vocational competences as learning objectives for selected slots of the framework.
5. **ASSIGN** these competences to given (if necessary: new) curriculum positions and sections of the respective educational standards documents.
6. **CHECK** whether crucial aspects have been missed, with special regards to the Sustainable Development Goals and slots of the framework which have yet been left empty.

After defining competences and learning objectives, learning settings and tasks can be developed, applying teachers' professional knowledge and sustainability-specific didactical principles such as those proposed by Schütt-Sayed et al. (2021) and Casper et al. (2023). This strategy has been applied to a variety of apprenticeship courses in pilot projects sponsored by BIBB before, however, as is the mission of BIBB, those projects were addressed at training companies, not at (public) schools.

For the „Flagship Schools“-network, the partners assume that the same strategy can be applied to school curricula development. Over the course of one year, a set of workshops with teachers and the institutional partners was arranged. The role of Humboldt-University was to introduce and guide the process according to prior experiences. EPIZ accompanied the process with their expertise in global learning and sustainability education, as well as offering spring and autumn workshop events for guided development, exchange, and feedback. The senate representative legitimates the process as a matter of further education, arranges for time resources and grants partial reliefs from teaching obligations for selected participating teachers.

The iteration/adaptation of the BIBB-process lead to the following steps: For (1) **COLLECTING**, workshop participants were asked to brainstorm associations with the term ‘sustainability’ in respect to their vocations, school life, and private life. This also served as a team-building exercise, giving participants the opportunity to learn more about each other and to identify shared values, interests and concerns. The brainstormed terms were then clustered according to the five „didactic analytical categories” of Vollmer & Kuhlmeier (2014):

- social, ecologic, and economic aspects (interdependence, discrepancies, dilemmas)
- effects on others (local, regional, global)
- effects on the future (positive vision, agency, responsibility)
- action strategies (consistency, sufficiency, efficiency)
- life cycles and value chains (products, processes)

Starting from the „processes“-cluster, the next step was to (2) **DEFINE** those work processes and tasks which actually confront apprentices/students with matters of sustainability. This approach aims to model sustainability as a dimension of daily (work) life rather than as an abstract regulative idea. This way, students can experience agency and find feasible ways of promoting sustainability in their own scope of action. While many sustainability-related decisions have to be made on a managerial or political level, there is also a lot that qualified workers can influence directly. However, these processes and tasks are understood to be the starting point, but not the end of education for sustainable development.

Thus, in step (3), a **STRUCTURE** for both direct scopes of action and more indirect scopes of understanding was built, aiming at a comprehensive picture of competencies for sustainable vocational action. For this, Humboldt-University introduced the competency matrix framework which had been developed in prior BIBB projects. Table 1 shows the published example for the domain of food crafts and food industry to illustrate this.

The BIBB-competency framework is defined by an X-axis with integrated competence dimensions, i.e. „Sustainable action competency as the ability to take...

- **sustainable professional action [aspects of product- and process-related expertise]**
- **socially responsible action [aspects of empathy and accountability; and]**
- **meaningful and self-responsible action [aspects of empowerment and identification].”**
(Strotmann et al., 2022, p. 3)

and a Y-axis with hierarchical „fields of action”, i.e.

- job-related work processes;
- entrepreneurial and organizational decisions; [and]
- social developments and political decisions.” (ibid.)

These categories result in a three-by-three matrix with nine thematic competency slots for each of the three selected vocations. As shown in Table 1, in prior BIBB projects investigating domains instead of individual vocations, such frameworks could be differentiated into even more stages and fields. For the „Flagship Schools”, however, the concise version of 3x3 was chosen in order to keep illustrations simple and focussed.

The steps (4) **FORMULATE** and (5) **ASSIGN** were carried out simultaneously by checking for existing learning tasks and possibilities to promote sustainability aspects by adding or changing certain aspects without changing the complete learning setting. This approach was chosen since the involved teachers did not have plenty resources for radical development. Also, they wanted to make a point towards their less involved colleagues for small changes having big impacts. Up to now, many sustainability-relevant learning objectives could already be formulated and assigned to existing tasks and learning settings, but some completely new settings still had to be developed. In the next section, the three respective competency frameworks and some exemplary learning tasks will be presented. The closing section will give an outlook on step (6) **CHECK**, since the whole process is still in progress to this date and **CHECKING** is understood as an ongoing formative evaluation of iterative development.

4 Results

The competency frameworks developed with the participating schools largely speak for themselves. They are presented in the following subsections with some comments on specifics and exemplary learning tasks. In general, it was perceived as very helpful to follow a similar process in three schools simultaneously. Exchanging early ideas and drafts helped the schools to adapt, find some common principles, and to contrast their respective vocational specifics. For example, a group of very dedicated physical education teachers from Hermann-Scheer-Schule emphasized personal health aspects of work life with new learning tasks, which was adopted by all schools (cf. „Maintaining personal health” as „meaningful and self-responsible action” in „work routines”), although in very different ways: Social security clerks primarily work in office environments, which are stressful due to long periods of sitting and screen work. Gardeners, on the other hand, tend to carry heavy objects; and mechanics potentially work in loud, hot and dangerous environments. Starting with self-care and reflection in these areas can then lead to a higher awareness of working conditions in a global context and thus allow for

empathic discussions about social justice and human rights along the respective value chains. Other common insights were a respective focus on resource efficiency on the level of „**sustainable professional action**” in „work routines” and a reflection of vocational identification, role perceptions, and personal contributions to the greater/common good on the level of „meaningful and self-responsible action” in „the (global) environment and society”. Those competency fields now invite historical, systemic, and ethical perspectives on the vocations at hand. In general, the column of „meaningful and self-responsible action” was embraced by many as a chance to address more clearly the emancipatory educational mission of vocational schools in the greater sense of German ‘Bildung’, surpassing mere qualification and job training for an ambition of holistic, humanistic personal growth.

Table 1

Competency matrix and thematic areas in the Food Crafts and Food Industry (Strotmann et al., 2022, p. 3)

| Competency dimension Fields of action | | Sustainable action competency as the ability to take... | | |
|--|--|---|--|---|
| | | ... sustainable professional action | ... socially responsible action | ... meaningful and self-responsible action |
| Job-related work processes | Procurement and provision of raw materials | Selecting and providing raw materials as required | Evaluating upstream working- and production-conditions and supply chains | Creating a „from the field to the table“ mindset |
| | Processing, storage, packaging | Valorising raw materials and optimising working processes | Producing in a resource and climate-conscious manner | Promoting sustainable development through food production |
| | Product development, marketing | Boosting sustainable product features | Supporting sustainable eating habits | Preserving traditions and setting trends |
| Entrepreneurial and organisational decisions | | Anchoring sustainability in the business model | Advocating for the social and health concerns of employees | Embracing the profession’s possibilities |
| Social developments and political decisions | | Assessing the political framework of food production | Supporting the regulative idea of sustainability | Expressing lifestyles with food |

4.1 The case of industrial mechanics at Georg-Schlesinger-Schule

At Georg-Schlesinger-Schule, a variety of mechanics is educated over three-year courses. They all share the same curriculum in their first year before specifying in different fields. Thus, the first year builds the foundation for understanding basic principles and relations of the trade. The involved teachers emphasized a responsibility for quality and safety, since mechanics are often entrusted with high value machinery. Especially in the huge field of maintenance, they take responsibility for efficient workflows and economic stability (since every second of pause in production has economic and thus also social consequences). Mechanics usually work in contexts of high energy and resource input, so it is important for them to understand the actual global and social cost of the objects they handle. Thus, they first focussed on the field „Identifying working and environmental conditions of resource exploitation” as „socially responsible action” in „the (global) environment and society” (see Table 2). With the help of EPIZ, the teachers at Georg-Schlesinger-Schule adapted an existing simulation game about their vocation’s main materials copper, aluminium, and steel (Hartwig & Llano Quintana, 2021). Students play different roles with conflicting agendas in the setting of a metals conference and thus learn

about the most important properties of the resources as well as their ecological and social footprints. This game is now fixed as an introduction at the very beginning of the school year.

Table 2

Competency matrix and thematic areas for sustainable action of mechanics

| Sustainable action competency as the ability to take [y] in [x] | [y] ... sustainable professional action | ... socially responsible action | ... meaningful and self-responsible action |
|---|---|--|--|
| [x] ... work routines | Choosing and using resources, materials, tools and machines according to sustainability criteria | Caring for oneself, others and products with regards to quality and safety | Maintaining personal health |
| ... company contexts | Comprehending entrepreneurial decisions in the face of industrial competition and sustainable development | Representing social and ecological interests as an employee | Organizing work for resource efficiency |
| ... the (global) environment and society | Handling hazardous substances and risk exposure appropriately | Identifying working and environmental conditions of resource exploitation | Evaluating the role of industrial production for quality of life and common good |

4.2 The case of social security clerks at Hermann-Scheer-Schule

Social security clerks work in institutions such as health insurance companies or Deutsche Rentenversicherung, the states' regional pension insurers. The involved teachers at Hermann-Scheer-Schule soon focussed on social issues such as diversity, equality and common good. They had a liberating insight when they learned that many SDGs have a social focus, so sustainability did not have to be an exclusively environmental matter for their school, which seemed rather far-fetched. Focussing on issues of common good and social justice was a much more comprehensible approach to sustainability for both teachers and students. Since social security should per definition be a matter of common good, the teachers developed a new project course with a focus on the field „Depicting the impacts of social insurance companies on the common good” as „sustainable professional action” in „company contexts” (see Table 3). In a first project, students develop infographics for SDGs and ideas for sustainable action at their school, getting more involved with auditing organisations from a sustainability perspective. In a second project, they choose from a set of criteria for common good and audit their own training companies, inquiring on the status quo and developing ideas for developments. Thus, they reflect on lip services in the public sector, the potentials and limits of good governance, and their personal role and fields of action as clerks. Since most of the training companies are involved in some kind of sustainability auditing anyways, these projects have the potential to create a stronger feeling of integration and agency.

Table 3

Competency matrix and thematic areas for sustainable action of social security clerks

| Sustainable action competency as the ability to take [y] in [x] | [y] ... sustainable professional action | ... socially responsible action | ... meaningful and self-responsible action |
|---|--|--|---|
| [x] ... work routines | Organising office processes resource-efficiently | Accompanying insured persons through all (sometimes challenging) life stages | Maintaining personal health |
| ... company contexts | Depicting the impacts of social insurance companies on the common good | Promoting diversity in public service | Pursuing permanent vocational education |
| ... society and politics | Managing insurance contributions accurately and responsibly | Comparing the fairness of social frameworks across the globe | Evaluating personal contributions to intergenerational contracts and solidarity |

4.3 The case of gardeners at Peter-Lenné-Schule

Peter-Lenné-Schule is a school for gardening, animal care and environmental technologies. It has been very committed to ecological awareness and global learning for a long time. As such, it should be the most obvious case of ecological sustainability. However, even though there are many interesting projects at Peter-Lenné-Schule, most of them are limited in time and resources, so they will usually not be repeated with several groups of students. Thus, one of the main goals of the teachers there was to implement sustainability aspects as permanent, regular aspects of their gardening curriculum. With the help of the competency matrix, thematic fields were identified quickly, and existing learning tasks could be expanded or re-designed with manageable effort. For example, in the field „Evaluating social and climate effects of gardening in global contexts” as „socially responsible action” in „the (global) environment and society” (see Table 4), one existing learning task concerning terrace construction was expanded to dig deeper into the subject of child labour in stone mines. Natural stone turns out to be a resource with quite problematic conditions, as EPIZ worked out in a previous material for gardening (Hartwig, 2018). Teachers adapted this for their learning tasks on terrace construction and developed similar tasks concerning water management, biodiversity and soil processing; always beginning with routine work tasks and zooming out to global perspectives, connecting hands-on vocational knowledge with managerial and global perspectives on sustainable action.

Table 4

Competency matrix and thematic areas for sustainable action of gardeners (cf. Haß et al., 2023, p. 26)

| Sustainable action competency as the ability to take [y] in [x] | [y] ... sustainable professional action | ... socially responsible action | ... meaningful and self-responsible action |
|---|--|--|--|
| [x] ... work routines | Choosing and using resources, materials, tools and machines according to sustainability criteria | Protecting and cultivating existential natural resources | Maintaining personal health |
| ... company contexts | Innovating gardening with alternative materials, processes and business models | Balancing the interests of the company, project owners and customers/users | Bearing discrepancies between routines and ideals and promoting good practice |
| ... the (global) environment and society | Appreciating the importance of plants, soil and water for life on Earth | Evaluating social and climate effects of gardening in global contexts | Evaluating the personal impact on quality of life through working in a „green job“ |

5 Conclusion and outlook: A focus on climate education

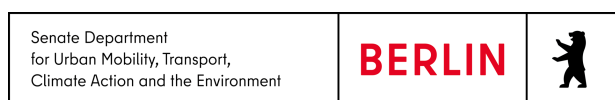
As the competency matrixes illustrate, the adapted BIBB process proved to help to identify vocation-specific competencies and thematic fields in the involved schools and to support sustainability-related enhancements of learning tasks and settings. So far, adapting the process for the internal curriculum development of vocational schools proved successful. However, there is still a long way to go. The schools identified a number of relevant fields and now face the challenge of creating learning opportunities for all of them, which can only be realized step by step. The 3x3 matrixes in their concise format provide a good reference, but because of the complexity of sustainability issues, there are no short cuts. Learning tasks tend to relate to multiple competencies and competencies need several learning opportunities to fully develop. As such, the matrixes should be understood as helpful heuristics for internal school curricula, not as curricula or syllabi in themselves.

It also has to be noted that the matrixes themselves do not prioritize. The comments show that, even though starting with work routines and most obvious action fields was consensual, the schools ended up prioritizing rather large and complex themes such as common good and human rights for their development of new learning opportunities. Now, since climate change is a topic of increased urgency and political interest, the next phase for the „Flagship Schools“ will be a focus on vocational climate education. This includes education on ways to minimize climate impact and climate change mitigation, such as reducing carbon emissions and necessary adaptations to those effects of climate change which are already manifesting or expected to manifest shortly. The latter is already a straightforward demand in many vocational areas today. Gardeners for example already have to face changing soil and water conditions in the Berlin/Brandenburg area. Climate change forces them to rethink plant selection and maintenance routines such as mowing and watering (cf. Haß et al., 2023). Likewise, mechanics are impacted by new regulations for industrial emissions, leading to new technologies. Social security clerks, like all office-related vocations, are faced with the problematic energy footprints of office buildings and the need to rethink office work in the face of energy regulations and changing real estate markets.

These examples show that climate education is a relevant aspect of sustainable development in every vocation. However, it should be remembered that it is just one of many aspects of the sustainability discourse concerning the 17 SDGs, although undoubtedly a key challenge

of our times. Politics in Germany acknowledge this, and the „Flagship Schools“-network is glad to be sponsored now by the Senate Department for Mobility, Transport, Climate Protection and the Environment, Berlin, for a three-year project on vocational climate education (<https://www.epiz-berlin.de/leinen-los-fuer-klimabildung/>). This enables EPIZ and Humboldt-University to support the schools' development of teaching material and learning tasks with personal and monetary resources, which comes at the right time: Due to a grave scarcity of teachers in Germany, those in service are busy teaching and keeping the base functions of their schools running. Under these conditions, cooperation and third-party assistance seem to be prerequisites for effective innovation. Considering that sustainable development aims at transformation rather than continuity, such project fundings are very precious.

From 01.09.2022 until 30.08.2025, the „Flagship Schools“ participate in the project „Leinen los für Klimabildung“, sponsored by the Senate Department for Mobility, Transport, Climate Protection and the Environment, Berlin



References

- Casper, M., Schütt-Sayed, S., & Vollmer, T. (2021). Nachhaltigkeitsbezogene Gestaltungskompetenz in kaufmännischen Berufen des Handels. In: C. Melzig, W. Kuhlmeier & S. Kretschmer (Ed.): *Berufsbildung für nachhaltige Entwicklung. Die Modellversuche 2015–2019 auf dem Weg vom Projekt zur Struktur* (pp. 179–199). Barbara Budrich.
- Casper, M., Kastrup, J., & Nölle-Krug, M. (2023). Lebendiges Lernen mit kreativen und erfahrungsbasierten Methoden zur didaktischen Umsetzung einer Berufsbildung für nachhaltige Entwicklung. In: M. Ansmann, J. Kastrup & W. Kuhlmeier (Eds.): *Berufliche Handlungskompetenz für nachhaltige Entwicklung. Die Modellversuche in Lebensmittelhandwerk und -industrie* (pp. 180–197). Barbara Budrich.
- Deutscher Bundestag. (2017). *Bericht der Bundesregierung zur Bildung für nachhaltige Entwicklung - 18. Legislaturperiode*. Heenemann. Retrieved from <http://dipbt.bundestag.de/dip21/btd/18/136/1813665.pdf>
- European Commission. (2023). *A European Green Deal. Striving to be the first climate-neutral continent*. Retrieved from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
- Hartwig, J. (2018). *Globales Lernen im Gartenbau. Unterrichtsmaterial für die berufliche Bildung*: EXILE Kulturkoordination e.V. Retrieved from http://globales-lernen-gartenbau.de/wp-content/uploads/2019/03/EXI_BRO_Gartenbau_W.pdf
- Hartwig, J., & Llano Quintana, I. (2021). *Kupfer, Alu, Stahl global. Unterrichtsmaterial für die Metallberufe*. Hamburg: Berufliche Schule für Anlagen- und Konstruktionstechnik am Inselpark BS13.
- Haß, D., Casper, M., & Hartwig, J. (2023). Umsetzung von Nachhaltigkeit im Garten- und Landschaftsbau. Innovationsbericht einer Berliner Berufsschule. In: *berufsbildung* (197), 25–27.
- Hemkes, B., Kuhlmeier, W., & Vollmer, T. (2013). Der BIBB-Förderschwerpunkt „Berufliche Bildung für eine nachhaltige Entwicklung“ - Baustein zur Förderung gesellschaftlicher Innovationsstrategien. In: *BWP - Berufsbildung in Wissenschaft und Praxis* 6/2013, 28–31. Retrieved from <https://www.bibb.de/veroeffentlichungen/de/bwp/show/7168>
- Kastrup, J., Kuhlmeier, W., & Strotmann, C. (2021). Entwicklung nachhaltigkeitsbezogener Kompetenzen in der Ausbildung. Ein Strukturmodell für Lebensmittelhandwerk und -industrie. In: *BWP - Berufsbildung in Wissenschaft und Praxis* (3), 24–27.
- Kretz, S. (2020). *The Cosmos of Design. Exploring the Designer's Mind*. Walther König.
- McKenney, S., & Reeves, T. C. (2018). *Conducting educational design research*. Routledge.
- Prskawetz, A., Fent, T., Barthel, W., Crespo-Cuaresma, J., Lindh, T., Malmberg, B., & Halvarsson, M. (2007). *The relationship between demographic change and economic growth in the EU*. Verl. der Österr. Akad. der Wiss (Forschungsbericht / Institut für Demographie, Österreichische Akademie der Wissenschaften, 32).
- Schütt-Sayed, S., Casper, M., & Vollmer, T. (2021). Mitgestaltung lernbar machen – Didaktik der Berufsbildung für nachhaltige Entwicklung. In: C. Melzig, W. Kuhlmeier & S. Kretschmer (Eds.): *Berufsbildung für nachhaltige Entwicklung. Die Modellversuche 2015–2019 auf dem Weg vom Projekt zur Struktur*. Barbara Budrich, pp. 200–227.
- Strotmann, C., Kastrup, J., Casper, M., Kuhlmeier, W., Nölle-Krug, M., & Kähler, A. (2022). *Competency Model for VETSD in the Food Crafts and Food Industry*. BIBB - Federal Institute for Vocational Education and

Training. Retrieved from https://www.fh-muenster.de/isun/downloads/Competency_model_for_VETSD_in_food_craft_and_industry.pdf

UNESCO. (2023). *What you need to know about education for sustainable development*. Retrieved from <https://www.unesco.org/en/education-sustainable-development/need-know>

van den Bergh, J., & Wulf, K. (2017). Millennials at Work. In: *Research World* (63), 19–21. DOI: 10.1002/rwm3.20490

Biographical notes

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