

Article

Green Skills Are Not Enough: Three Levels of Competences from an Applied Perspective

Oliver Wegenberger ^{1,2,*} and Ivo Ponocny ^{1,*}¹ Faculty of Psychology, Sigmund Freud Private University, 1020 Vienna, Austria² MODUL University Vienna, 1190 Vienna, Austria

* Correspondence: oliver.wegenberger@sfu.ac.at or 1754502@modul.ac.at (O.W.); ivo.ponocny@sfu.ac.at (I.P.)

Abstract: The world of work is increasingly recognizing sustainability needs and issues, which require skills and competences. Accordingly, concepts like green skills and sustainability competences have been discussed in the literature. However, it remains unclear what green skills are and what differentiates them from other concepts such as sustainability competences. The aim of this paper is to address the question of what green skills are in order to facilitate the application of them by bringing the concept closer to practice. A qualitative approach was employed, utilizing semi-structured interviews with experts engaged in sustainability matters across various sectors. In line with previous research, the term green skills is seen as a complex and ambiguous one. Based on the findings of the present study, we propose to differentiate three levels of skills and competences, delineated by their specificity: general sustainability competences, intermediate cross-sectional competences, and specific green skills. Additionally, experts underscored the pivotal role of personal values and interests.

Keywords: green skills; sustainability competences; sustainability; green career



Academic Editors: Gabriela Topa and
Mário José Baptista Franco

Received: 24 November 2024

Revised: 17 December 2024

Accepted: 2 January 2025

Published: 4 January 2025

Citation: Wegenberger, O.; Ponocny, I. Green Skills Are Not Enough: Three Levels of Competences from an Applied Perspective. *Sustainability* **2025**, *17*, 327. <https://doi.org/10.3390/su17010327>

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

A large-scale transformation of a society will correspond to a change in the skills required of its members and, therefore, of the skills that succeed on the labor market. Accordingly, in the current situation, the need for green skills is widely postulated and acknowledged. Less evident is the question that asks what these demanded green skills actually are, and what discriminates them from the previously required competences. At any rate, the issue is a pressing one: Reports of the Intergovernmental Panel on Climate Change (IPCC) [1] emphasize its urgency, since the chance to meet the Paris Climate Goals is rapidly narrowing. Accordingly, the European Union has set itself ambitious sustainability or rather climate goals in this decade [2]. In addition, decoupling economic growth from degradation of the environment is among the Sustainable Development Goals (Goal 8.4) [3]. The transition toward a more circular [4,5] as well as green economy [6,7] is an essential component of European Union policies, but it will not happen if the according (green) skills are not available on the labor market [8].

Concepts like the green economy and the circular economy, thus, have received broad attention [9–13]. A green economy is an “economy in which the capacity to satisfy tomorrow’s needs is not limited by today’s resource use, emissions, and waste” [14] (p. 38). For the circular economy, we use the definition proposed by the Ellen MacArthur Foundation: “The circular economy tackles climate change and other global challenges like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources” [15].

The transition toward a more sustainable, green, circular economy will impact employment quantitatively as well as qualitatively (in terms of skills). Understanding these impacts can help to both avoid shortages in employment and to reduce unemployment and potential skill bottlenecks [16]. Skills are an essential factor in achieving a sustainable economy [17], whereby currently more green skills are needed than are quantitatively available [18]. New professions, skills, and a transformation of the world of work are required [19], as well as new and evolved skills in existing jobs [20]. To prepare individuals for this new (and greener) world of work, having a clear picture of skill needs is crucial [21].

The availability of (green) skills presents an accelerator or, in the adverse case, an inhibitor of the transition [22]. Since lifelong guidance is crucial [23], various (global) organizations (e.g., International Labour Organization (ILO) [24], OECD [8] or Cedefop (European Centre for the Development of Vocational Training)) and the European Commission [25] are addressing the issue of green skills. In the scientific literature, the term has received increased attention since 2012 and gained momentum in the beginning of the 2020s due to addressing various global crises [21].

Green skills is a rather broad and ambiguous notion, that is often used synonymously with green jobs [21] or sustainability competences (e.g., in the GreenComp [25]) [21], but no clear definition currently exists [17,26]. Furthermore, the scope of green skills is varying and is often limited to skills in STEM fields [26]. Moreover, studies on green skill needs are often focused on sectors central for achieving net-zero emissions (e.g., energy) [17]. Also the meaning of “sustainability competences” lacks clarity and there is divergence on whether a unified framework for key sustainability competences does yet exist at all [27,28]. The ambiguity of the concepts makes it difficult to detect skill shortages [17].

Green skills are rather focused. For example, the ESCO (European Skills, Competences, Qualifications and Occupations) green skills and knowledge concept [29] includes a total of 571 concepts, all of them labeled as green. In contrast, sustainability competences are broader than the environmental dimension and are more transversal and comprehensive, including other sustainability aspects as well [21]. The concept of green skills has appeared earlier in the scientific literature than sustainability competences. Both concepts are experiencing an increasing number of publications; however, overall sustainability competences have received more attention in the academic literature [21].

Wiek et al. [19] present an influential framework of key sustainability competences [30], namely: *systems thinking competence*, *anticipatory competence*, *normative competence*, *strategic competence*, and *interpersonal competence*. It has often been utilized as a basis to which competences have been added, e.g., *intrapersonal competence* [27,31,32], *integration competence* [33], *intervention competence* [34], and *implementation competence* [27], *future thinking*, *system thinking*, *disciplinarity* and *interdisciplinarity*, *normative and cultural* as well as *strategic competences* [32]. Redman et al. [35] have adopted the framework of key sustainability competences [19] and expanded it by three emerging competences: *intrapersonal competence*, *implementation competence*, and *integration competence*. Moreover, e.g., the European Commission [25] has proposed its own framework for sustainability competences, the “Green Comp”, which includes twelve competences, namely *valuing sustainability*, *supporting fairness*, *promoting nature*, *systems thinking*, *critical thinking*, *problem framing*, *futures literacy*, *adaptability*, *exploratory thinking*, *political agency*, *collective action*, and *individual initiative*, organized into four competence areas.

Green skills are affecting industry as well as education institutions [21]. Education has a pivotal role in the development of green skills and sustainability competences, thereby facilitating a green, sustainable transition [36–39]. Education prepares individuals with the skills needed [35] and orients society according to sustainability issues [40]. The crucial role of education is also acknowledged by industry stakeholders [17]. Generally, all levels

of education are key [38,41]. Accordingly, sustainable education is explicitly claimed in the Sustainable Development Goals (SDGs) of the United Nations (targets 4.7): “By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development” [42]. Education programs focusing on sustainability have been established for some decades already [19], and in recent years, the number is on a sharp rise [27], alongside a general increase in attention to sustainability in academia [43]. Also, multipliers like teachers for education in sustainable development are on the rise [44].

In summary, gaining clarity on the concepts of green skills or sustainability competences is critical for several reasons: the changing world of work needs new jobs as well as new and evolved skills in existing jobs [19,20]. At the same time, skills are a critical factor in achieving a sustainable economy [17], making it necessary to understand these changes to avoid possible skill shortages [16]. This in turn requires a clear understanding of the concept and skills needed. At the level of individuals, people or rather their skillset need to be prepared for this new and greener world of work, which also requires a clear view on these topics [21,28], also because global sustainability goals need to be supported by concrete (skill) frameworks, which in turn requires a clear view on the skills needed [28,32]. Understanding the skills needed helps to better guide individuals as well as educators [27,28]. Further, a better understanding helps in detecting skill demands [17].

Therefore, the present study aims to shed some light on the concept of green skills from an applied perspective and the extent to which a clear picture of green skills exists in professional contexts. It focuses on the range of skills which need to be subsumed, not on a detailed taxonomy of professional skills involved. An actual list of technical competences would go beyond the scope of this study; an example can be found in the ESCO green skills and knowledge concepts [29]. The study focuses on how the concept of green skills is perceived in applied contexts, and which types of competences on a general level need to be included.

Accordingly, the research questions are:

- What are green skills?
- How is the concept of green skills perceived in applied contexts?

2. Methods

To explore the research questions and to gain a more in-depth understanding of the topic of green skills, we used an inductive qualitative approach, based on grounded theory [45] and semi-structured interviews, which seem best suited to the exploratory purposes of this study [46].

A total of 17 semi-structured interviews were conducted. Sampling in grounded theory should consider individuals and organizations that are involved in the research question [47]. Therefore, the participants (representatives of Austrian organizations), were selected based on their field of work and their involvement in a sustainable, green, circular economy. To align the sample with the objectives of the present study, purposive sampling was used [48] (in line with the recommendation of [47]).

There is ambiguity surrounding the concepts of sample sizes and saturation in qualitative research, particularly in the context of grounded theory [49]. Therefore, we followed the recommendation of Corbin and Strauss [45]: we began with analysis and the generation of concepts immediately after the first data were collected. After initially interviewing 11 participants, questions were still not fully answered, and the major categories were not

fully developed. To learn more about the concepts and themes that emerged from the data, and to further develop the theory, 6 additional participants were recruited. Based on the total of 17 interviews, the major themes were developed and integrated to a sufficient extent, indicating that saturation had been reached.

The following inclusion criteria were employed: (a) participants should hold a position (management or expert) in a public or private sector organization dealing with sustainability issues; (b) participants should have a high level of applied experience; we thus defined that participants should have at least 10 years of job experience; (c) to ensure a high level of expertise, we defined it as an inclusion criterion that participants should have a profound educational background at a Master or PhD level.

In selecting the interview partners, we paid attention to achieving a balanced share of the public and the private sector. Our sampling goal was to have a broad range of perspectives and thus interview representatives from different organizations, representing different sectors and diverse fields of work. To ensure confidentiality, we assured the participants that no organization or individual name would be mentioned unless specifically requested. Four organizations explicitly agreed to be named: Stadt Wien—Bereichsleitung für Klimaangelegenheiten (City of Vienna - Directorate for Climate Matters, Vienna, Austria), Stadt Wien—Umweltschutz (City of Vienna - Environmental Protection, Vienna, Austria), Upstream Mobility (a company of Wiener Stadtwerke, Vienna, Austria and Wiener Linien, Vienna, Austria), and HYPO Oberösterreich, Linz, Austria. The interviewees represent the following typical sustainability-related sectors and fields: public sector/public administration, logistics, energy, traffic, public transportation, city planning, forestry, agriculture, chemistry, environmental protection, finance, IT, animal welfare, law, banking, and waste management.

The interviews were conducted between December 2023 and June 2024. In order to be more inclusive, avoid selection bias, and to circumvent any constraints that might be imposed by the time or location of the participants [50,51], both in-person and online interview formats were offered to the interviewees. Online format interviews were conducted via Microsoft Teams, which presents a valid alternative for qualitative data collection if in-person meetings are not possible [52]. Given the focus on factual content and the absence of personal elements, we did not anticipate a significant impact based on the setting. The duration of the interviews and the number of codes generated exhibited only minimal discrepancies between the online and in-person interview formats.

The hybrid (in-person and online) format of the interviews is a potential source of bias. An example would be if participants were not sufficiently familiar with the technology [50]. We assumed that the participants would have sufficient digital skills and be used to online meetings, as all the participants hold either an expert or management position. It can be assumed that the participants were adequately equipped with the requisite digital skills and were sufficiently accustomed to online meetings, as there were no technical issues, and the interviews proceeded unimpeded.

Roughly half of the interviews were conducted in person and roughly half online. They lasted between 30 and 120 min, on average 43 min. At the beginning of each interview, participants were informed about the purpose and the goals of the study. Further, they were informed that the participation in the interview study was fully voluntarily and that consent could be withdrawn any time. Confidentiality was ensured. Participants were also asked whether they agreed to being audio-recorded, which all interviewees did. The participants signed a form of consent, which stated the purpose of the study, ensured confidentiality, and asked for explicit consent (a copy of the form was handed to the participants). The interview questions were posed in an open-ended and as neutral as possible manner,

and participants were encouraged to express their opinions and approaches freely. All interviews were conducted in German.

As mentioned before, green skills is an ambiguous term. Therefore, this article aims at gaining a clearer picture of green skills. Accordingly, the following topics as listed in the literature (see above) constituted the interview guidelines:

- Participants understanding of the term “green skills”
- (Green) skills currently needed in the respective field of work
- Development of skills
- Green skills expected to be needed in the future
- Skills and fields needed for the transformation toward a sustainable, green, circular economy

Initial questions were based on the interview guideline. Follow-up questions were asked spontaneously based on specific contents. Overall, participants answered in a consistent way and on point of the subjects raised.

Interviews were conducted by the first author. In line with the recommendations of [53], the interviewer’s aim was to maintain a balance between creating a friendly atmosphere and being empathetic, while at the same time maintaining a degree of distance to mitigate interviewer effects. Furthermore, active listening was employed. Emphasis was placed on preventing the inadvertent influence of verbal and non-verbal cues on participants and ensuring impartiality in the processing of information.

The interviews were transcribed verbatim in two stages. The initial step involved the electronic transcription of the audio records, which was conducted using the MAXQDA Transcription software (<https://www.maxqda.com/automatic-transcription> (accessed on 29 November 2024)). Subsequently, the transcripts generated electronically were subjected to a verification and correction process, based on the original audio recordings. Overall, the language was clear and precise, which meant that only some minor corrections had to be made to the transcripts.

The analysis included several iterative steps, facilitating open, axial, and selective coding. For that, MAXQDA software (Version 24.6.0) was used. As a first step, open coding was used to identify and name concepts that emerged from the data. In this initial coding phase, the interview transcripts were analyzed line by line. As suggested by [45], memos were used as reflective tool to document or record own thoughts in the open coding phase. In the open coding phase, emphasis was placed on being as open as possible to the data and the ideas emerging from it.

After having completely coded the data, we proceeded with the second step, the axial coding, by which the concepts and their relationships were identified. Concepts were clustered and combined or connected based on their interrelationships, and major themes were developed. In the selective coding phase, the main themes were integrated, refined and the theoretical framework was built. The analysis was mainly carried out by the first author and cross-checked by the second author at each stage for transparency and plausibility. Since the interview statements were given in quite a factual language in general, the open coding closely followed the wording of the interview partners. Similarly, the assignment of units to higher-order categories showed high face validity, widely free from interpretation ambiguity. As an example, the category *interdisciplinarity* (defined as the cooperation of different scientific disciplines) comprised passages either mentioning the word or referring to heterogeneity of expertise, claiming collaboration between science and humanities, praising the connection of different expertise or, in one case, postulating that persons from various specialist areas should work together on a common-sense basis.

3. Results

In the following, the themes found are presented along with the results of the interviews (see Table 1).

Table 1. Major themes and Themes.

Major Themes	Themes
Green skills	Broad term. A clear definition needed All sectors need green skills Sustainability and green skills
Cross-sectional competences	Process management Art and Culture IT and AI Participation Leadership Law
Sustainability competences	Connected thinking Openness Pragmatism Interdisciplinarity and Diversity Communication
Personal values and interests	Mindset and value system Interest and Motivation
Framework conditions	Increasing complexity and velocity Legal frameworks
Qualitative and quantitative skill demand	Staff and skill demand New challenges require new skills
Skill development	Education Continuing education Training on the job

3.1. Green Skills

3.1.1. Broadness of the Term and Need for a Clear Definition

All of the 17 interviewees perceive green skills as a complex and ambiguous notion, not least because of the complexity of framework conditions. *“That is a very broad term. Green skills are extremely broad and that is the disadvantage that it is so broad that it cannot yet be precisely defined. It can be everything and nothing or a lot and nothing”* (Interviewee I).

Throughout, they are considered highly relevant and timely, connected to a broad range of expertise. This makes it hard to define what green skills are; accordingly, no clear and commonly agreed definition exists. Already the scope of the term is ambiguous; is it “only” technical skills or also soft skills that are covered? Therefore, several interviewees consider it important to define the term, otherwise “everything and nothing” can be attributed to green skills, which leaves room for misuse, such as greenwashing.

3.1.2. The Nature of Green Skills

Green skills are understood as the skills and specific knowledge required for a sustainable, climate-friendly, resource-conserving, green and circular economy. Corresponding to the wide range of fields and areas of expertise that were mentioned, there are interlinked requirements that integrate technical, ecological, economic and social aspects. Interviewee IV relates the definition immediately to a couple of application areas:

“These are the abilities, the skills, the training elements that are increasingly needed or newly needed in order to meet the increased needs or requirements in the area of climate protection, climate change adaptation, resource conservation, and sustainability in general.” In contrast, Interviewee III stresses the transition aspect: *“Green skills are the very skills that enable ecological transformation and at least facilitate it.”*

Green skills, or rather the concept of green skills, might be too specific to cover all the skills and competences needed for a more sustainable economy. In addition to specific skills, generic, cross-sectional competences and transversal sustainability competences were also mentioned. Interviewee XIV explains why:

“For me, green skills alone would be too little, because sustainability is much bigger. Sustainability is not just about the environment, but also about social and governance issues. So, for me, the focus here is much, much more on this overall field of skills or competences that I need.”

Interviewee VI makes a similar point, arguing that implementation requires ‘more’ than ‘just’ technical (green) skills:

“This sensitivity is a bit lacking. I also sometimes experience that highly committed people, about whom there is nothing to criticize in terms of their know-how, in terms of their core technical skills (. . .). They come up with great ideas, but you listen to them and think, yes, that is a cool academic experiment, but I mean, that is not possible, that is impossible. We could not put that into practice.”

Similarly, Interviewee I argues: *“You need a solid basic education and then you need this ability to always remain curious. That’s typical of scientists, always staying curious, always asking questions. You also need good communication skills and common sense. You always need that.”*

Table 2 shows a list of all specific skills and fields mentioned by the participants of the present study. The green skills listed here are not meant to be exhaustive, but rather examples that emerged from this study.

Table 2. Green skills and fields mentioned in the scope of the present study (listed alphabetically).

Green Skills and Fields		
Agriculture	Air pollutants	Air pollution control
Alternative building materials	Biochemistry	Biology
Biomass	Budgeting greenhouse gasses	Building refurbishment
Buildings	Carbon capture technology	Chemistry
Circular economy	City planning	Climate change adaptation
Climate protection	Conservation of resources	Construction
Electrical engineering	Emissions	(Renewable) Energy
Energy efficiency	Energy storage	Environmental engineering
Environmental management	Food/Nutrition	Forestry
(Alternative) fuels	(Landscape) gardening	Geothermal sector
Green areas	Heating/Cooling	Hydrogen
Material cycles	Materials	Mechatronics
Microclimatic examinations	Mining of raw materials (ecologically, socially sustainable)	Mobility solutions (e.g., sharing)
Nature conservation	Photovoltaics	Physics
Public transport	Recycling	Safety measures (e.g., flooding)
Spatial planning	Traffic	Waste management
Waste water	Water management	Wood technology

The transition to a sustainable economy will affect all sectors and areas to varying degrees. *“Every area is really affected. In my opinion, some more, others less. But everyone has to think about what contribution they can make”* (Interviewee XII). Energy and mobility, for example, were mentioned as highly influenced. However, the responsibilities required of organizations with economic objectives tend to become more and more similar to those of institutions such as environmental agencies.

For instance, governance was mentioned. Interviewee II, on the other hand, highlights the role of financial skills: *“Today, it is almost impossible to become effective without having some kind of economical background. In other words, you must have a basic knowledge of business management and also because you can use it to penetrate other areas. I think just ecology is probably not enough to be effective.”* In the end, every organization, team, or field is expected to contribute on both the individual and the organizational level. The need for achieving sustainability presents a chance for many people to get involved and contribute with their interests and values.

Four interviewees also point at social sustainability issues, which often stand in the shadow of environmental and economic issues, e.g., Interviewee XIV: *“Please do not limit it to environment, but really to the sustainability skills, rather open up the spectrum. The thing I have noticed a bit in the meantime is that this silent S is bringing social skills back into focus, including in the media. Because the interesting thing is that the more social competence increases, the more cooperative cooperation with a view to the future and the less egomaniacal individual realization thinking is present.”*

3.2. Cross-Sectional Competences

In addition to specific green skills, intermediate cross-sectional competences are needed. While cross-sectional competences are not inherently ‘green’, they are essential for facilitating the green transformation. Interviewee II presents an illustrative case involving an organization dedicated to environmental protection. Beyond green skills, which are fundamental to their scope of activities, competences in economics or sociology (presenting a cross-sectional competences) are also vital for being effective:

“Today, it is almost impossible to become effective without having some kind of economic background. You also have to have a basic knowledge of business administration (...). I think just ecology is not enough to be effective. We also see that we now have sociologists, we also try to attract economists. We now have two or three people here. When it comes to scenarios, you must be able to convert everything into money. In other words, it is not just a case of saying, okay, we need to reduce greenhouse gasses now, but what does that mean? They come from somewhere. What does it mean if I tax gasoline? There are so many economic implications. And I have to be able to evaluate that.”

Table 3 provides an overview of the more general cross-sectional competences that have been mentioned. The cross-sectional competences listed here are not meant to be exhaustive, but rather examples that emerged from this study. Selected cross-sectional competences (which have been elaborated comprehensively by participants) are described in more detail below.

Table 3. Cross-sectional competences and fields, mentioned in the present study (listed alphabetically).

Cross-Sectional Competences and Fields		
AI	Art and culture	Auditing
Awareness raising	Business administration	Complexity research
Consulting	Controlling	Data analytics
Digitization/IT	Economics	Education
Facility management	(Sustainable) Finance	Freight transport
Geo-information	HR	Industrial engineering
Marketing	Mathematics	Media
Medicine	Noise control	Organizational competence
Participation	Politics	Process engineering
Process management	Product design	Project management
Psychology	Social sciences	Sociology
Strategy	Subsidies	Supply chain management
Sustainability reporting	(Eco-)Tourism	Transformation competence

Different participants have emphasized the importance of processes or rather process management in the transition, which is perceived as process-related technological progress. This also includes awareness and analysis of the impact of individual processes or process steps. This is especially important for the circular economy: *“For circular economy you need enormously high process design competence”* (Interviewee IX).

Art and culture are explicitly mentioned as facilitators of a transformation of economy and society. Art stimulates creativity and creates novel ideas. One participant mentioned Science Fiction in that context. Thought processes are invoked and allow people to create a picture of the future, to experience different realities, and thus potentially to form a different view on certain aspects, as expressed by Interviewee IX:

“There is also the art and culture industry, which is also concerned with content, how to change society (. . .). Green skills are also needed to be able to think transformation. And that’s where art and culture are an exciting lever.”

Information technology and the opportunities it provides are seen differently by participants. Concerning IT or AI solutions, the costs and benefits need to be analyzed thoroughly. There are many solutions that might seem promising at first; however, at second glance might have an adverse impact or evoke rebound effects. IT is affecting all sectors, but it is not “green” per se, which makes it a cross-sectional competence; however, it can help with achieving more sustainable behavior, such as video calls instead of traveling to meetings. IT or rather its applications, on the other hand, do have a huge environmental impact, due to the energy demand. However, software can also be programmed in a resource-efficient way. The statement of Interviewee XII is illustrative:

“There is also the possibility of programming energy efficiently. Simply the ability to develop software that requires less computing power. In software development, it is necessary to optimize computing power. (. . .) It is possible to optimize this energy consumption with any software. On the one hand in programming, but also in operation.”

Participation and citizen involvement are becoming increasingly important. Authorities need to find new ways to involve the population and take their concerns into account. This requires specific skills and methods to design and implement participation processes. It is further important to arouse the enthusiasm and motivation of citizens for participation. The involvement of people and showing them the benefits and opportunities of participation is demanded. Only in this way can genuine participation and the involvement of citizens in important decisions be achieved (Interviewee IX):

“For my department, the topics of participation, involvement and the corresponding skills are certainly also exciting. I will certainly need that even more in my department. Because the time when I could simply explain everything by setting standards with a single decision is over. Especially with dwindling trust in state structures, you must take countermeasures. (. . .) How do I involve the population with new formats? How can I use it to explain things? Through participation.”

Managers have a special and important role in implementing sustainability issues in organizations. They must first develop an awareness of sustainability and then communicate this attitude credibly. They will also need to think in an interdisciplinary way and inspire employees and stakeholders to work together toward sustainability. Acting as an according role model (in addition to the general role model function) and actively shaping change processes requires a basic understanding of sustainability issues as a holistic concept. Especially, top managers should deal with long-term developments and confront experts within the organization accordingly, especially since many processes will have a top-down character. Interviewee XIV outlines this ideal using conditional wording: *“That*

is one of the green skills that managers need in my view, to have the enthusiasm and be able to lead people, that would be the master class.” This concerns both aspects of the core business as well as factors aside, e.g., greening or equipping areas belonging to the organization with PV-modules.

Dealing with law and legal frameworks and thus applied legal competence is perceived as a central skill. Participants believe that the demand for legal skills is increasing. The range of the depth varies, starting from a basic understanding of legal aspects through to being an expert in law, or rather a lawyer. Legal practitioners and experts are needed for understanding and applying legal frameworks but also to create them. Without them, the transition will fail. Dealing with regulatory circumstances is to be seen as a craft, which is as important as the expertise in one’s field, and is crucial for implementation, as Interviewee XVI emphasizes:

“No matter how inspired you are to make the world a better place ecologically or otherwise. If you do not know anything about the legal framework, you are just dreaming of hot ice lollies, and at some point, you will either be very frustrated in the worst case or at least will not be able to contribute your ideas accordingly.”

3.3. Sustainability Competences

3.3.1. Connected Thinking

Connected or coherent thinking is perceived as central when it comes to sustainability development, green economy, or particularly circular economy, highlighting the ability of thinking holistically. Connected thinking is essential to understand complex systems. It also means to keep the pillars of sustainability well in balance and to consider them simultaneously. *“Yes, I believe that you must think much more coherently. I believe that this subject, at least in sustainability, because yes, you have to have a bit of an idea of everything and of course the connection to the economy”* (Interviewee II).

Furthermore, Interviewee V emphasizes the importance of “non-box-thinking”, in other words not to play off different areas against each other, such as landscape vs. energy.

Interviewee XIII gives an illustrative example:

“Sales needs to have a more counselling approach. I am thinking of Energy consultants who go into the company with certain tools and then take a look at how they produce, what they do and what kind of lights they have inside would be really exciting. You can replace the lights. Can you add photovoltaics somewhere? Can it start producing the hours later somewhere? In summer, because or early is perhaps a little less, a little less hot or has air conditioning and runs far too long anyway, right? I think there are really many different solutions.”

3.3.2. Openness

Openness is perceived as crucial for the transition. This includes a willingness to learn, curiosity, openness to new things and a general openness. It is further connected to interdisciplinary work, in a sense of being open for other areas, forms of expertise, and points of view. Interviewee XI considers this even as the “credo” of the whole interview that *“...you need people who are open to everything.”*

It includes staying curious and questioning the status quo, raising questions again and again, as is the case in research. Openness further includes the ability to adapt to new framework conditions and challenges as well as new developments, as Interviewee I emphasizes: *“Open-minded for everything that comes along. Because it will come along.”*

3.3.3. Pragmatism

Pragmatism means to keep a balance between ecological and social as well as economic aspects. The term “common sense” is repeatedly used in that context. People are often highly motivated and emotional when it comes to implementing sustainability goals; however, sometimes they tend to neglect other goals of a company or organization (e.g., being profitable or being a dependable partner for customers). It is important to understand the entrepreneurial context, the economic viability, and/or the political framework conditions. Without pragmatism, there is a risk that good ideas and projects will fail in the face of reality. Pragmatism also includes an understanding of the complexity and multi-layered nature of decision-making processes in large organizations. Especially, graduates in their first jobs lack this experience. At the same time, they are usually highly motivated and would like to make an impact. What is to be learned is that some things take time, especially in a complex surrounding, which Interviewee I vividly outlines:

“They come with very good professional competence (...). Most of them are highly emotional on the subject. (...) This is a situation where I am the spoilsport. Guys, you work in a local authority. We make proposals and the politicians say yes or no. (...) Yes, and if we have a good policy, then it will do well. (...) That means they have a high level of technical expertise. However, and this is understandable, they cannot yet have the pragmatism that I, for example, have after 40 years in this organization. Yes, much progress is being made. But you still need pragmatism, otherwise you throw yourself out of the window every other day.”

3.3.4. Interdisciplinarity and Diversity

“You simply have to think more broadly, you have to think in a more interdisciplinary way. And above all, there are no simple solutions where you can press a button and the world will be different and better tomorrow”

(Interviewee XIII)

The multiplicity of green skills indicates that no individual possesses a comprehensive set of them. At the same time, the framework conditions are (increasingly) complex and rather difficult to find. However, when several specialist areas are brought together, the probability of generating solutions is assumed to increase. Moreover, interdisciplinary teams help distribute sensitivity for aspects specific to issues or fields, suggesting team competence to be a critical aspect. A specific mindset and personal maturity are important here, in particular an openness for other points of view.

Education or rather educational programs, especially those offered by universities of applied sciences (see below), are sometimes quite focused. To be able to map the complexity of the issues, it is important to take this heterogeneity into account when putting together a diverse team. This in turn has an impact on recruiting and personnel selection.

“It is also about the group. As I said, too homogeneous does not work. It is also uninteresting, from my point of view” (Interviewee XI)

Interdisciplinarity is not limited to collaborating within a team or an organization. Rather, it also includes networking and collaboration across organizations. Interviewee V believes that *“...it is important to always be aware that nothing works without networking. You have to network the various specialist areas and organizations.”*

3.3.5. Communication

Communication is seen by the interviewees as extremely important and central to various areas, from banking to nature conservation. It enables the transfer of knowledge, the communication of information and products as well as collaboration in teams. It is,

therefore, seen as a key skill that is essential in many areas, as it is not enough to be a (top) expert in a certain field if you cannot communicate. Communication is further related to awareness creation, as Interviewee VII emphasizes:

“General communication and awareness creation. These are fundamental things.”

3.4. Personal Values and Interests

Ideally, green skills are linked to a certain (authentic) set of values or basic attitude (respectful treatment of the environment). This applies to individuals as well as organizations that ideally align themselves with a set of values. However, this value system or basic attitude should be intrinsic and authentic. *“It is no use knowing how the theory works if I do not actually feel it or live it”* (Interviewee V). Otherwise, it is just “paper waste”. The mindset or value system is thus not limited to the workplace but also connected to private life or even life in general. For instance, it may mean respect for natural fundamentals of life, going beyond mere knowledge.

A sustainable mindset and value system can be developed in various ways, through active or passive confrontation. Among those are education, upbringing, and the workplace. On a societal level, an according mindset should be developed as early as possible in the individual development, ideally in elementary school or even kindergarten, as children are especially receptive for sustainability issues. Interviewee XVI mentions the example of waste separation:

“There is a good tradition in Austria of starting waste advice in kindergartens and schools at a very early age. We know from various studies that the level of commitment to ecological issues in general and to the issue of waste is very high depending on age. Children are highly motivated, come home from school, explain to their parents how to separate waste.”

This may, in turn, ease the entry to the job market for the upcoming labor force generation (Interviewee I):

“Many, many different subject areas are needed. I believe that the opportunity for young people is extremely high because they can bring in all their interests, right through to the humanities.”

Interviewee XIII extends the scope of green skills from professionals to the whole population:

“If you think about it more comprehensively, then the entire population really needs to have green skills. Perhaps there should be training courses for the population or somehow a course for everyone where they are told the truth. For example, if the government were to offer a course that lasts three weekends in a row or something. That would be an idea.”

Interviewee IV contributes in a similar vein:

“So, then we just need well-qualified skilled workers. At least if you look at the professions where there are large numbers of them, the individual engineers, we can manage that. But I think that the masses of implementers also need a higher level of qualification than before. As I said, this higher qualification of relatively broad sections of the workforce is something that we have to invest in as a society, otherwise we will not achieve our goals.”

Organizations should foster this interest and motivation or rather should build framework conditions, so that the (intrinsic) motivation of people can develop. The purpose of sustainable jobs should be conveyed to employees. Managers have a central role in this. This can be achieved through feedback, recognition and highlighting individual and company-wide contributions. Ultimately, it is crucial that employees stand behind the

cause and have internalized the hope to be successful in the long term. Interviewee VIII frames it as follows:

“It is our task to convey a sense of purpose, to give them a message or to say that this is your mission or our shared mission, your contribution. And it is a little easier for us, I have to say, because when I walk through the city, you cannot get away from us. Coworkers see their contribution in the city, their contribution to a greener city.”

3.5. Framework Conditions

3.5.1. Increasing Complexity and Velocity

The framework conditions are becoming increasingly complex, and the velocity is also increasing. These developments are affecting the nature of work, and the skills required for it. Interviewee VIII even expressed this as a “quantum leap” in skill demands. Linear thinking is not sufficient (anymore), people rather need to think in (systemic) contexts. Furthermore, soft skills become more important to deal with increasing complexity. Interviewee IX describes the situation as follows:

“We are no longer in complex or complicated complexes, we have now arrived at a hyper-complex system context or state that I can achieve a goal or solve a problem, with a linear way of thinking.”

3.5.2. Legal Frameworks

Legal frameworks tend to be perceived as helpful and facilitating the transition. They are perceived as a chance rather than a threat; a kind of external push to change from inside. Frameworks like the EU taxonomy on sustainable investments are perceived as new, difficult to deal with, but nevertheless helpful, since they provide a guideline for organizations and businesses. Interviewee XIV endorses taxonomies: *“The topic of taxonomy, where the first type of classification or the first regulatory type of classification takes place, is of course very helpful.”*

3.6. Qualitative and Quantitative Skill Demand

3.6.1. Staff and Skill Demand

Sustainability goals are a top priority in society, politics, and thus organizations. Participants indicate a significant demand for personnel. In addition to the requirements associated with the transformation of business processes, there are legal obligations and projects that must be delivered in a shorter timeframe than previously required. This has resulted in a situation where some organizations attempt to entice people away from their employers by offering huge salaries, also for junior positions. Some organizations would have enough budget for ambitious projects, but not enough staff. Consequently, projects are delayed, even essential and important ones. For some organizations, especially the public sector or infrastructure, this represents a stark contrast to the situation in the past (Interviewee VIII):

“In terms of capacity, we are a long way from what we would need. I also like to say to our stakeholders you can give me €1 billion, I cannot spend it. I would never have said that in the past, but I cannot spend it. I do not have the people for it.”

This situation—favorable for employees—leads to unusually high salaries, including for juniors. An example is ESG managers who are recruited by consulting companies, but this effect is not restricted to highly qualified people. Reskilling and upskilling will be necessary (Interviewee II):

“So we will also need enough people who perhaps come from a different background and then perhaps reskill, because all of them having a science degree, that will not be possible.”

3.6.2. Some New Challenges and Their Impact on Skill Sets

The ubiquity of the climate issue also demands for more interdisciplinary understanding. In various areas, such as transport and spatial or city planning, the focus is increasingly on climate protection, climate adaptation, or the circular economy. Even the financial sector and many banks are now taking climate change and the according adaptation measures into consideration, unlike two or even one decade ago when the topic was less visible in Austria. Interviewee IV assumes that

“...my colleagues must be familiar with microclimatic studies by now. This is also a basis for many new developments, that you get the relevant detailed studies from climatologists, and you have to be able to read and interpret them. As I said, this was certainly unknown ten years ago.”

Individual skill sets will need enrichment, as Interviewee IV mentions:

“Of course, new skills will be necessary because we will also face new challenges. Little by little. That will certainly have to be constantly adapted. The skillset you need there.”

3.7. Skill Development

The world and the world of work are in a state of constant evolution, requiring new skills and knowledge on a regular basis. Skill development can happen in at least three ways: education, continuing education, and training on the job. The interviewees emphasized the importance of education, whereby, due to complexity and permanent and rapid changes, (formal) education reaches its limits. Participants have expressed diverging opinions concerning whether education programs are really addressing sustainability aspects accordingly. While some perceive green skills as well settled in education programs, right up to very specific studies or apprenticeships, others do not yet see them as well implemented. However, it can be stated at least that, as the climate crisis continues, green skills are more and more implemented. Especially those offered by universities of applied sciences are perceived as specialized and focused. Educational programs are usually mid- to long-term oriented, while (e.g., regulatory) frameworks consistently change and adapt. It would, therefore, be neither realistic nor fair to expect that graduates bring all the skills needed from their education.

“To deal with evaluatively changing regulatory framework conditions, because they are almost overly decisive for us. And I would really say that no one from a university can bring that to the table” (Interviewee VI)

The limitations of formal education underscore the importance of on-the-job-training and continuing education. Formal education can be seen as no more than a platform where people form a foundation in their respective field.

Training on the job can be seen as a special form of competence or skill development. Not all skills needed can be developed in the scope of education programs. Some skills *must* and *can only* be developed on the job, since practical experience is necessary. For certain tasks or functions, like being an expert witness, it takes years of on-the-job training. Furthermore, some jobs require knowledge that is organization-specific, which can only be gained inside the organization. For specific skills, the job itself is the best way for skill development, as Interviewee X describes it:

“So, you are given the basics, but in reality, you only learn how the world out there works there. And that is another way of saying that the best training is the job itself.”

Continuing education represents a crucial strategy for individuals to adapt their skill sets in a manner that enables them to address current and future challenges effectively. It is

the responsibility of organizations, individuals, and should also be addressed on a societal level. The statement of Interviewee IV describes this situation clearly:

“I think it will be a permanent one. Of course, new skills will be necessary, because we will also face new challenges. Little by little. That will certainly have to be constantly adapted. The skillset you need there.”

4. Discussion

The objective of this paper is to enhance the concept of green skills from an applied standpoint. Figure 1 illustrates the major themes, including framework conditions, as mentioned by the interviewees.

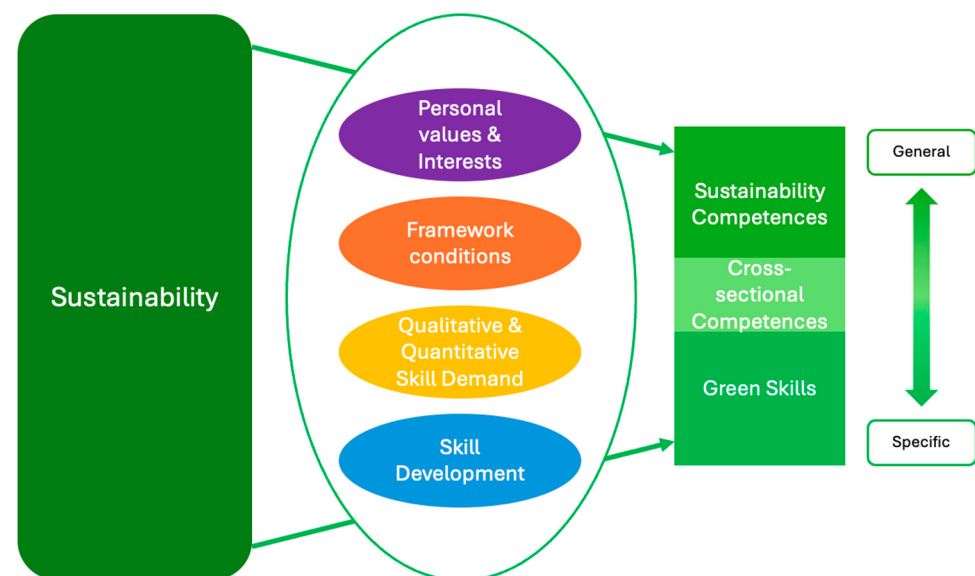


Figure 1. Major themes.

4.1. Green Skills, Sustainability Competences, Cross-Sectional Competences

In line with previous research [17,26], interviewees perceived the term green skills as a vague and ambiguous one. A clear and consistent definition is needed, otherwise detrimental aspects (e.g., not having a clear view of skill needs or greenwashing) can easily happen. The study thus emphasizes the need for a clear definition of green skills and confirms the complexity of the terms ‘skill’ or ‘competence’ itself [21]. Participants have mentioned aspects related to attitude, knowledge, personality traits, as well as education and the variety of relevant fields of application.

Green skills and sustainability competences are closely related (in line with Montanari et al. [21]), but may be differentiated according to their specificity. On the one end, there are general, broad sustainability competences, on the other end specific green skills. We propose to also consider cross-sectional competences at an intermediate level of specificity, leading to the following differentiation:

- general, broad sustainability competences
- intermediate cross-sectional competences
- specific green skills.

In this classification, green skills are specific skills, competences and knowledge that enable individuals, organizations, and societies to act and operate in a more environmentally friendly and sustainable way. They encompass the abilities, skills, and training elements required for a sustainable, climate-friendly, and resource-conserving future. They are essential for achieving decarbonization, climate protection, and a circular economy.

These green skills, however, are too specific to cover all the skills and competences needed for a more sustainable economy; therefore, they need to be supported by more general cross-sectional and sustainability competences. Green skills, cross-sectional competences, and sustainability competences are interrelated. To be effective, capabilities on all three levels are required.

4.1.1. Cross-Sectional Competences

In addition to the concepts of specific green skills and broad sustainability competences, we see cross-sectional competences at an intermediate level of specificity. It would be inaccurate to describe these competences as inherently ‘green’. However, they can be regarded as cross-cutting or transversal ‘tools’ that facilitate the green transformation.

Project management presents an example of such a cross-sectional competence. While project management is not ‘green’ per se, as this competence can be applied in any context, it can be employed as a means of facilitating or implementing sustainable solutions.

Among these cross-sectional competences are IT and AI which were discussed divergently in the present study, since they come along with environmental impacts but can enable sustainable solutions. Additionally, software can also be developed in a resource-efficient way, affecting both programming and operations.

Another mentioned aspect of cross-sectional competence was art and culture, when it comes to the communication of climate change [54]. Art allows people to deal with novel aspects or new approaches in a creative and reflective way, and it may create visions of the future.

In line with Farao et al. [55], the pivotal role of managers and thus leadership in the integration of sustainability within organizational frameworks was addressed. Leadership is also associated with communicating the purpose of jobs and tasks related to sustainability matters.

Another crucial cross-sectional competence is understanding and actively shaping the legal environment. Recent examples for regulations as transition drivers are the EU taxonomy for sustainable activities [56] or the EU nature restoration law [57]. Applied legal competence is not limited to specialist legal skills of lawyers, but affects people in various professions, which suggests that it should be a part of any education.

4.1.2. Sustainability Competences

The term sustainability competences refers to the ability to address complex sustainability issues [19]. Complexity in general, and specifically complexity of framework conditions, is increasing and pertinent to all sectors, jobs, and occupational roles, in line with [19,25,27,28,38].

Among the topics in the interviews, we identified connected thinking, openness, pragmatism, interdisciplinarity and diversity, and communication as part of sustainability competences. Connected thinking is related to what Wiek et al. [19], as well as Redman and Wiek [28], refer to as system thinking competence. In particular, it underscores the importance of interdisciplinary collaboration, as emphasized by [32,36,58–60], and the value of working diverse teams. Sustainability issues involve a variety of stakeholders [32]. Both interdisciplinarity and communication are related to interpersonal competence proposed by Wiek et al. [19]. Generally, we acknowledge the sustainability competences proposed in the previous literature [19,27,28,32] and propose openness and pragmatism as additional sustainability competences.

Openness (representing one of the Big Five Personality Traits [61]) means to question the status quo and to be open to question one’s own mindset and values, which is needed for a fundamental transformation.

Pragmatism is needed across different fields and jobs as an implementation competence [35]. It means to acknowledge that change and transformation do not happen overnight but rather take years. Pragmatism includes seeing the big picture and bringing a certain level of patience as well as acknowledging framework conditions of the respective organization. In addition to technical expertise, it includes an understanding of the overall context and of economic aspects, regulatory framework conditions, and political realities.

4.2. Personal Values and Interests

The urgency of various sustainability goals is obvious, and thus in the focus of individuals as well as organizations, influencing and shaping personal values, (vocational) interests, and the mindset of individuals. This aspect is acknowledged to some extent in the literature on sustainability competence through intrapersonal competence [27,32]. However, our results suggest a more detailed and comprehensive discussion, particularly with regard to the underlying values and interests. Personal values and the according mindset are ideally intrinsic and self-determined (see also [62,63]). This personal value system can be developed in various ways. Awareness can be created in various ways; among these are upbringing, education, as well as the work place. In other words, awareness creation concerns children as well as adults. Sustainability needs do not only shape personal values, but also personal values leading to an increased attention or rather awareness for sustainability. The study emphasizes the importance of awareness creation and mindset building. Education has a central role in that context, which is true for all levels of education, ideally starting in kindergarten (see also [41]). Personal values and interests shape educational and job or rather career choices in general. Interviewees have observed that people increasingly tend to consider ‘green’ issues in their career choices.

4.3. Framework Conditions and Skills Need

This study confirms that the availability of (green) skills is crucial for the sustainable transition [22]. Different participants would easily hire more people if they were available on the market. This shortage of staff hinders (fast) progress in certain projects and thus is slowing down the transition. In line with [17], green skills are needed in more or less all jobs and sectors. This also affects existing jobs, which require new and evolved skills (see also [20]).

(Formal) education plays a key role in skill development to meet sustainability needs [30,36]. Concerning the “readiness” or implementation of green skill aspects in education programs, diverging views existed among participants. While some do not see them as being well covered (see also [17,38]), others perceive green skills as well implemented in existing programs.

Skill development can happen as formal continuing education or as on the job training. While continuing education is crucial to keeping individual skillsets fit for new challenges, the importance of on-the-job training was emphasized as well, in line with Boone et al. [64]. Training on the job does not substitute but enriches formal education. To meet the skill need, reskilling and upskilling do have an important role, also on a societal level.

Suggestions for Education

Based on the findings of this study, educational institutions should focus on skill and competence development at all the three levels of skills and competences presented: in addition to specific green skills, education should also encompass the development of broad sustainability competences and intermediate cross-sectional competences. This is particularly important in specialized programs. The more specific the skills, the more flexible the programs must be to meet evolving skill needs. The necessity of integrating sustainability competences into educational curricula has been a persistent topic of discus-

sion in the academic literature [19,27,36], and the findings of the present study serve to reinforce this notion. Further, the findings confirm the need for interdisciplinarity and the need to balance theoretical and applied aspects in education, as emphasized by Deriu and Gallo [36].

The present study has highlighted the importance of cross-sectional competences and sustainability competences. Examples are (applied) legal competence or communication, which are needed in diverse jobs, and which are crucial for implementation. Moreover, educational programs at all levels, beginning with kindergarten, should prioritize the cultivation of personal values and an informed perspective on sustainability to foster an awareness of these issues at the societal level.

5. Limitations and Future Research

The present study is based on qualitative data derived from semi-structured interviews. Our findings are based on the interview statements of 17 representatives of Austrian organizations, which limits the generalizability across different cultural contexts. To gain a more comprehensive understanding, it would be beneficial to conduct similar investigations in other countries and regions, with due consideration of cultural contexts.

The present study does not aim to provide a comprehensive reflection of the demand and distribution of green skills, which is a question for future research. Frameworks such as the ESCO green skills and knowledge concept [29] provide a solid basis for this. The list of skills and competences presented above (Tables 2 and 3) is not intended to be exhaustive, but rather to provide examples of the skills mentioned in the context of this study. While a qualitative approach is well suited for the exploratory purposes of this study [46], future research could seek to gain a more complete picture by employing a mixed methods approach [65,66].

The findings of the present study indicate that green skills, cross-sectional competences, and sustainability competences are interrelated, yet differentiated due to their specificity. Our research focused on a rough demarcation of the areas of skills and competences. The demarcation or boundaries between these three levels of skills and competences requires further elucidation, a task that future research should address.

It should be noted that participation in this interview study was entirely voluntary. Furthermore, the organizations or rather participants were recruited on a personal basis, which inevitably introduces a certain degree of bias. Furthermore, the specific working context and the objectives of the respective organization may introduce potential biases. Considering this, the analysis and interpretation were conducted with due caution. It is important to consider these aspects when reviewing the conclusions of the present study.

The present study did not employ triangulation or independent reviews, which represents a limitation of the study. The initial objective was to gain a deeper understanding of the concept of green skills and to obtain insights from an applied perspective on the skills required for a green transformation. The presented framework emerged from the data and was not based on prior assumptions made by the researchers. Based on this, it seems reasonable to assume that the potential for researcher bias has been mitigated. Nevertheless, the present study cannot claim to be fully free of any researcher influence or bias.

We anticipate that the proposed framework, comprising three levels of skills and competences, will facilitate the identification and differentiation of skill and competence requirements. However, as also pointed out by an anonymous reviewer, the operational definition of green skills could still be enhanced. Future research could refine and quantify the analysis of them, for instance by investigating the specific skill requirements of green technologies in greater depth.

6. Conclusions

The concept of green skills is complex and open to interpretation, but is certainly too specific to encompass all the skills and competences required for a more sustainable economy. In line with Montanari et al. [21], the present study substantiates the interrelatedness between green skills and sustainability competences. We see a continuum, where on the one end there are specific green skills and more general, broadband sustainability competences on the other. At an intermediate level of specificity, we see cross-sectional competences. We propose the addition of openness and pragmatism to the concept of sustainability competences.

Currently, such competences are lacking in spite of an increased demand, as participants have reported a significant need for personnel and skills, underscoring the pivotal role of skill development and education as well as re- and upskilling. However, this will need to match the personal values and interests of employees—a topic that future research should delve into more profoundly.

Based on the findings of the present study, we suggest the following definition: green skills are specific skills and knowledge required for a sustainable, climate-friendly, resource-conserving, green and circular economy. Green skills are to be considered in conjunction with intermediate cross-sectional competences and broad-band sustainability competences.

Author Contributions: Conceptualization, O.W. and I.P.; methodology, O.W.; formal analysis, O.W.; investigation, O.W.; resources, O.W.; data curation, O.W.; writing—original draft preparation, O.W.; writing—review and editing, I.P.; visualization, O.W.; supervision, I.P. All authors have read and agreed to the published version of the manuscript.

Funding: Open Access Funding by Sigmund Freud Private University.

Institutional Review Board Statement: This research was approved by the MODUL University Vienna - Institutional Review Board (20357).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The datasets presented in this article are not readily available due to privacy reasons.

Acknowledgments: We would like to express our gratitude to the participants of this study for their contribution of time and insights. We would like to thank Josef Wegenberger for his help with the recruitment of participants for this study.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Intergovernmental Panel on Climate Change (IPCC). *IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*; Core Writing Team, Lee, H., Romero, J., Eds.; First; Intergovernmental Panel on Climate Change (IPCC): Geneva, Switzerland, 2023.
2. European Commission “Fit for 55”: Delivering the EU’s 2030 Climate Target on the Way to Climate Neutrality. Available online: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0550&from=EN> (accessed on 8 July 2024).
3. United Nations 8. Promote Sustained, Inclusive and Sustainable Economic Growth, Full and Productive Employment and Decent Work for All. Available online: https://sdgs.un.org/goals/goal8#targets_and_indicators (accessed on 15 July 2024).
4. D’Amato, D.; Korhonen, J. Integrating the Green Economy, Circular Economy and Bioeconomy in a Strategic Sustainability Framework. *Ecol. Econ.* **2021**, *188*, 107143. [CrossRef]
5. Mazur-Wierzbicka, E. Circular Economy: Advancement of European Union Countries. *Environ. Sci. Eur.* **2021**, *33*, 111. [CrossRef]
6. Kasztelan, A. On the Road to a Green Economy: How Do European Union Countries ‘Do Their Homework’? *Energies* **2021**, *14*, 5941. [CrossRef]
7. Siksnyte-Butkiene, I.; Karpavicius, T.; Streimikiene, D.; Balezentis, T. The Achievements of Climate Change and Energy Policy in the European Union. *Energies* **2022**, *15*, 5128. [CrossRef]

8. OECD. *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*; Job Creation and Local Economic Development; OECD: Paris, France, 2023; ISBN 978-92-64-60592-3.
9. Georgeson, L.; Maslin, M.; Poessinouw, M. The Global Green Economy: A Review of Concepts, Definitions, Measurement Methodologies and Their Interactions: Global Green Economy: Definitions & Measurement. *Geo Geogr. Environ.* **2017**, *4*, e00036. [CrossRef]
10. Korhonen, J.; Honkasalo, A.; Seppälä, J. Circular Economy: The Concept and Its Limitations. *Ecol. Econ.* **2018**, *143*, 37–46. [CrossRef]
11. Loiseau, E.; Saikku, L.; Antikainen, R.; Droste, N.; Hansjürgens, B.; Pitkänen, K.; Leskinen, P.; Kuikman, P.; Thomsen, M. Green Economy and Related Concepts: An Overview. *J. Clean. Prod.* **2016**, *139*, 361–371. [CrossRef]
12. Nobre, G.C.; Tavares, E. The Quest for a Circular Economy Final Definition: A Scientific Perspective. *J. Clean. Prod.* **2021**, *314*, 127973. [CrossRef]
13. Söderholm, P. The Green Economy Transition: The Challenges of Technological Change for Sustainability. *Sustain. Earth* **2020**, *3*, 6. [CrossRef]
14. International Labour Organization World Employment and Social Outlook 2018—Greening with Jobs. 2018. Available online: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_628654.pdf (accessed on 4 November 2024).
15. Ellen MacArthur Foundation What Is a Circular Economy? Available online: <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview> (accessed on 14 September 2024).
16. Černý, M.; Bruckner, M.; Weinzettel, J.; Wiebe, K.; Kimmich, C.; Kerschner, C.; Hubacek, K. Global Employment and Skill Level Requirements for ‘Post-Carbon Europe’. *Ecol. Econ.* **2024**, *216*, 108014. [CrossRef]
17. Strachan, S.; Greig, A.; Jones, A. Going Green Post COVID-19: Employer Perspectives on Skills Needs. *Local Econ. J. Local Econ. Policy Unit* **2022**, *37*, 481–506. [CrossRef] [PubMed]
18. LinkedIn Economic Graph Global Green Skills Report. 2023. Available online: <https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/global-green-skills-report/green-skills-report-2023.pdf> (accessed on 15 July 2024).
19. Wiek, A.; Withycombe, L.; Redman, C.L. Key Competencies in Sustainability: A Reference Framework for Academic Program Development. *Sustain. Sci.* **2011**, *6*, 203–218. [CrossRef]
20. Sulich, A.; Sołoducho-Pelc, L. The Circular Economy and the Green Jobs Creation. *Environ. Sci. Pollut. Res.* **2022**, *29*, 14231–14247. [CrossRef] [PubMed]
21. Montanari, S.; Agostini, E.; Francesconi, D. Are We Talking about Green Skills or Sustainability Competences? A Scoping Review Using Scientometric Analysis of Two Apparently Similar Topics in the Field of Sustainability. *Sustainability* **2023**, *15*, 14142. [CrossRef]
22. Bachus, K. The Job Impact of the Circular Economy: An Outline. In *The Circular Economy and Green Jobs in the EU and Beyond*; Brizga, J., El Khadraoui, S., Eds.; FEPS Foundation for European Progressive Studies: Brussels, Belgium, 2022; pp. 87–98; ISBN 978-1-913019-55-6.
23. Marchych, M.; Montanari, S. Sustainability Competences in Lifelong Guidance. The Key Role of Pathways for Transversal Skills and Orientation Program to Shape Future Scenarios. *Med. Humanit. Med. Narrat.* **2022**, *6*, 67–86. [CrossRef]
24. International Labour Organization. *Skills for a Greener Future*; International Labour Organization: Geneva, Switzerland, 2019.
25. European Commission. Joint Research Centre. GreenComp, the European Sustainability Competence Framework. Available online: <https://data.europa.eu/doi/10.2760/13286> (accessed on 11 July 2024).
26. Kwauk, C.T.; Casey, O.M. A Green Skills Framework for Climate Action, Gender Empowerment, and Climate Justice. *Dev. Policy Rev.* **2022**, *40*, e12624. [CrossRef]
27. Brundiers, K.; Barth, M.; Cebrián, G.; Cohen, M.; Diaz, L.; Doucette-Remington, S.; Dripps, W.; Habron, G.; Harré, N.; Jarchow, M.; et al. Key Competencies in Sustainability in Higher Education—Toward an Agreed-upon Reference Framework. *Sustain. Sci.* **2021**, *16*, 13–29. [CrossRef]
28. Redman, A.; Wiek, A. Competencies for Advancing Transformations Towards Sustainability. *Front. Educ.* **2021**, *6*, 785163. [CrossRef]
29. European Commission Green Skills and Knowledge Concepts: Labelling the ESCO Classification 2022. Available online: <https://esco.ec.europa.eu/en/about-esco/publications/publication/green-skills-and-knowledge-concepts-labelling-esco> (accessed on 15 October 2024).
30. Grosseck, G.; Tîru, L.G.; Bran, R.A. Education for Sustainable Development: Evolution and Perspectives: A Bibliometric Review of Research, 1992–2018. *Sustainability* **2019**, *11*, 6136. [CrossRef]
31. Frank, P. A Proposal of Personal Competencies for Sustainable Consumption. *Int. J. Sustain. High. Educ.* **2021**, *22*, 1225–1245. [CrossRef]

32. Giangrande, N.; White, R.M.; East, M.; Jackson, R.; Clarke, T.; Saloff Coste, M.; Penha-Lopes, G. A Competency Framework to Assess and Activate Education for Sustainable Development: Addressing the UN Sustainable Development Goals 4.7 Challenge. *Sustainability* **2019**, *11*, 2832. [\[CrossRef\]](#)
33. Wiek, A.; Bernstein, M.J.; Foley, R.W.; Cohen, M.; Forrest, N.; Kuzdas, C.; Kay, B.; Keeler, L.W. Operationalising Competencies in Higher Education for Sustainable Development. In *Routledge Handbook of Higher Education for Sust Dev*; Routledge: London, UK, 2016; Chapter 16, pp. 241–260.
34. Perez Salgado, F.; Abbott, D.; Wilson, G. Dimensions of Professional Competences for Interventions towards Sustainability. *Sustain. Sci.* **2018**, *13*, 163–177. [\[CrossRef\]](#)
35. Redman, A.; Wiek, A.; Barth, M. Current Practice of Assessing Students' Sustainability Competencies: A Review of Tools. *Sustain. Sci.* **2021**, *16*, 117–135. [\[CrossRef\]](#)
36. Deriu, F.; Gallo, R. Sustainable Green Educational Paths in the Italian Higher Education Institutions: A Text Mining Approach. *Sustainability* **2024**, *16*, 5497. [\[CrossRef\]](#)
37. Greenland, S.J.; Saleem, M.; Misra, R.; Nguyen, N.; Mason, J. Reducing SDG Complexity and Informing Environmental Management Education via an Empirical Six-Dimensional Model of Sustainable Development. *J. Environ. Manag.* **2023**, *344*, 118328. [\[CrossRef\]](#)
38. Okada, A.; Gray, P. A Climate Change and Sustainability Education Movement: Networks, Open Schooling, and the 'CARE-KNOW-DO' Framework. *Sustainability* **2023**, *15*, 2356. [\[CrossRef\]](#)
39. Singer-Brodowski, M.; Förster, R.; Eschenbacher, S.; Biberhofer, P.; Getzin, S. Facing Crises of Unsustainability: Creating and Holding Safe Enough Spaces for Transformative Learning in Higher Education for Sustainable Development. *Front. Educ.* **2022**, *7*, 787490. [\[CrossRef\]](#)
40. Holst, J. Towards Coherence on Sustainability in Education: A Systematic Review of Whole Institution Approaches. *Sustain. Sci.* **2023**, *18*, 1015–1030. [\[CrossRef\]](#)
41. Vesterinen, M.; Ratinen, I. Sustainability Competences in Primary School Education—A Systematic Literature Review. *Environ. Educ. Res.* **2024**, *30*, 56–67. [\[CrossRef\]](#)
42. United Nations 4. Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities for All. Available online: <https://www.globalgoals.org/goals/4-quality-education/> (accessed on 11 July 2024).
43. Salovaara, J.J.; Soini, K.; Pietikäinen, J. Sustainability Science in Education: Analysis of Master's Programmes' Curricula. *Sustain. Sci.* **2020**, *15*, 901–915. [\[CrossRef\]](#)
44. Fischer, D.; King, J.; Rieckmann, M.; Barth, M.; Büssing, A.; Hemmer, I.; Lindau-Bank, D. Teacher Education for Sustainable Development: A Review of an Emerging Research Field. *J. Teach. Educ.* **2022**, *73*, 509–524. [\[CrossRef\]](#)
45. Corbin, J.; Strauss, A. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 4th ed.; Sage: Thousand Oaks, CA, USA, 2015.
46. Creswell, J.W. *Qualitative Inquiry and Research Design. Choosing Among Five Approaches*, 2nd ed.; Sage: Thousand Oaks, CA, USA, 2007.
47. Makri, C.; Neely, A. Grounded Theory: A Guide for Exploratory Studies in Management Research. *Int. J. Qual. Methods* **2021**, *20*, 160940692110136. [\[CrossRef\]](#)
48. Campbell, S.; Greenwood, M.; Prior, S.; Shearer, T.; Walkem, K.; Young, S.; Bywaters, D.; Walker, K. Purposive Sampling: Complex or Simple? Research Case Examples. *J. Res. Nurs.* **2020**, *25*, 652–661. [\[CrossRef\]](#) [\[PubMed\]](#)
49. Low, J. A Pragmatic Definition of the Concept of Theoretical Saturation. *Sociol. Focus* **2019**, *52*, 131–139. [\[CrossRef\]](#)
50. Bolin, G.; Kalmus, V.; Figueiras, R. Conducting Online Focus Group Interviews With Two Generations: Methodological Experiences and Reflections From the Pandemic Context. *Int. J. Qual. Methods* **2023**, *22*, 16094069231182029. [\[CrossRef\]](#)
51. Lobe, B.; Morgan, D.L.; Hoffman, K. A Systematic Comparison of In-Person and Video-Based Online Interviewing. *Int. J. Qual. Methods* **2022**, *21*, 16094069221127068. [\[CrossRef\]](#)
52. Frey, T.K.; Bloch, B.S. Using Microsoft Teams to Facilitate Asynchronous Online Focus Groups. *Int. J. Qual. Methods* **2023**, *22*, 16094069231211251. [\[CrossRef\]](#)
53. Brinkmann, S.; Kvale, S. *InterViews: Learning the Craft of Qualitative Research Interviewing*, 3rd ed.; Sage: Thousand Oaks, CA, USA, 2015.
54. Schrader, C.; Mohn, C.C. *Über Klima Sprechen*; oekom Verlag: Munich, Germany, 2022; ISBN 978-3-96238-374-9. Available online: www.klimafakten.de (accessed on 17 September 2024).
55. Farao, C.; Bernuzzi, C.; Ronchetti, C. The Crucial Role of Green Soft Skills and Leadership for Sustainability: A Case Study of an Italian Small and Medium Enterprise Operating in the Food Sector. *Sustainability* **2023**, *15*, 15841. [\[CrossRef\]](#)
56. EUR-Lex Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the Establishment of a Framework to Facilitate Sustainable Investment, and Amending Regulation (EU) 2019/2088. Available online: <http://data.europa.eu/eli/reg/2020/852/oj> (accessed on 17 September 2024).

57. EUR-Lex Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on Nature Restoration and Amending Regulation (EU) 2022/869. Available online: <http://data.europa.eu/eli/reg/2024/1991/oj> (accessed on 17 September 2024).
58. Barth, M.; Godemann, J.; Rieckmann, M.; Stoltenberg, U. Developing Key Competencies for Sustainable Development in Higher Education. *Int. J. Sustain. High. Educ.* **2007**, *8*, 416–430. [[CrossRef](#)]
59. Barth, M.; Jiménez-Aceituno, A.; Lam, D.P.; Bürgener, L.; Lang, D.J. Transdisciplinary Learning as a Key Leverage for Sustainability Transformations. *Curr. Opin. Environ. Sustain.* **2023**, *64*, 101361. [[CrossRef](#)]
60. Filho, W.L. About the Role of Universities and Their Contribution to Sustainable Development. *High. Educ. Policy* **2011**, *24*, 427–438. [[CrossRef](#)]
61. Tupes, E.C.; Christal, R.E. Recurrent Personality Factors Based on Trait Ratings. *J. Pers.* **1992**, *60*, 225–251. [[CrossRef](#)]
62. Deci, E.L.; Ryan, R.M. The “What” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychol. Inq.* **2000**, *11*, 227–268. [[CrossRef](#)]
63. Ryan, R.M.; Deci, E.L. Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *Am. Psychol.* **2000**, *55*, 68–78. [[CrossRef](#)]
64. Boone, C.G.; Bromaghim, E.; Kapuscinski, A.R. Sustainability Careers. *Annu. Rev. Environ. Resour.* **2023**, *48*, 589–613. [[CrossRef](#)]
65. Tashakkori, A.; Teddlie, C. *Mixed Methodology: Combining Qualitative and Quantitative Approaches*; Applied Social Research Methods; Sage: Thousand Oaks, CA, USA, 1998.
66. Hanson, W.E.; Creswell, J.W.; Clark, V.L.P.; Petska, K.S.; Creswell, J.D. Mixed Methods Research Designs in Counseling Psychology. *J. Couns. Psychol.* **2005**, *52*, 224–235. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.