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Raising the bar for education for sustainable development:

A synthesis of frameworks for transformational skills

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¹ Keywords: Education for Sustainable Development, Transformational Competencies, Sustainability, Psychological Resources



**HOCHSCHULE
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**Raising the bar for education for sustainable development:
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Bachelor Thesis

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List of Abbreviations

AAR-Cycle	Anticipation, Action, and Reflection Cycle
DeSeCo	Definition and Selection of Competencies
ESD	Education for Sustainable Development
ESDG	Education for Sustainable Development Goals
HLPF	High-Level Political Forum on Sustainable Development
IDG	Inner Development Goals
KPI	Key Performance Indicator
OECD	Organization for Economic Co-operation and Development
SDG	Sustainable Development Goals
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAP	World Action Program

Abstract

The objective of this research is to identify which transformational competencies need to be taught to students to contribute to the achievement of the 17 Sustainable Development Goals of the United Nations. To achieve this, five transformational competency frameworks are compared using a systematic document analysis. One of these frameworks is selected as the benchmark for minimum requirements, thus serving as the basis for comparison. The findings indicate that two frameworks fail to meet the minimum requirements. Two other frameworks, however, extend the basic framework and provide a comprehensive overview of all necessary transformational competencies. To communicate these frameworks in a unified manner, the frameworks are integrated into a synthesis, thereby forming a new framework for conveying transformational competencies. As this research presented here uses both young and established frameworks, it is the first to be specifically dedicated to these five frameworks. The outcome of the research calls into question the established frameworks, yet the synthesis of them opens up further approaches and questions regarding the teaching of transformational competencies.

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Kurzfassung

Das Ziel der Bachelorarbeit ist es, herauszufinden, welche Transformationskompetenzen Schüler*innen und Student*innen vermittelt werden müssen, um zum Erreichen der 17 nachhaltigen Entwicklungsziele der Vereinten Nationen beizutragen. Dafür werden fünf Modelle von Transformationskompetenzen mit Hilfe einer systematischen Dokumentenanalyse verglichen. Eines dieser Modelle wird als Maßstab für die Mindestanforderungen ausgewählt und dient somit als Grundlage für den Vergleich. Die Ergebnisse zeigen, dass zwei Modelle die Mindestanforderungen nicht erfüllen. Zwei andere Modelle erweitern jedoch das grundlegende Modell und bieten einen umfassenden Überblick über alle erforderlichen Transformationskompetenzen. Um diese Modelle auf einheitliche Weise vermitteln zu können, werden diese in eine Synthese integriert und bilden so ein neues Modell zur Vermittlung von Transformationskompetenzen. Da die hier vorgestellte Forschung sowohl junge als auch etablierte Modelle verwendet, ist dies die erste, die sich speziell mit diesen fünf Modellen beschäftigt. Das Ergebnis der Forschung stellt die etablierten Modelle in Frage, doch die Synthese der Modelle eröffnet weitere Ansätze und Fragen hinsichtlich der Vermittlung von Transformationskompetenzen.

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1 Introduction

The term 'sustainability' was first coined in the early 18th century by Carl von Carlowitz, who used it to refer to forestry and defined that only as much wood should be felled as would grow back in the same period of time.¹ Today, 'sustainable development' is also a widely used term and has gained considerable importance since 1983, when it was defined by a special commission of the United Nations as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".² The World Environment Conference in Rio de Janeiro in 1992, at which the necessary measures to protect natural resources and mitigate climate change were agreed, also made a decisive contribution to these terms gaining importance.³ This includes the concept of education for sustainable development, which has played a key role in promoting sustainable development since then.⁴

All of this reflects the reactions to anthropogenic factors and illustrates that the issue of sustainable development has been of great importance for many decades. However, the simultaneous occurrence of multiple crises and various global disasters has significantly hindered the implementation of sustainable development measures. These challenges not only lead to stagnation in the implementation of necessary measures but also increase the urgency of action.⁵ This urgency is also directed at educational institutions, which are ascribed a high level of responsibility and are seen as drivers of quality development to teach future generations the necessary knowledge for sustainable development.⁶

This Bachelor's thesis examines the competencies that need to be taught within educational institutions to contribute to sustainable development, for this purpose, five different competence frameworks are compared with each other. The objective of the comparison is to identify the most suitable framework and to

¹ Sächsische Carlowitz-Gesellschaft & Grober (2013), p. 14

² United Nations (1987), p. 37

³ Michelsen & Adomßent (2014), p. 16-18

⁴ Barth (2021), p. 36

⁵ Independent Group of Scientists (2023), p.2

⁶ Barth (2021), p. 36-37

recognize possible gaps within these frameworks. In addition, the following research question is used to examine whether a synthesis of the frameworks is possible to increase their effectiveness:

To what extent do the existing frameworks provide a comprehensive representation of all necessary transformational competencies that contribute to achieving the Sustainable Development Goals?

The current state of research on the comparison of competence frameworks for education for sustainable development indicates a pressing need for further investigation. Occasional critical examinations of one of the frameworks have been conducted, but no such examination has been made of the other selected competence frameworks. This can be justified by the fact that two of the frameworks were blocked in 2021.

The Bachelor's thesis opens with an introduction to the topic of education for sustainable development, which provides a basic understanding of sustainability and the extent of current global challenges. Building on this, the current state of teaching in the field of education for sustainable development is presented, as well as the area in which further research is required. This is followed by a detailed examination of the competence frameworks and their specific competencies, which is then followed by an overview of the current state of research. The subsequent methodology describes the procedure of a systematic document analysis, which is supplemented by a structured qualitative content analysis. As illustrated in Figure 1, the frameworks are initially examined, after which a comparison is conducted, resulting in a synthesis of the frameworks. The fourth chapter is devoted to the results of the comparison and presents the insights gained. The interpretation of these findings is presented in the discussion chapter, which allows for the development of new insights. Finally, the most significant findings are presented and subjected to critical analysis, accompanied by an examination of the methodological approach. Finally, an outlook on potential further research approaches is presented.

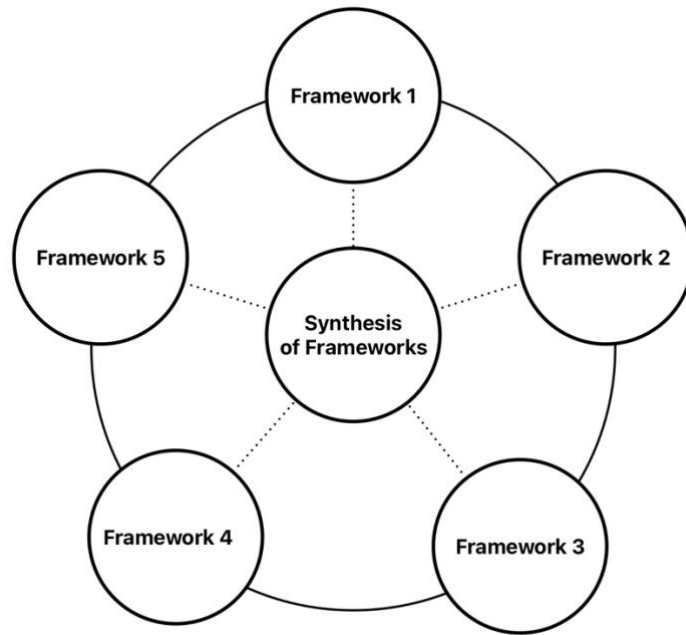


Figure 1: Research Design⁷

⁷ Own illustration

2 Theoretical Foundation

The following theoretical foundation serves to provide a basic understanding of the subject area and to create a basis for the subsequent analysis. It is also necessary to define key terms to avoid misunderstandings. Furthermore, there is a detailed consideration of relevant frameworks that are of importance in the context of this work. To ensure a uniform understanding, the current state of research is also examined. This includes both the presentation of previous findings and the identification of potential research gaps. The objective is to prepare the available information in a manner that facilitates the formulation of clear and comprehensive subsequent analysis and discussion.

2.1 Sustainable Development Goals

The stability of Earth changed rapidly with the onset of the Industrial Revolution, leading to man-made disasters with dire consequences for the environment, which in turn had a major impact on life on Earth. To address these challenges, 30 scientists have developed planetary boundaries, which serve as a safe space for action. Crossing these boundaries, also known as tipping points, can lead to irreversible changes and thus alter life on Earth.⁸ As shown in Figure 2, the grey globe with green markings symbolizes the safe space for action, while the orange-red area protruding from it symbolizes the crossing of these tipping points.

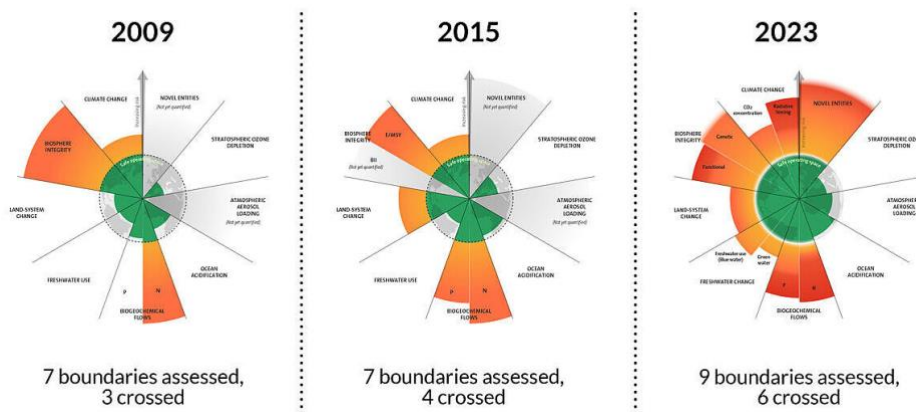


Figure 2: The nine planetary boundaries⁹

⁸ Rockström et al. (2009), p. 472

⁹ Bundesumweltministerium (2024)

Three of the nine spaces of action were exceeded in 2009. In 2023, six were already defined as being in the high-risk area.¹⁰ The presentation of the planetary boundaries illustrates the drastic and often rapid environmental changes as well as the inability to implement appropriate protective measures to date. As early as 2009, the authors of the article 'A Safe Operating Space for Humanity' pointed out that the nine boundaries are interconnected. Crossing a tipping point in one of these boundaries can trigger chain reactions and lead to a further increase in other planetary boundaries. This realization underscores the complexity and interactions within the earth system. Individual environmental problems can quickly escalate into wider crises if the underlying causes are not addressed. The interdependence of planetary boundaries highlights the need for an integrated and holistic approach to ensure the sustainability and stability of the planet.¹¹

To combat the overshooting of further planetary boundaries, the United Nations (UN) developed an agenda in 2015, resulting in 17 Sustainable Development Goals (SDGs), also called Agenda 2030, that focus on social, economic, and environmental sustainable development. These are aimed at developing necessary understanding in society and preventing the advancement of planetary boundaries.¹² The 17 SDGs are guidelines for sustainable development that can be used by both governments and individuals to preserve natural resources and offer everyone the opportunity to live in dignity. At the SDG Summit in 2023, the current status of the Agenda 2030 was last reported with the sobering realization that previous measures are still not sufficient to achieve the SDGs in time.¹³ The statement „we're halfway there but nowhere close“¹⁴ describes the status quo of the High-Level Political Forum on Sustainable Development (HLPF), and according to the SDG progress report of the UN Secretary-General, only 15% of the sub-goals and goals of the Agenda are expected to be achieved by 2030, 30% of the goals have not progressed or have even progressed in the opposite direction.¹⁵

¹⁰ Bundesumweltministerium (2024)

¹¹ Rockström et al. (2009), p. 474

¹² United Nations Development Programme (2015)

¹³ Umweltbundesamt (2023)

¹⁴ Löpelt (2023), p. 2

¹⁵ The Sustainable Development Goals Report 2023: Special Edition (2023), p. 2

The link between the realization of SDG 4 'Quality Education' and the achievement of the other 16 goals is of central importance. This is also emphasized by UNESCO, which stresses that the achievement of SDG 4.7 in particular is of great importance for overcoming global challenges, as the objective is to impart knowledge and skills that contribute to the promotion of sustainable development and that students should acquire this knowledge by 2030.¹⁶

In order to gain a comprehensive understanding of education for sustainable development (ESD), Vare and Scott defined the term according to two different aspects, which nevertheless complement each other. ESD type 1 defines that an awareness of the need for change can be created by changing society's behavior and using technology to solve environmental problems. These are short-term measures that can be implemented immediately, such as saving energy, and water or avoiding waste. ESD type 2, on the other hand, goes beyond short-term measures and requires a critical examination of environmental problems and the development of skills to understand alternative perspectives and make informed decisions in the future. The focus here is on an educational approach that aims to give people the skills to think critically about sustainability and also to critically question expert statements.¹⁷

2.2 Classification of Competence Term

The term 'competencies' is often used in education policy as a synonym for 'skills' and is widely used in the German language.¹⁸ However, this versatility makes it difficult to find a uniform definition in an academic context. In society, education plays a fundamental role in the transmission of knowledge and the preparation of individuals for the demands of everyday working life. Based on this, the motivation to promote skills within the population has so far been attributed to the

¹⁶ Holst et al. (2024), p. 2; UNESCO (2023); Destatis (n.d.)

¹⁷ Vare & Scott (2007), p. 192-194

¹⁸ Duden (2024)

economy and employers who have identified the need to increase productivity and competitiveness, create an environment conducive to innovation, and combat unemployment. This is evidenced by the findings of the member countries of the *Organisation for Economic Co-operation and Development* (OECD), which indicate that a society that has a solid education and high qualifications contributes significantly to overcoming the challenges of the present and future.¹⁹

Weinert defines competencies as available and learnable cognitive abilities that are necessary to solve certain problems. These also include motivational, volitional, social, and moral competencies to successfully solve problems in variable situations and are to be regarded as interdependent.²⁰ These skills are not exclusively related to economic aspects but play an important role in social justice and cooperation within society to meet future challenges in an ever-changing world. Therefore, an interest has developed in politics to learn more about the skills and competencies of individuals rather than measuring educational attainment in terms of numbers and qualifications. A conceptual framework depicting the relationship between competencies, skills, and knowledge was lacking at the time, to which the OECD responded in 1997 with the development of the *Definition and Selection of Competencies* (DeSeCo) program.²¹ The program coined the term 'key competencies' to describe the skills needed to understand social change, help shape the world, and navigate one's environment.²² However, in another publication by De Haan et al. the German term "Gestaltungskompetenz" (English: shaping competency) is used. The authors argue that the goal of educating society in the field of sustainable development is to enable it to contribute to shaping a sustainable present and future. The authors define shaping competencies as the ability to actively participate in transforming and shaping the future of society to promote sustainable development. The concept of sustainable development is understood as a modernization concept that requires change but does not necessarily mean a regression to the status quo. This requires an innovative ability to act in

¹⁹ OECD (2005)

²⁰ Weinert (2001), p. 28

²¹ OECD (2005)

²² De Haan, (2007), p. 16 - 17

sustainable areas and cooperation with society to jointly develop forward-looking solutions.²³

Transformative literacy is also a common term within transformative science. This type of competence enables a person to understand the complex and multi-layered aspects of changes in society and also enables them to contribute their own actions to these transformational processes in a targeted manner.²⁴ As the term 'literacy' is a skill, it is often equated with the term competencies. Accordingly, the term transformational skills is also used. The following Figure provides a final overview of the defined terms. According to this, skills, knowledge, and ability are indispensable components of competencies, which in turn are important components of shaping and key competencies. To ensure a uniform understanding, the term transformational competencies is used and includes the terms shown in Figure 3.

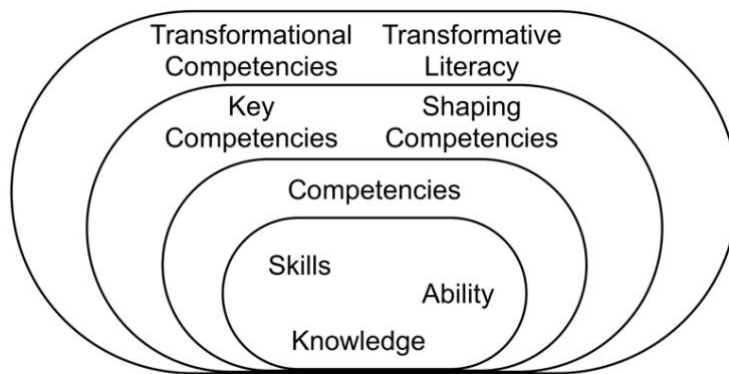


Figure 3: Classification of competence terms²⁵

2.3 Teaching of Education for Sustainable Development

It has not yet been possible to combine the large number of existing competence frameworks into a uniform framework. This is also evident in the German education system, as a study from 2023 shows. According to this study, sustainability is not seen as an interdisciplinary topic, but merely as an add-on.²⁶ Education for Sustainable Development is not just another subject that is taught

²³ De Haan et al. (1999), p. 62-65)

²⁴ Schneidewind & Bergische Universität Wuppertal (2013), p. 83

²⁵ Own illustration basend on Erpenbeck et al. (2017), p. 26

²⁶ Müller-Christ et al. (2017), p. 2; Holst et al. (2024), p. 1

independently of other modules in educational institutions. Rather, it is important that the existing modules and subjects are taught in line with the 'Whole Institution Approach', which is a comprehensive implementation of ESD in an institution.²⁷ However, UNESCO also confirms the lack of interdisciplinary teaching in many countries, as this approach to ESD is not transferred to learning content, pedagogy, and learning outcomes in the sense of a Whole Institution approach.²⁸ According to its own documentation, UNESCO conducted a study with the objective of reviewing the status of the SDGs, thereby also reviewing the integration of ESD in education systems worldwide. However, this study is subject to considerable criticism as it is based on self-reporting by countries and reviews best practices, which leads to positive reports that lack adequate justification.²⁹ A review of the results in Germany reveals that the country receives a very high score, indicating that education for sustainable development is already strongly integrated into education policy, curricula, teacher training, and student assessment. Nevertheless, when other studies by Grund and Brock and Holst et al. are taken into account, it becomes evident that the results diverge considerably. Furthermore, students and teachers express a desire for a more advanced implementation of ESD.³⁰

Although 50% of young people surveyed in a study by Grund et al. have a very high level of sustainability awareness and are also aware that the climate crisis can have a negative impact on their own lives, they do not feel able to contribute to combating the climate crisis due to the formal education they have been taught. Also examined in this study were the points of contact with sustainability in comparison from 2018 to 2022 which was mainly Social Media, educational institutions only covered the fifth of eight places.³¹ With regard to educational institutions, it is necessary to differentiate between schools, vocational schools, and universities. While 78% of respondents have encountered sustainability at school, only 57% of vocational school students and 64% of university students

²⁷ Bundesministerium für Bildung und Forschung, (n.d.-a); UNESCO, (n.d.)

²⁸ UNESCO (2020), p. 9

²⁹ Holst et al. (2024), p. 1-2

³⁰ Grund & Brock (2020), p. 8-10; Holst et al. (2020), p. 12

³¹ Grund et al. (2021), p. 7-10

can say the same. Looking at the teachers' perspective, the study by Grund and Brock shows that almost 50% of the teachers surveyed in 2022 have integrated ESD into their lessons. Nevertheless, almost a quarter of respondents indicated that they lacked awareness of the specific activities and exclusions associated with ESD.³² The findings of the report by Brock and Holst suggest that teacher training is an essential prerequisite for effectively promoting ESD in schools. Nevertheless, 65% of the teachers surveyed stated that they had never had any contact with ESD during their own studies.³³ In summary, the lack of integration of ESD within higher education has the consequence that those who are responsible for imparting this knowledge to students in schools are not taught it themselves.³⁴

2.4 Framework for Transformational Competencies

The creation and publication of the SDGs have contributed to an increased awareness of sustainable development in politics and society.³⁵ For many years, there has been a discussion about which competencies society should have to help shape sustainable development. Rieckmann refers to these as 'key competencies'. At the international level, various frameworks of competence have been developed. One example is the *Framework for Global Development Education in the context of Education for Sustainable Development* (in German: *Orientierungsrahmen für den Lernbereich Globale Entwicklung im Rahmen einer Bildung für nachhaltige Entwicklung*) in Germany. However, the objectives and competencies outlined in this framework are only presented in a general manner, which presents a challenge for educators seeking to ensure the integrity of the curriculum.³⁶ The OECD framework is a globally applicable framework that, according to the author de Haan, serves as a reference for other frameworks, However, it is not a uniform framework that can be used as a guide by educational institutions.³⁷

³² Grund & Brock (2020), p. 11 - 12

³³ Brock & Holst (2022), p. 14

³⁴ Müller-Christ et al. (2017), p. 21 - 22

³⁵ Barth (2021), p. 35

³⁶ Rieckmann (2021), p. 5 (translated from German by the author)

³⁷ De Haan (2007) p. 8

Transformational competence frameworks are developed to identify and teach the necessary skills to promote sustainable development and thus advance the achievement of the Sustainable Development Goals. These frameworks provide a framework to identify relevant competencies, skills, abilities, and knowledge for individual and collective growth, especially in the context of global challenges. Their focus is on disseminating these competencies and supporting their development to respond more effectively to global challenges. By consciously supporting organizations, companies, and institutions, the necessary skills for personal growth are to be promoted. According to the definition of ESD by Vare Scott (see chapter 2.1.3), the transformational frameworks can be assigned to type 2 of their definition.

The following sections present five competency frameworks, accompanied by definitions of the competencies listed therein. These frameworks are of central importance for the further course of this thesis, as the information presented here serves as the basis for the upcoming comparison and analysis.

2.4.1 Framework 1: Education for Sustainable Development Goals

Competence frameworks to promote ESD are not new concepts but have been striving for relevance for many years. From 2005 to 2014, the UN Decade of ESD program was launched, with the aim of seamlessly integrating sustainable development into all areas of education. The program is considered a decisive milestone for the anchoring of ESD in the German education system, and laid the foundation for numerous initiatives, in particular for the promotion of sustainability education and the necessary adjustments to curricula.³⁸ The development of concepts and action plans was carried out by experts from various fields, which were continued as part of the *World Action Program* (WAP 2015-2019). The WAP was dedicated to fostering a symbiotic relationship between sustainable development and education.³⁹ In order to continuously support and simplify the integration of this, UNESCO defined concrete learning objectives in 2017,

³⁸ UN-Dekade (2011)

³⁹ Bundesministerium für Bildung und Forschung (n.d.-b)

adapted to the SDGs, and thus designed the framework *Education for Sustainable Development Goals: Learning Objectives*. In addition to the objectives, eight key competencies were defined that are necessary to achieve these learning objectives. The framework is based on three frameworks by the authors Rieckmann (2012), Wiek et al. (2011) and de Haan (2010). The key competencies are described below:

System Thinking Competency

Instead of examining individual components in isolation, a systems approach looks at the interactions between the parts as a whole. It describes the ability to perceive and understand the world around us. This approach enables a more comprehensive understanding of complex problems by examining individual elements and their interrelationships. It also includes the ability to deal with uncertainty, as complex systems often exhibit unpredictable changes.⁴⁰

Anticipatory Competency

Anticipatory competence is defined as the ability to recognize and evaluate different futures. In addition to considering a single future possibility, anticipation also encompasses the consideration of other probable and desirable scenarios. Consequently, a vision for the future is developed and the precautionary principle is applied to assess potential risks and consequences. This capacity enables one to cope more effectively with change and risk by anticipating and preparing for a range of potential future scenarios.⁴¹

Normative Competency

Normative competence is defined as the capacity to comprehend and reflect upon the rationale behind one's actions and the values and norms that inform them. It is concerned with the recognition of moral and ethical principles and their incorporation into decision-making processes. In terms of sustainability, normative competence implies an understanding of the values, principles, goals, and guidelines of sustainability, as well as the capacity to integrate these into

⁴⁰ UNESCO (2017), p. 10

⁴¹ UNESCO (2017), p. 10

one's actions. This is of particular importance in situations where competing interests or goals are present. In order to make decisions that promote sustainability in the long term while meeting current needs, it is necessary to be able to deal with uncertain knowledge and contradictions.⁴²

Strategic Competency

In collaboration with other people, creative and innovative measures are developed and implemented with the objective of enhancing sustainability at both the local and supra-regional levels. This implies that the individual is capable of establishing long-term objectives and identifying strategies to achieve these objectives by integrating innovative approaches and solutions. Strategic competence also encompasses the capacity to effectively utilize resources and to enter into collaborations with a range of stakeholders in order to facilitate the implementation of these measures.⁴³

Collaboration Competency

The achievement of goals is facilitated by effective collaboration with others, which entails integrating the insights and perspectives of others into one's own cognitive processes. Furthermore, there is the concept of empathy and empathic leadership. Empathy allows for the construction of relationships and the comprehension of others. Empathic leadership, in contrast, entails the integration and contemplation of the needs and perspectives of others during the formulation of decisions and the resolution of conflict. Finally, conflict management is an integral aspect of the capacity to cooperate. This describes the capacity to identify and address conflicts within a group in a constructive manner, thereby facilitating collaborative and participatory problem-solving.⁴⁴

Critical Thinking Competency

This is the capacity to engage in critical thinking and to challenge assumptions without resorting to unquestioning acceptance. It is about adopting a skeptical

⁴² UNESCO (2017), p. 10

⁴³ UNESCO (2017), p. 10

⁴⁴ UNESCO (2017), p. 10

stance towards norms, practices, and opinions, and understanding the reasons behind their existence and the potential consequences of these beliefs. Furthermore, critical thinking skills encompass the capacity to reflect on one's own values, perceptions, and actions. Students will be expected to engage in critical examinations of a range of perspectives, information, and arguments, and to formulate their own opinion on the basis of sound understanding and reasoning.⁴⁵

Self Awareness Competency

One's own actions are subjected to a systematic and critical analysis, which enables the individual to identify their strengths and areas for improvement. The capacity to regulate one's emotions and desires is also a component of self-awareness. Such abilities assist individuals in developing a more profound comprehension of themselves, in formulating personal objectives, and in directing their own growth and development.⁴⁶

Integrated Problem Solving Competency

Complex problems are addressed by integrating diverse approaches. In order to identify a fair and balanced solution, the needs and perspectives of all parties involved are taken into account. To achieve this, an integrative approach to skill utilization is employed, as the combination and application of diverse skills enables the development of a holistic and effective approach to the resolution of problems.⁴⁷

2.4.2 Framework 2: Inner Development Goals

The framework *Inner Development Goals* (IDG) consists of 23 defined competencies developed by more than 1,000 representatives and is based on the Agenda 2030. In 2019, scientists from the field of adult education came together and published a manifesto that deals with the complexity of social challenges and how they can be addressed. While there is already a lot of

⁴⁵ UNESCO (2017), p. 10

⁴⁶ UNESCO (2017), p. 10

⁴⁷ UNESCO (2017), p. 10

knowledge about various social problems, the transformation of society, and visions of what needs to be changed, the authors believe that it is necessary to focus on how these things can be changed and how society can be motivated to participate in them.⁴⁸ The authors themselves define the 'Inner Development Goals' as a project that aims to promote inner growth through relevant skills, qualifications, and abilities to enable outer development.⁴⁹

For a meaningful classification of these competencies, people from different backgrounds were involved, like practitioners who deal with sustainability on a daily basis or researchers who have been dealing with the management of complex tasks in relation to adults for years.⁵⁰ In addition, two surveys were sent to people who the author group felt had a greater understanding of working with SDGs than the general population.⁵¹ The results of the first survey served as a first approach to the framework, which was strengthened on the basis of the second survey, the current version consists of a total of 23 competencies and 5 generic categories, which can be seen in Figure 4, a detailed definition of these can be found in Appendix A. It should be emphasized that this is not a finalized framework. The organization holds an annual IDG Summit to discuss potential changes to ensure that the listed transformational competencies adapt to constant change and are applicable at all times.⁵²

⁴⁸ Jordan et al. (2021), p. 3

⁴⁹ Jordan et al. (2021), p. 3

⁵⁰ Jordan et al. (2021), p. 4

⁵¹ Jordan et al. (2021), p. 8

⁵² Inner Development Goals (n.d.-a)

Being	Thinking	Relating	Collaborating	Acting
<p>Inner Compass</p> <p>Guiding sense of purpose driven by awareness.</p>	<p>Critical Thinking</p> <p>Questioning statements that are not evidence-based.</p>	<p>Appreciation</p> <p>Strengthens interpersonal relationships and promotes creative collaboration.</p>	<p>Communication Skills</p> <p>Understanding values of others.</p>	<p>Courage</p> <p>Developed through various strategies to stand up for values and beliefs.</p>
<p>Integrity and Authenticity</p> <p>Having a strong sense of self and the ability to show feelings.</p>	<p>Complexity Awareness</p> <p>Recognizing multi-layered systems.</p>	<p>Connectedness</p> <p>Being part of a larger whole due to connection between humanity and environment.</p>	<p>Co-Creation Skills</p> <p>Includes skills to create favorable conditions for productive collaboration.</p>	<p>Creativity</p> <p>Closely linked to developmental processes in adulthood.</p>
<p>Openness and Learning Mindset</p> <p>High willingness to learn to be open to new perspectives and changes.</p>	<p>Perspective Skills</p> <p>Understanding and incorporating different points of view.</p>	<p>Humility</p> <p>To act without ego, respectfully towards others.</p>	<p>Inclusive Mindset and Intercultural Competence</p> <p>Understanding and integrating different backgrounds.</p>	<p>Optimism</p> <p>Raising hope and drawing attention to feasible aspects.</p>
<p>Self-awareness</p> <p>Understanding of one's own behavior.</p>	<p>Sense-making</p> <p>Recognizing patterns, sharing understanding with others.</p>	<p>Empathy and Compassion</p> <p>Identifying with the feelings of others, taking care of their needs.</p>	<p>Trust</p> <p>Transparency, goodwill, combined with compassion and empathy.</p>	<p>Perseverance</p> <p>Maintain commitment to objectives despite the time it takes to achieve them.</p>
<p>Presence</p> <p>Being empathetic towards others.</p>	<p>Orientation and Visioning</p> <p>Complex global problems require long-term strategies and perseverance.</p>		<p>Mobilisation Skills</p> <p>Reaching out to different groups and engaging their interest.</p>	

Figure 4: Explanation of competencies⁵³

2.4.3 Framework 3: Wiek et al. Key Competency in Sustainability

The framework *Key Competencies in Sustainability* by Wiek et al. serves as an orientation for sustainability programs taught in educational institutions. The purpose is to educate future change agents and to enable graduates to participate in the development of a sustainable future and to solve global societal

⁵³ Own illustration based on Jordan et al. (2021), p. 13-24

problems.⁵⁴ Wiek et al. define competencies not only as subject-related knowledge, but as a complex of knowledge, skills, and abilities. The framework was first published in 2011 with five key competencies, but in 2015 the authors added a sixth competency.⁵⁵ The revised version will be used in the course of the bachelor's thesis.

The following Figure 5 presents the revised version of the framework, which comprises a combination of four modules and six key competencies. Furthermore, the figure illustrates the point at which current problems, visions, and actions can be employed in a targeted manner to facilitate change toward a sustainable future. The areas outlined in black represent the four modules, which identify the current issues, constellations, and visions for a sustainable future that require the implementation of concrete strategies and action plans. Additionally, undesirable developments are identified. The grey areas represent the key competencies, which are defined below.

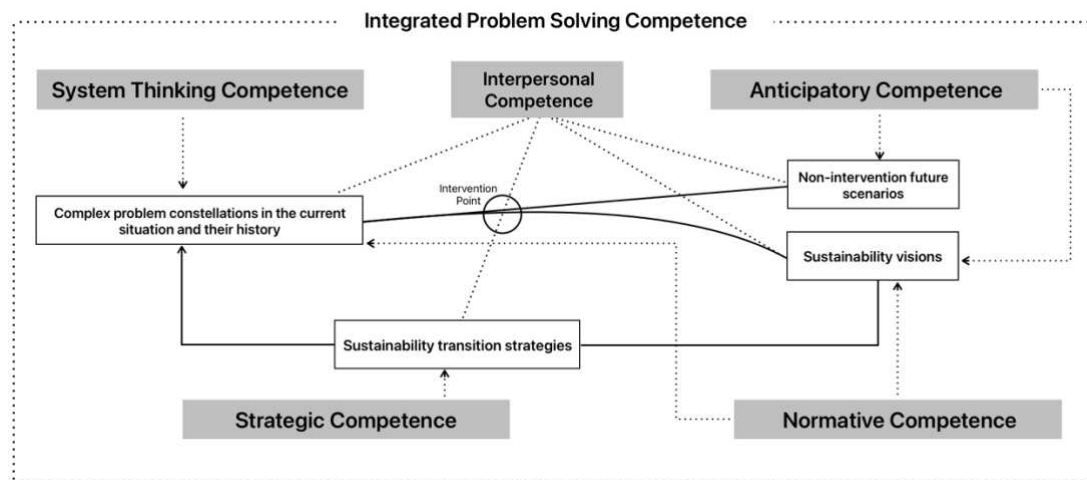


Figure 5: Key Competencies⁵⁶

System-thinking Competence

Graduates who are able to think systemically are able to analyze sustainability problems in different areas and at different scales using systems concepts such

⁵⁴ Wiek et al. (2011), p. 204

⁵⁵ Wiek et al. (2015), p. 241 - 243

⁵⁶ Own illustration based on Wiek (2011), p. 206; Wiek (2015), p. 243

as cause-effect structures, cascading effects, and feedback loops. They can explain the need for systemic thinking in solving sustainability problems, including predicting future developments, identifying areas of intervention, and evaluating transition strategies. In addition, they can explain how different professional roles play a part in addressing or mitigating sustainability issues.⁵⁷

Anticipatory Competence

Graduates have the ability to imagine how sustainability problems can develop over time. They consider different scenarios and recognize that problems often change slowly and can be exacerbated by existing structures. They are able to develop strategies aimed at mitigating sustainability problems. In addition, they can also anticipate how their careers might develop and how their professional activities might influence or mitigate future sustainability problems.⁵⁸

Normative Competence

Graduates are able to delineate the values, principles, and goals of sustainability with precision and apply them in a variety of contexts. They draw upon concepts such as justice, equality, and responsibility, which they use in various processes including the development of a vision, assessment, and evaluation. Furthermore, graduates are aware of the pivotal role of value-based thinking in the planning of future-oriented activities and are able to envisage a sustainable future within their professional field.⁵⁹

Strategic Competence

Graduates are able to develop and test complex strategies. They are able to develop plans, mobilize resources, and coordinate stakeholders to achieve the desired outcome. Additionally, they are aware of the significance of strategic thinking and use their skills to develop plans and actions with the objective of reducing sustainability problems and facilitating progress towards a sustainable future.⁶⁰

⁵⁷ Wiek et al. (2015), p. 243

⁵⁸ Wiek et al. (2015), p. 244

⁵⁹ Wiek et al. (2015), p. 246

⁶⁰ Wiek et al. (2015), p. 247

Interpersonal Competence

Graduates with interpersonal skills are able to initiate and facilitate various forms of collaboration, including teamwork and stakeholder engagement in sustainability initiatives. These graduates can demonstrate proficiency in communication, intercultural understanding, empathy, consultation, negotiation, and leadership. Furthermore, they are able to articulate how this collaboration supports all the competencies described above.⁶¹

Integrated Problem Solving Competence

Graduates trained in integrated problem-solving are familiar with different approaches and can use them to address complex sustainability problems in order to develop workable solutions. This ability enables them to effectively combine problem analysis, sustainability assessment, vision development, and strategy formulation. Furthermore, they are able to explain the importance of integrated problem-solving approaches and how different competencies support these efforts, thereby contributing to the promotion of sustainability. This competence serves to complement their ability to describe the specific contributions of the previous five competencies to the resolution of sustainability problems.⁶²

2.4.4 Framework 4: OECD Learning Compass 2030

The OECD Learning Compass is a framework that is primarily aimed at students, its purpose is to redesign today's education system worldwide in order to prepare students for global and complex challenges. The concept was developed by the OECD organization, it builds on the previous program DeSeCo and further develops the key competencies listed there into transformational competencies. The representation of the framework as a compass is a deliberate choice and thus represents a comparison between students and travelers who are supposed to find their bearings in unknown environments with the help of the compass.⁶³ A

⁶¹ Wiek et al. (2015), p. 250

⁶² Wiek et al. (2015), p. 251 - 252

⁶³ OECD (2020), p. 20

simplified representation of the compass can be found in Figure 6, which shows the main components listed in the framework: Transformational competencies, core foundations, knowledge, skills, attitudes and values, and the Anticipation, Action, and Reflection Cycle (AAR-Cycle).⁶⁴

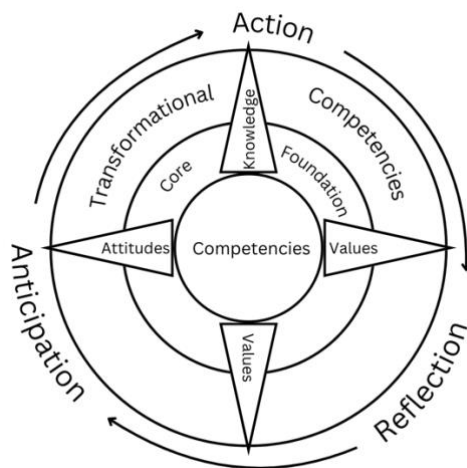


Figure 6: OECD Learning Compass 2030⁶⁵

The main components are complemented by the elements of student agency and co-agency. Student agency in particular plays a central role, as the framework is based on students taking more responsibility for themselves and society and discovering and developing creative skills. Students should learn the ability to actively participate in their own learning process and influence people and circumstances to bring about positive change and make self-determined decisions. Co-agency represents the student's peers, teachers, or parents. The intention of this is to create a supportive network in which everyone involved works together to achieve the student's goals.⁶⁶

Core foundations, attitudes, knowledge, values, and skills form the basis of the compass and the Student Agency. The elements are closely interlinked and are essential for building transformational competencies. For students to be successful in advocating for well-being, they need three transformational

⁶⁴ OECD (2020), p. 24

⁶⁵ OECD (2020), p. 25

⁶⁶ OECD (2020), p. 26 - 27

competencies, which are defined as ‘creating new values’, ‘balancing tensions and dilemmas’, and ‘taking responsibility’, as described below.⁶⁷

Creating new values

The ability to create new value is based on entrepreneurial thinking and responsible action as well as on the innovation of ideas and solutions for existing and future challenges. A vision of sustainability is crucial to ensure that these values also have a social and cultural connection. A sense of purpose and openness to new ideas are key aspects of this. In order to solve complex problems and find alternative approaches, critical thinking, creativity, and agility are of great importance so that students can tackle complex problems.⁶⁸

Balancing tensions and dilemmas

The ability to balance tensions and dilemmas means being able to deal with difficult situations. This requires students to be flexible and to consider, respect, and understand the views of others. In some cases, this requires complex decisions to resolve conflicts, which in turn requires perseverance and the ability to tackle complex problems. Students are taught that there are often multiple solutions to a problem and that different ideas and opinions are considered in order to solve them.⁶⁹

Taking responsibility

Students are aware of their ability to influence others through their actions and reflect on their decisions with regard to personal and social goals. They act responsibly, have an awareness of alternative courses of action, and follow an ethical compass.⁷⁰

The whole journey to well-being is described as a cycle of anticipation, action, and reflection (AAR) rather than a one-off journey. The student agency's thinking and behavior can be continuously improved by reflecting on the impact of their

⁶⁷ OECD (2020), p. 52

⁶⁸ OECD (2020), p. 44

⁶⁹ OECD (2020), p. 45

⁷⁰ OECD (2020), p. 46

actions, aligning their behavior with the well-being of others, and reflecting on and improving that behavior.⁷¹

2.4.5 Framework 5: Future Skills

The framework Future Skills was conceived by Stifterverband and McKinsey & Company and lists 21 cross-industry skills that, according to their own statements, will become increasingly important in both a professional and personal context over the next five years.⁷² There, a distinction is made between four competencies: 'Technological Competencies', 'Digital Key Competencies', 'Classical Competencies', and 'Transformative Competencies'. Only 'Transformative Competencies' deals with sustainable development, which is why only this category is examined in more detail, a brief explanation follows for the other competencies.

'Technological Competencies' are considered essential for the development and effective application of technology. It is primarily professionals in the technology sector who have the necessary knowledge and these competencies. 'Digital Key Competencies' are essential to actively participate in a digitized environment. This describes competencies that are crucial for a variety of professions and are therefore a basic requirement for society to gain a foothold in today's labor market. 'Classic Competencies' were already important in the past and will become even more important in the future. They are the cornerstone of individual professional success and that of organizations. 'Transformative Competencies' deal with societal and social challenges and are intended to provide society with the knowledge to overcome them.⁷³ Subordinate to this, five further transformative competencies are defined:

Judgment

Judgment involves the ability to critically examine and reflect on social issues and media reports. This actively draws attention to the achievement of the 17 SDGs.

⁷¹ OECD (2020), p. 94 - 96

⁷² Stifterverband für die Deutsche Wissenschaft e.V. (2024)

⁷³ *ibid.*

Innovation Competence

Innovations are to be developed in both professional and private environments in order to counteract social challenges.

Mission Orientation

The competency of mission orientation describes the ability to craft a compelling mission narrative to move society and inspire action.

Change competence

The competence to address change involves developing strategies to facilitate the implementation of change objectives. This includes an appreciation of the functioning of groups, organizations, networks, and systems.

Ability to engage in dialog and resolve conflicts

The ability to engage in dialog and resolve conflicts implies the bringing together of different areas of expertise and responsibility. Furthermore, it includes the ability to balance tensions and solve problems that may arise from different perspectives. The capacity to cope effectively with uncertainty is of central importance as it also requires the courage to discuss openly and express one's own opinion.⁷⁴

2.5 State of Research

The framework Key Competencies by Wiek et al. was extended by the authors Brundiers et al. as part of a Delphi study. The framework was subjected to an analysis to optimize the development of teaching programs for education for sustainable development and thus ensure comparability with other sustainability programs. The framework was approved and two further competencies were identified and added to the framework which make the framework more practice-oriented. 'Implementation Competency' enables the practical implementation of sustainability strategies, while 'Intrapersonal Competency' promotes emotional

⁷⁴ Stifterverband für die Deutsche Wissenschaft e.V. (2024)

intelligence.⁷⁵ A further revision of the model was made in 2021 by Wiek and Redman, who added three more key competencies to the model, namely ‘Disciplinary Competencies’, ‘General Competencies’ and ‘Other professional Competencies’. The interdisciplinary competencies are intended to expand the existing framework with content-independent specialist knowledge, while the general and professional competencies serve to actually drive the change in sustainability and implement the measures developed.⁷⁶

Although no direct elaboration of the ESDG framework can be found, UNESCO itself has further developed the earlier programs (see Chapter 2.3.1) and the ESDG framework which is called *ESD for 2030 Roadmap*. It contains a concrete guideline that describes the promotion and integration of education for sustainable development up to the year 2030. The action plan is directed towards a diverse range of stakeholders, making it more action-oriented than the ESDG framework. However, no specific learning objectives are outlined, and the focus is on stakeholders and political decision-makers rather than teachers and educational institutions.⁷⁷ With regard to the IDG, OECD Learning Compass, and Future Skills frameworks, no further elaboration or comparative study could be found that critically examines the frameworks in terms of their suitability for achieving the SDGs.

The overview of the current state of research shows that some frameworks have been critically scrutinized or further developed in order to ensure practical relevance and effectiveness. Nevertheless, there is a significant research gap in terms of critical evaluation and comparison with other frameworks, particularly with regard to the more recent frameworks. A comparison of these frameworks and those that have been further developed can contribute to a better understanding of their effectiveness and applicability and also offer the opportunity to make a significant contribution to educational research.

⁷⁵ Brundiens (2020)

⁷⁶ Redman & Wiek (2021)

⁷⁷ UNESCO (2020)

3 Methodology

A systematic document analysis according to Mayring was chosen as the research method, as this offers the opportunity to go into depth in order to gain a comprehensive understanding of the transformational competence frameworks and to review and reinterpret the existing literature. The focus of this method is to analyze the written content of the selected literature.⁷⁸

The term "document" is defined broadly in the context of this methodology, encompassing not only written texts but also internet sources, audio tapes, and tools. The importance of this is that the medium can be interpreted. The advantage of this approach is the diversity of the material, which allows the researcher to avoid the need to collect the data independently, and due to the secondary analysis, there is no risk of incorrect data collection. However, this can still occur when selecting the documents. The research field is accessible with rather minimal effort, as no independent observations are made and therefore no appointments with survey or interview participants need to be arranged.⁷⁹

3.1 Research Design

The process of document analysis is explained in the following chapters, which also report how the research was conducted. As can be seen in Figure 7, the method begins with the definition of the research question to be investigated, followed by determining the document material. This is followed by an explanation of how the documents were accessed and a classification of their relevance. The source criticism is based on six criteria specified by Mayring.⁸⁰ The documents are also evaluated using a predefined scheme. Finally, the results are considered and interpreted.

⁷⁸ Mayring (2023), p. 43 – 46; Schmidt (2016), p.9

⁷⁹ Mayring (2023), p.43; Schmidt (2016), p.2-3

⁸⁰ Mayring (2023), p. 44

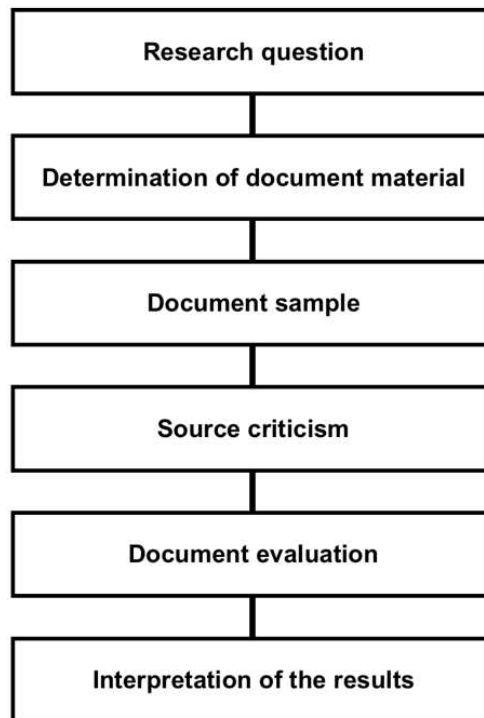


Figure 7: Document analysis process model⁸¹

3.1.1 Research Question

The objective of the bachelor's thesis is to compare and analyze the presented frameworks of transformational competencies in a systematic manner. This will investigate whether one or more frameworks represent an overview of the transformational competencies required to achieve the SDGs. Additionally, the research aims to identify potential gaps within the frameworks. To investigate this further, the following research question will be addressed: "To what extent do the existing frameworks provide a comprehensive representation of all the necessary transformational competencies that contribute to achieving the SDGs?"

3.1.2 Definition of Document Material

In addition to various books, journal articles, reports, and websites are also defined as documents in this thesis.

⁸¹ Own illustration based on Mayring (2023), p. 45

3.1.3 Document Sample

Based on the topic of the thesis and the research question, search terms were defined that can mainly be assigned to the terms and phrases 'education for sustainable development', 'sustainability', 'competency', and 'transformation'. Synonyms, related terms, and foreign-language terms were also researched for the respective terms, as the research was carried out in both English and German. The literature research was carried out using the databases *Google Scholar*, *SpringerLink*, *JSTOR*, and *ResearchGate*. Access to the literature of the frameworks was provided directly via the website of the respective organization or publication of the authors.

To ensure that the literature used corresponds to a high scientific quality, the selection criteria were citation frequency, relevance to the research, and the topicality of the documents. Accordingly, the selected documents were checked with regard to citation frequency, and the profiles of the authors were also checked for those selected via *ResearchGate*. In terms of relevance, it was necessary for the literature to be directly related to education for sustainable development, transformational competencies, or basic knowledge. For the definitions of individual terms, sources older than 10 years were used to clarify the importance of the content and to point out that the problem described has existed for several decades.

3.1.4 Source Criticism

The knowledge value of documents can be determined based on six criteria:

- 1) Type of document: The document type can be derived from the definition in section 3.1.2.
- 2) External characteristics: The external characteristics are positive, as all available documents are relevant to the research.
- 3) Internal characteristics: The content of the available documents was selected according to subjective meaningfulness for answering the research question, as these are the explanations of the frameworks.

- 4) Intentionality: The intentions of the authors in creating the documents are to support education systems in the integration and implementation of Education for Sustainable Development. Both learners and teachers should be provided with tools to promote and strengthen interdisciplinary approaches and problem-solving skills.
- 5) Proximity of the document to the object: The proximity of the documents to the object of research exists because they are directly relevant to answering the research question.
- 6) Origin of the document: Based on the definition of the document in the context of the work, the origin of the document can be viewed.⁸²

3.1.5 Document Evaluation

To ensure that the evaluation of the documents has a high degree of structure, this chapter explains the data evaluation procedure and the rules to be observed. The procedure is then described and reasons given, as to why this method was chosen.

A structured qualitative content analysis was chosen as the data evaluation method, which offers the advantage of systematically analyzing the documents and processing them step by step using a category system. Mayring distinguishes between a structured, a summarizing, and an explicative content analysis. Due to the research question and the defined objective, a structured form is the most suitable.⁸³ The process of structured qualitative content analysis was used in the bachelor thesis to critically analyze the documents of the presented frameworks. The aim is to filter out a system of categories based on formal or content-related aspects and to be able to assign textual material to these categories.⁸⁴ The analysis is carried out in three steps. First, the categories are defined and

⁸² Mayring (2023), p. 44

⁸³ Mayring (2023), p. 98-100

⁸⁴ Mayring (2023), p. 101

explained, and the text passages to which they are attached are also determined. Anchor examples are then listed, which function as prototypes of the respective category. Finally, coding rules are drawn up that apply if text passages cannot be clearly assigned. The result of the steps carried out is recorded in a coding guide that can be edited or extended as the analysis progresses. Despite the listed rules, the researcher still has room for interpretation, which is why Mayring's process model has been applied in an adaptive form, as can be seen in Figure 8.⁸⁵

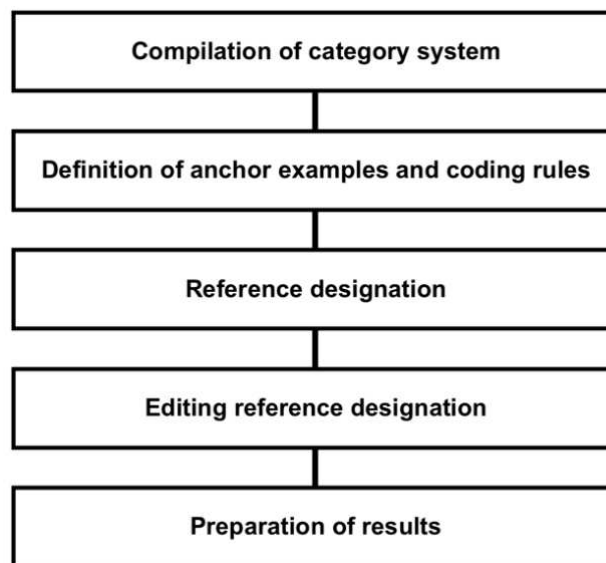


Figure 8: Structured qualitative content analysis process model⁸⁶

To ensure a uniform understanding of the categories, the documents were analyzed intensively and the competencies listed there were defined. This was followed by the creation of the category system by working through the documents according to suitable categories. Since the analysis of the frameworks revealed many similarities and the framework by Wiek et al. was occasionally used as a basis, the key competencies mentioned there were used as categories. As these are the previously defined competencies, they also serve as an anchor example. With regard to the coding guide, it was determined that if a category

⁸⁵ Mayring (2023), p. 102 - 103

⁸⁶ Mayring (2023), p. 103

could not be clearly assigned, it would remain as is, as the objective was also to ascertain whether there were gaps in the frameworks.

The reference where the categories are mentioned can be found in the document of the framework by Wiek et al. As explained in Chapter 2.3.3, the framework was revised so that a sixth competence was added as a category. As a result, there were six categories from this point onwards: System Thinking Competence, Strategic Competence, Normative Competence, Anticipatory Competence, Interpersonal Competence, and Integrated Problem Solving Competence. The coding guide can be found in Appendix B.

3.1.6 Interpretation of the Results

The selected frameworks are coded, which provides insight into how frequently the categories are found. To simplify the categorization, the categories were marked with colors, which are shown in Figure 9. Figure 10 provides an overview of the assigned categories to the frameworks.






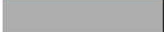
Codes	
	System-Thinking Competence
	Anticipatory Competence
	Normative Competence
	Strategic Competence
	Interpersonal Competence
	Integrated Problem Solving Competence

Figure 9: Codes⁸⁷

⁸⁷ Own illustration

Codes	Frameworks	No Match
	ESDG	
	System Thinking Competency	Critical Thinking Competency
	Anticipatory Competency	Self Awareness Competency
	Normative Competency	
	Strategic Competency	
	Collaboration Competency	
	Integrated problem solving Competency	
	IDG	
	Complexity Awareness	Openness
	Perspective Skill	Appreciation
	Long term orientation and visioning	Connectedness
	Perseverance	Humility
	Inner Compass	Trust
	Integrity and Authenticity	Courage
	Co-Creation Skills	Creativity
	Mobilization skills	Optimism
	Empathy and Compassion	Presence
	Communication Skills	Critical Thinking
	Inclusive Mindset and Intercultural Competence	
	Sense-making	
	OECD Learning Compass 2030	
	Creating new values	
		
		
	Balancing tension and dilemmas	
	Taking responsibility	
		
	Future Skills	
	Mission orientation	Judgment
	Change competence	
	Innovation competence	
	Ability to engage in dialog and conflict	

Figure 10: Assignment of codes to frameworks⁸⁸

The assignment shows that the categories System Thinking Competence, Anticipatory Competence, and Normative Competence could be assigned a total of four times. This is followed by Interpersonal Competence with six assignments and Strategic Competence with seven assignments. The last assignment can be attributed to Integrated Competence with three assignments. A successful assignment of all categories was possible for the ESDG, IDG, and OECD

⁸⁸ Own illustration

frameworks, although the ESDG framework has two competencies to which no category could be assigned and the IDG framework has ten to which no category could be assigned.

3.2 Quality Criteria and Alternative Method

Due to the selected research method, the thesis presented fulfills the five quality criteria defined by Stenfors et al.⁸⁹ The theoretical foundation, the research question, the data collection, and the results are consistent and underline the credibility of the research. In addition, sufficient information is available so that other researchers can retrace the steps, which ensures the dependability of the study. Confirmability is also given, as a detailed description shows how the results were achieved. The comprehensive description of the research ensures the transferability of the results to other contexts. In addition, reflexivity is guaranteed by the transparent and systematic documentation of the entire research process.

An alternative approach to document analysis would have been to conduct expert interviews with the authors of the respective frameworks. This would have made it possible to analyze the frameworks thematically and explain the respective competencies to then assign them to the corresponding categories together with the interview partners. However, this option was ruled out as the necessary information can already be found in the literature. In addition, the accessibility of the experts played a decisive role in the decision not to pursue this option, as the availability of the authors or researchers of the frameworks could not be guaranteed. Overall, a systematic document analysis offers a methodological approach to deepen the understanding of the frameworks for transformational competencies. At the same time, it offers a broader perspective that complements and extends the existing research.

⁸⁹ Stenfors et al. (2020), p. 598

4 Result

The following chapter presents the results of the comparison of the various transformational competence frameworks presented. As mentioned in Chapter 3.1.5, the Key Competency framework by Wiek et al. served as the basis. The framework was selected due to its relevance for education for sustainable development and its clear structure, as well as being a scientifically recognized framework that also serves as the basis for other frameworks (see Chapter 2.3.1).

4.1 Comparison of Frameworks

As part of the analysis, the competency frameworks ESDG, Inner Development Goals, OECD Learning Compass, and Future Skills were compared with the Key Competency framework by Wiek et al. The comparison aimed to ascertain which of the frameworks offers a comprehensive overview of all the transformational competencies required to facilitate the achievement of the 17 SDGs. It should also be examined whether there are gaps within these frameworks. A coding guide was created for the comparison (see Appendix B), which provides an overview of the categories used to compare the frameworks with each other. The competencies listed in the framework, which are referred to as categories in this case and in the following, are as follows: System Thinking, Anticipatory, Normative, Strategic, Interpersonal, and Integrated Problem Solving Competence. In addition to listing the categories, the coding guide contains a definition of these, an example, and associated rules that can be used for orientation during coding.

The initial comparison was conducted with the framework ESDG, which is designed for all levels of educational institutions and emphasizes the significance of integrating ESD into early childhood education as well as technical and vocational training.⁹⁰ The framework consists of eight key competencies and is based on the framework developed by Wiek et al. (see Chapter 2.3.1). Six of the eight competencies have the same names as in Wiek et al., as follows: Systems

⁹⁰ UNESCO (2017)

Thinking, Anticipatory, Normative, Strategic, Collaboration, Integrated Problem Solving Competency. These competencies could be transferred without modification. Furthermore, two additional competencies could not be assigned: The remaining competencies are Critical Thinking and Self-Awareness Competence.

The second comparison was with the framework IDG, which was designed through a co-creation process involving over 1,000 scientists and experts in 2021. Consequently, it represents the most recent framework presented in the bachelor's thesis and is not aimed at a selected group, but rather at individuals. (see Chapter 2.3.2) In comparison, it exhibits a significant divergence in terms of development. Although numerous scientists and experts were involved in the framework's design, the knowledge of society is also represented, thus creating an open learning ecosystem.⁹¹ Based on the defined categories, a total of 12 of the IDG competencies could be directly assigned, which are as follows in Figure 11:

Category	Transformational Competence
System-thinking Competence	Complexity Awareness Perspective Skill
Anticipatory Competence	Long term orientation and visioning Perseverance
Normative Competence	Inner Compass Integrity and Authenticity
Strategic Competence	Co-Creation Skills Mobilization skills
Interpersonal Competence	Empathy and Compassion Communication Skills Inclusive Mindset
Integrated Problem Solving Competence	Sense-making

Figure 11: Assignment of categories to IDG-Framework⁹²

⁹¹ Inner Development Goals (n.d.-b)

⁹² Own illustration

A comparison with the framework OECD Learning Compass is presented in Figure 12. It serves as a guide for students and also focuses on the students' environment, which is considered to play an important role in their well-being.

Category	Transformational Competence
System-thinking Competence	Creating new values
Anticipatory Competence	Creating new values
Normative Competence	Balancing tension and dilemma
Strategic Competence	Balancing tension and dilemma
Interpersonal Competence	Taking responsibility
Integrated Problem Solving Competence	Creating new values

Figure 12: Assignment of categories to OECD-Framework⁹³

The last comparison was made with the framework Future Skills. This is directed at universities with the objective of identifying the skills required by the economy and society and subsequently incorporating them into study programs. As only a fraction of the framework deals with transformational competencies, only these are used for the comparison. These are the following: Mission orientation, Change competence, Innovation competence, Ability to engage in dialog and conflict, and Judgment (see Chapter 2.3.4). When assigning the categories, it became apparent that only the categories Strategic and Interpersonal Competence could be assigned.

4.2 Findings from the Comparison

When comparing the frameworks, it became apparent that the Key Competency Framework by Wiek et al. is fully reflected in the ESDG framework, which is even extended by two further competencies. As ESDG is also a scientifically based framework and was designed by various experts from the fields of education for sustainable development and SDGs, the remaining competencies were

⁹³ Own illustration

subsequently included in the comparison to identify similarities between the IDG and Future Skills frameworks to the ESDG. The following Figure provides an overview of which framework is assigned to the selected categories and additional competencies. The added categories of the ESDG framework are marked separately:

	ESDG	Future Skills	IDG	OECD
Focus	School University	University	Society	School
System Thinking Competence	X		X	X
Anticipatory Competence	X		X	X
Normative Competence	X		X	X
Strategic Competence	X	X	X	X
Interpersonal Competence	X	X	X	X
Integrated Problem Solving Competence	X		X	X
Critical Thinking Competency	X	X	X	X
Self-Awareness Competency	X		X	X

Figure 13: Overview of assignable categories⁹⁴

When looking at Future Skills, it becomes evident that only two of the original categories could be assigned to the framework. If the two additional categories are now included, it is possible to assign the competence ‘Judgement’, but this results in five unassigned categories.

With regard to the IDG framework, it is possible to assign at least one competence to each of the categories. However, not all 23 competencies can be

⁹⁴ Own illustration

assigned to the categories. Therefore, it was deemed appropriate to add the additional categories as well which led to three further assignments. The ESDG competence Self Awareness Competency was assigned to the IDG competencies Self Awareness and Presence, and the ESD competence Critical Thinking Competency was assigned to the IDG competence Critical Thinking of the same name. After assigning the categories, there are still eight further competencies that cannot be assigned to either the six categories of the key competency framework by Wiek et al. or the two further competencies of the ESD for 2030 framework. The eight unassigned competencies are as follows:

- Openness and learning mindset
- Presence
- Critical Thinking
- Self-Awareness
- Appreciation
- Connectedness
- Humility
- Trust
- Courage
- Creativity
- Optimism

5 Discussion

The comparison was based on the Key Competency Framework by Wiek et al. due to its relevance and widespread use in academic and professional contexts. The objective of the comparison was to identify which of the frameworks provides a comprehensive overview of all the transformational competencies required to contribute to the achievement of the 17 SDGs, given that there is no standardized transformational competency framework that students or teachers can use as a guide. In addition, it should be investigated whether there are gaps within the frameworks. The comparison with the ESDG framework demonstrates complete alignment with the framework by Wiek et al. and extends it by two additional competencies. The IDG framework shows a degree of alignment with the categories, although 10 competencies could not be assigned. The OECD Learning Compass 2030 could be fully assigned to the categories, with the categories being assigned several times to competencies, as only three transformational competencies are listed in the framework. The comparison with the Future Skill Framework proved to be the most complex, as only three of the categories could be assigned.

A comparison of the frameworks reveals that those from Wiek et al., ESDG, IDG, and OECD offer a comprehensive and differentiated presentation of the necessary transformational competencies. In contrast, Future Skills has considerable gaps, rendering it less suitable for effectively supporting the promotion of education for sustainable development. This hypothesis will be examined in more detail in the following chapter to be confirmed or, if necessary, refuted.

5.1 Interpretation of the Frameworks

To discuss and interpret the results, the transformational competence framework, which allows for the lowest number of categories to be assigned, is considered first. This is the Future Skills Framework, which comprises five transformational competencies and can only be assigned to three out of the eight categories. The framework consists of four components and, in addition to transformational

competencies, mainly deals with cross-industry skills that play an important role in professional life. The initiators of the framework are therefore targeting universities in particular to prepare students for the demands and challenges of the job market. However, a major weakness of the framework is its lack of specific focus on sustainability and the inadequate consideration of ethical and normative aspects. Furthermore, there is a lack of reference to holistic and forward-thinking approaches, as well as a lack of emphasis on integrating diverse perspectives to address complex problems. The previously defined categories serve as a benchmark for which skills should be integrated within a transformational skills framework. However, the analysis of the Future Skill Framework revealed that the benchmark could not be met, which is why the framework will no longer be considered in the further course of the bachelor thesis. Nevertheless, the framework's focus remains pertinent, as it facilitated the development of cross-industry skills and the promotion of effective teamwork and adaptability.

This is followed by an examination of the results of the OECD framework, which deals with three transformational competencies. Given the limited number, but the broad definition of the competencies, it was possible to assign all of them. The framework differs considerably from others due to its focus on student-agency and co-agency. It therefore addresses not only transformational competencies that prepare students for future challenges but also aims to further develop the entire education system, with teachers included as essential components. Although the framework permits the assignment of each category, the broad definition of transformational competencies is a major disadvantage, as this makes it challenging to implement and measure. Another shortcoming of the framework is its lack of specification regarding sustainable development. While ethical and social aspects are acknowledged, there is no specific focus on sustainability, which represents a significant obstacle to achieving a sustainable transformation. It is important to note that the content of the broadly defined transformational competencies of the OECD Learning Compass can also be found in the other frameworks due to the successful assignment of the categories. Consequently, the decision was made not to continue to consider this framework in the further course as well. It should still be emphasized that the OECD framework makes a significant contribution to the improvement of global

education systems due to its comprehensive approach to individual capacity to act and collective cooperation. These are essential prerequisites for teaching the contents of the transformational competence frameworks in an interdisciplinary manner.

The UNESCO framework Education for Sustainable Development Goals: Learning Objectives defines specific learning objectives aligned with the SDGs and links them to eight transformational competencies. As the framework can be integrated into existing curricula from primary school to higher education, it offers students and teachers a comprehensive understanding of how to apply and teach the knowledge and thus offers a wide range of applications. By listing several learning objectives for each SDG, a holistic interdisciplinary understanding of these is promoted and thus makes a significant contribution to achieving a sustainable transformation. Six of the eight transformational competencies have the same name as those of Wiek et al., which makes a direct assignment possible. Upon re-examination of the definitions of the two additional transformational competencies 'Critical Thinking' and 'Self Awareness Competence', it becomes evident that these can be assigned based on individual points, but yet no clear assignment can be made.

'Self-Awareness' and 'Critical Thinking' are more personal and reflective and focus on individual actions and thought processes rather than systemic analysis. Anticipatory Competence hinges on the future, while Self-Awareness and Critical Thinking focus more on understanding and reflecting on the present. There is an alignment between Critical Thinking and Normative Competence as both involve reflection on values and principles. However, Critical Thinking is about evaluating all norms and practices, not just those related to sustainability. Although self-awareness and critical thinking can be seen as prerequisites for the development of strategic competencies, these two categories cannot be directly assigned to specific sustainability competencies. There is a clear link between self-awareness, critical thinking, and interpersonal competence. Personal understanding is crucial for effective communication, and critical thinking can help to promote a better understanding of group dynamics. Self-Awareness and Critical Thinking also have a fundamental and supportive function in Integrated

Problem Solving Competence. They form the basis on which the other competencies can build and develop further. To summarize the ESDG framework, it can be said that Critical Thinking Competence and Self Awareness Competence are transformational competencies that can support the framework of Wiek et al. They provide a solid basis and thus create a holistic approach to education for sustainable development.

Finally, the results of the comparison with the Inner Development Goals framework are scrutinized. The framework comprises 23 competencies, with the primary focus being on the development of individuals. One of the most significant distinctions between IDG and the other frameworks is that it places a greater emphasis on the development of inner competencies, which in turn serves to reinforce the SDGs. A comparison with the work of Wiek et al. reveals that twelve transformational competencies could be readily assigned. A further comparison with the additional transformational competencies of the ESDG framework reveals that three more can be assigned, which ultimately leads to eight transformational competencies that cannot be assigned.

The findings so far indicate that the IDG framework in combination with the ESDG framework could enhance the efficacy of the Wiek et al. framework by emphasizing the importance of inner human development. This can be illustrated in a modified framework (see Figure 14) based on Wiek et al. The two additional transformational competencies of the ESDG framework are added as an extension and illustrated using a second surrounding framework. The IDG framework is organized around transformational competencies. This illustration demonstrates how the different frameworks interlock and complement each other, thereby enabling a more comprehensive and effective promotion of education for sustainable development.

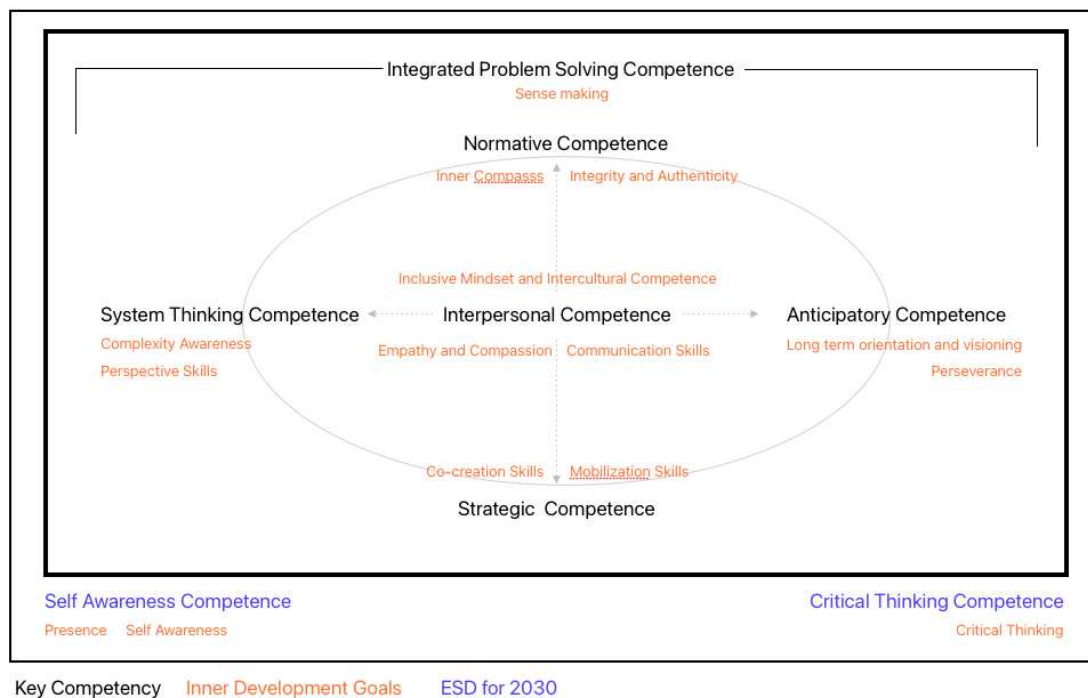


Figure 14: Synthesis of frameworks⁹⁵

The inclusion of the research question "To what extent do the existing frameworks provide a comprehensive representation of all necessary transformational competencies that contribute to achieving the SDGs" in the results does not fully confirm the previously formulated hypothesis. The frameworks of Wiek et al, ESDG, and IDG provide a comprehensive representation of all necessary transformational competencies when combined. The hypothesis that the OECD framework would also provide a comprehensive representation could be refuted, as this, as well as the Future Skills Framework, has significant gaps. Although the content of the OECD's transformation skills can be found in the other frameworks, neither of the latter two frameworks contributes to the promotion of Education for Sustainable Development.

5.2 New Findings

The analysis so far and the resulting findings have generated sufficient information to answer the research question. However, there is still a gap in the

⁹⁵ Own illustration based on Wiek (2011), Wiek (2015), UNESCO (2017), Jordan et al. (2021)

research, as there are still eight transformational competencies of the IDG framework that could not be categorized.

The book *Psychology of Sustainability* by Michael Hunecke, which sees an overlap between psychology and education for sustainable development, can be used as a reference point for where these could be assigned. Hunecke speaks of psychological resources, which are mental and emotional abilities that help an individual deal with stress, challenges, or everyday demands.⁹⁶ The concept of psychological resources has so far hardly been addressed in the field of education for sustainable development, yet both the competence concept and the resource concept aim to promote an individual's skills and attitudes.⁹⁷

Hunecke, therefore, researched psychological resources that promote both subjective well-being and a sustainable lifestyle and settled on the following: 'Ability to enjoy', 'Self-Acceptance', 'Self-Efficacy', 'Mindfulness', 'Construction of meaning', and 'Solidarity'. As could already be seen in the two additional transformational competencies of the ESDG framework, psychological resources have an indirect influence on environmental behavior. Due to a supportive function, values and goal setting are activated in the longer term and thus lead to sustainable behavior.⁹⁸ Hunecke examines the six resources and the ESDG framework for overlaps and emphasizes the conceptual differences between them, as the framework focuses on teaching skills that serve to apply knowledge. As illustrated in Figure 15, four of the eight transformational competencies could be assigned to seven of the eight psychological resources. However, there is minimal overlap in content as the resources are designed to facilitate emotion regulation in sustained behavior. Hunecke suggests that one aspect of emotion regulation could be identified in 'self-awareness skills', yet he concludes that there are no other similarities to the ESDG framework.⁹⁹

⁹⁶ Hunecke (2022), p. 81 - 82

⁹⁷ Hunecke (2022), p. 173

⁹⁸ Hunecke (2022), p. 86

⁹⁹ Hunecke (2022), p. 176

ESDG-Framework	Psychological resources
Collaborative competency	Solidarity
Strategic competency	
Normative competency	Construction of meaning
	Mindfulness
	Self-acceptance
	Self-efficacy
Self-awareness competency	Mindfulness
	Ability to enjoy
	Construction of meaning
System thinking competency	
Anticipatory thinking competency	
Critical thinking competency	
Integrated problem solving competency	

Figure 15: Consistency of ESGD framework and psychological resources¹⁰⁰

Upon further examination of the non-categorized transformational competencies of the IDG framework, it becomes evident that there are certain similarities in terms of content. Hunecke defines the resources as follows:

‘Ability to enjoy’ is defined as the conscious perception of positive experiences, including physical and sensual as well as aesthetic and cultural stimuli. In terms of sustainability, a high capacity for enjoyment is characterized by the realization of the principle of ‘less is more’ and without seeing ‘less’ as a loss.¹⁰¹ ‘Self-acceptance’ means accepting one’s strengths and weaknesses, which leads to more emotional stability and fewer comparisons with others. People with high self-acceptance have less need to increase their self-worth through materialistic consumption.¹⁰² ‘Self-efficacy’ consists of the components of belief in competence and expectation of results and states that self-imposed goals can be achieved with one’s abilities and behavior. This promotes positive emotions and

¹⁰⁰ Own illustration based on Hunecke (2022), p. 175

¹⁰¹ Hunecke (2022), p. 88 - 91

¹⁰² Hunecke (2022), p. 93 - 95

overcomes the feeling of helplessness.¹⁰³ 'Mindfulness' describes the conscious perception of the present moment and thus promotes the acceptance of inner states. A pronounced mindfulness is recognizable by a reduced materialistic striving and a pronounced connection to nature.¹⁰⁴ 'Constructing meaning' helps to perceive life as coherent and valuable by giving meaning to activities, events, and relationships.¹⁰⁵ 'Solidarity' describes the cohesion and mutual support of people.¹⁰⁶

Comparing the definitions of the eight uncategorized transformational skills with Hunecke's psychological resources, there is a clear correspondence in content. This suggests that the IDG framework not only teaches knowledge-centred transformational skills but also focuses on promoting emotion regulation. The framework presented in Chapter 5.1 can therefore be extended to include the missing IDG transformation skills and psychological resources (see Figure 16). These are presented in a third frame and form the lowest level of the framework together with the IDG transformational competencies, which are grouped with psychological resources. To develop the transformational competencies of the first and second levels of the framework, it is necessary to acquire the psychological resources and the corresponding IDGs. Therefore, the curriculum should be designed step by step from the outside in. This ensures that the basic resources and transformational skills are consolidated first before tackling the inner levels of the framework.

This methodical approach ensures that students build a solid foundation of necessary skills and resources that will enable them to successfully master the more challenging and deeper competencies of the inner levels.

¹⁰³ Hunecke (2022), p. 100 - 102

¹⁰⁴ Hunecke (2022), p. 102 - 105

¹⁰⁵ Hunecke (2022), p. 120 - 123

¹⁰⁶ Hunecke (2022), p. 129 - 132

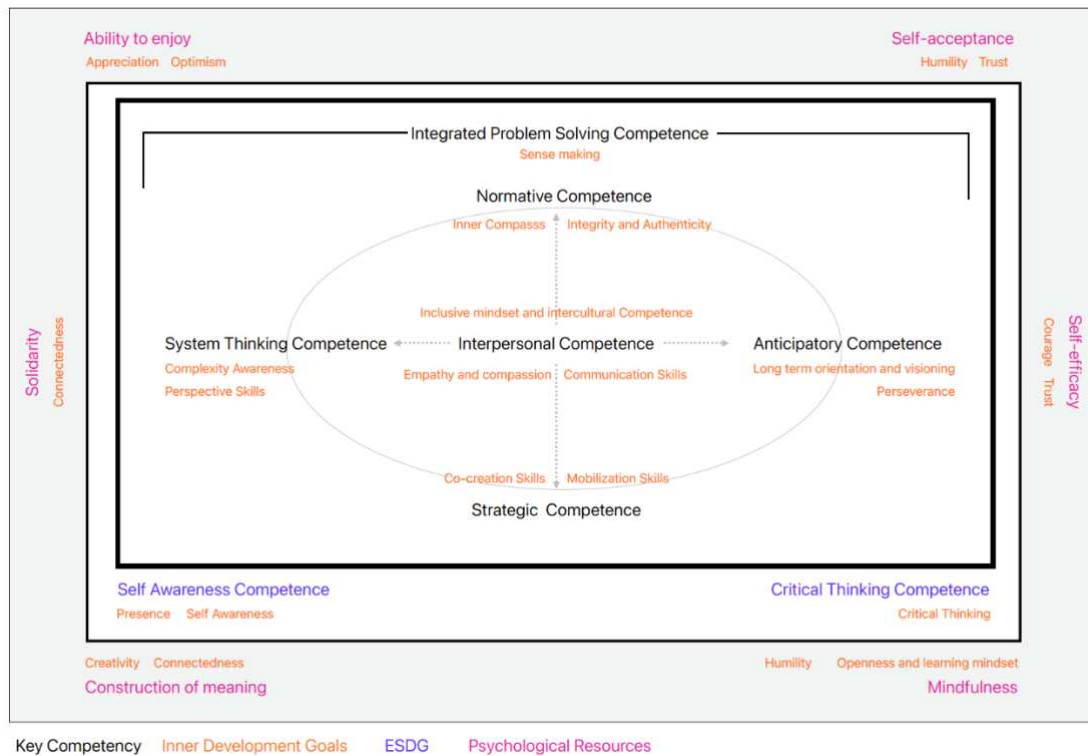


Figure 16: Synthesis of frameworks including psychological resources¹⁰⁷

Upon revisiting the research question with the newly acquired knowledge, a definitive answer can be provided. The comprehensive IDG framework enabled the assignment of at least one IDG transformational competency to each category of the Wiek et al. and ESDG framework and psychological resources. In this way, the IDG framework facilitates both knowledge-centred and emotion-regulating aspects, thereby providing a comprehensive representation of all transformational competencies required to contribute to the achievement of the SDGs. It should be noted, however, that the framework is not based on scientific principles. The integration of the three frameworks and resources is therefore considered beneficial. The awareness of the framework of Wiek et al. can help to promote the dissemination of the IDG framework. The IDG framework can therefore be regarded as an extension of Wiek's framework. This can be beneficial for both students and teachers, as the IDG framework can provide a more comprehensive understanding of the framework at first glance, thus promoting practicality in the classroom.

¹⁰⁷ Own illustration based on Wiek (2011), Wiek (2015), UNESCO (2017), Jordan et al. (2021), Hunecke (2022), p. 86

6 Conclusion and Outlook

This bachelor's thesis is dedicated to the comparison and synthesis of different frameworks that deal with transformational competencies in order to contribute to the achievement of the SDGs. The objective of the comparison was to ascertain which framework is most suitable and provide a comprehensive representation of all required transformational competencies. In addition, the analysis sought to identify any gaps within the frameworks. As part of this, it was determined that the framework by Wiek et al. serves as the foundation for other frameworks and is therefore suitable as a benchmark. The categories for comparison were therefore designated according to the competencies listed in the framework. For purposes of comparison, the frameworks *Inner Development Goals*, *Education for Sustainable Development Goals: Learning Objectives*, *OECD Learning Compass 2030*, and *Future Skills* were considered for comparison. Various shortcomings were identified about the latter two, which resulted in their exclusion from further consideration.

In contrast, the ESDG and IDG frameworks could not only be assigned to the selected categories but also exhibited an extension of these categories. ESDG is based on the framework developed by Wiek et al., has adopted six key competencies, and can also demonstrate two further competencies, which were also used to compare the frameworks. The IDG framework could be readily assigned to the categories, and there were also correspondences with the supplementary competencies of the ESDG framework. One peculiarity was observed, namely that although at least one transformational competence could be assigned to each category, no match could be found for eight competencies. Nevertheless, in order to gain an understanding of their inclusion in the framework, the link between psychology and education for sustainable development was employed. In his book *Psychology of Sustainability*, Michael Hunecke defines six psychological resources that facilitate the management of challenges and stress. The application of these resources enabled the complete assignment of the transformational competencies of the IDG framework, thus providing a comprehensive overview of necessary transformational competencies. The final synthesis of the frameworks identified as suitable

resulted in a representation of the Wiek et al. framework, extended by the two additional transformational competencies of the ESDG framework, the six psychological resources and the IDG transformational competencies.

The importance of a multi-layered approach to developing transformational competencies is emphasized by integrating the strengths of different frameworks and approaches. These insights are particularly useful for educators as they provide a valuable resource for teaching students the skills needed to cope with diverse challenges and global crises.

6.1 Critical Review

The objective of this reflection is to undertake a critical examination of both the procedure and the result of the Bachelor's thesis. Concerning the procedure and performance, it can be stated that the theoretical foundations were solidly developed in the initial phase. However, it would have been more logical to first analyze and critically examine the framework conditions in order to develop the theoretical foundation on this basis. The frameworks provide comprehensive background information on their design and research, which could only be addressed in a cursory manner. A further aspect is the country-specific focus of the elaboration. When examining the education system and the current state of ESD teaching, only Germany was considered, despite the frameworks presented being applicable internationally. Although 80% of the IDG framework was developed with participants from Europe, which would have made global inclusion of the framework more difficult, it would have been possible to extend it to Europe. The research findings were largely consistent with the hypothesis that had been put forward. However, the number of IDGs that could not be assigned was unexpected. The realization that these are psychological resources has significantly enhanced the understanding of the topic. Nevertheless, it is important to note that the assignment of the categories remains subjective and that a different outcome may be obtained if the process were to be repeated.

6.2 Limitations and Further Research

A major limitation of this thesis is illustrated by the attribution of some transformational competencies to psychological resources, as only a small part of the discussion chapter could be used to illustrate the connection between psychology and education for sustainable development. With a deeper understanding of the topic, the bachelor thesis could have provided a more comprehensive analysis of the importance of this topic. However, the theoretical foundation should also have been adapted accordingly and already covered the basics of the topic. Another limitation concerns the consideration of teachers in the comparison and the design of the frameworks. Although teachers are considered in the OECD Learning Compass and the ESDG as well as in the frameworks by Wiek et al., the selected materials did not provide enough information to examine this topic in detail.

Although there are a variety of frameworks that address transformational competencies for students, it is important to understand how these can be taught effectively. The current approach to ESD teaching in Germany is inadequate, which raises the question of what concrete measures are needed to ensure that teachers also acquire these transformational competencies. Further research is therefore needed to determine the extent to which teacher training needs to be modified. In addition, research is needed on how the current education system and the curricula need to be adapted to facilitate the teaching of transformational competencies in line with the 'Whole Institutional Approach'. These issues are of paramount importance to improve the effectiveness of Education for Sustainable Development and to ensure sustainable change in education.

Furthermore, an investigation into the efficacy of the frameworks and the selection of pertinent key performance indicators is essential as well. The development of suitable measurement tools or a Sustainability Education Score is necessary to monitor and enhance the progress and efficacy of transformational competencies being taught, ensuring their long-term integration.

7 References

- Barth, M. (2021). Bildung für nachhaltige Entwicklung. In T. Schmohl & T. Philipp (Eds.), *Handbuch Transdisziplinäre Didaktik* (p. 472). transcript. Retrieved from https://www.pedocs.de/volltexte/2021/23619/pdf/Handbuch_Transdisziplinäre_Didaktik_2021.pdf
- Brock, A., & Holst, J. (2022). *Schlüssel zu Nachhaltigkeit und BNE in der Schule: Ausbildung von Lehrenden, Verankerung in der Breite des Fächerkanons und jenseits der Vorworte. Kurzbericht Des Nationalen Monitorings Zu Bildung Für Nachhaltige Entwicklung (BNE)*. Retrieved from https://refubium.fu-berlin.de/bitstream/fub188/36378/1/Brock_Holst_2022_Schule_Dokumentenanalyse_BNE_Monitoring.pdf
- Brundiars, K., Barth, M., Cebrián, G., Cohen, M., Díaz, L., Doucette-Remington, S., Dripps, W., et al. (2020). Key competencies in sustainability in higher education—toward an agreed-upon reference framework. *Sustainability Science*, 16(1), 13–29. Retrieved from <https://doi.org/10.1007/s11625-020-00838-2>
- Bundesministerium für Bildung und Forschung. (n.d.-a). Schule. *BNE-Portal*. Retrieved April 10, 2024, from <https://www.bne-portal.de/bne/de/einstieg/bildungsbereiche/schule/schule.html>
- Bundesministerium für Bildung und Forschung. (n.d.-b). UNESCO-Weltaktionsprogramm BNE (WAP BNE 2015–2019). *BNE-Portal*. Retrieved May 2, 2024, from https://www.bne-portal.de/bne/de/bundesweit/das-unesco-weltaktionsprogramm-bne/das-unesco-weltaktionsprogramm_node.html
- Bundesumweltministerium. (2024). Planetare Belastbarkeitsgrenzen. *Bundesministerium Für Umwelt, Naturschutz, Nukleare Sicherheit Und Verbraucherschutz*. Retrieved April 7, 2024, from <https://www.bmuv.de/themen/nachhaltigkeit/integriertes-umweltprogramm-2030/planetare-belastbarkeitsgrenzen>
- De Haan, G., Harenberg, D., & Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung (BLK). (1999). *Bildung für eine nachhaltige*

- Entwicklung. Gutachten zum Programm. Materialien zur Bildungsplanung und zur Forschungsförderung.* BLK. Retrieved from <https://www.pedocs.de/volltexte/2008/218/pdf/heft72.pdf>
- De Haan, G. (2007). *Kompetenzen der Bildung für nachhaltige Entwicklung: Operationalisierung, Messung, Rahmenbedingungen, Befunde.* Springer-Verlag.
- Destatis. (n.d.). SDG 4 - Quality education. *Destatis.* Retrieved June 12, 2024, from <https://sdg-indikatoren.de/en/4/>
- Duden. (2024). Synonyme zu Fähigkeit. *Duden.* Retrieved June 12, 2024, from <https://www.duden.de/node/246818/revision/1476184>
- Erpenbeck, J., Rosenstiel, L., Grote, S., & Sauter, W. (2017). *Handbuch Kompetenzmessung: Erkennen, verstehen und bewerten von Kompetenzen in der betrieblichen, pädagogischen und psychologischen Praxis.* Schäffer-Poeschel.
- Grund, J., & Brock, A. (2020). Education for sustainable development in Germany: not just desired but also effective for transformative action. *Sustainability*, 12(7), 2838. Retrieved from <https://doi.org/10.3390/su12072838>
- Grund, J., Brock, A., & Nationales Monitoring Bildung für nachhaltige Entwicklung. (2021). *QUANTITATIVE STUDIE Formale Bildung in Zeiten von Krisen – die Rolle von Nachhaltigkeit in Schule, Ausbildung & Hochschule. Kurzbericht Des Nationalen Monitorings Zu Bildung Für Nachhaltige Entwicklung (BNE) Auf Basis Einer Befragung Von > 3.000 Jungen Menschen Und Lehrkräften.* Retrieved from https://www.ewipsy.fu-berlin.de/erziehungswissenschaft/arbeitsbereiche/institut-futur/Projekte/Dateien/Formale-Bildung-in-Zeiten-von-Krisen_Grund-_Brock_-2022.pdf
- Holst, J., Brock, A., Singer-Brodowski, M., & De Haan, G. (2020). Monitoring Progress of Change: Implementation of Education for Sustainable Development (ESD) within Documents of the German Education System. *Sustainability*, 12(10), 4306. Retrieved from <https://doi.org/10.3390/su12104306>
- Holst, J., Singer-Brodowski, M., Brock, A., & De Haan, G. (2024). Monitoring SDG 4.7: Assessing Education for Sustainable Development in policies,

- curricula, training of educators, and student assessment (input-indicator). *Sustainable Development*. Retrieved from <https://doi.org/10.1002/sd.2865>
- Hunecke, M. (2022). *Psychologie der Nachhaltigkeit, Vom Nachhaltigkeitsmarketing zur sozial-ökologischen Transformation*. oekom Verlag eBooks. Retrieved from <https://doi.org/10.14512/9783962389130>
- Independent Group of Scientists. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change: Science for accelerating transformations to sustainable development* (report). United Nations. Retrieved from https://sdgs.un.org/sites/default/files/2023-09/FINAL%20GSDR%202023-Digital%20-110923_1.pdf
- Inner Development Goals. (n.d.-a). IDG Summit. *Inner Development Goals*. Retrieved June 13, 2024b, from <https://innerdevelopmentgoals.org/events/summit2024/>
- Inner Development Goals. (n.d.-b). About. *Inner Development Goals*. Retrieved June 12, 2024a, from <https://innerdevelopmentgoals.org/about/>
- Jordan, T., Jonathan Reams, Kristian Stålne, Stefanie Greca, Jan Artem Henriksson, Tomas Björkman, & Theo Dawson. (2021). *Inner Development Goals: Background, method and the IDG framework*. Retrieved from https://static1.squarespace.com/static/600d80b3387b98582a60354a/t/61aa2f96dfd3fb39c4fc4283/1638543258249/211201_IDG_Report_Full.pdf
- Löpelt, S. (2023). *Ernüchternde Zwischenbilanz zur Agenda 2030. HLPF 2023*. Retrieved from <https://www.wpn2030.de/wp-content/uploads/2024/02/HLPF-2023-Reisebericht-final.pdf>
- Mayring, P. (2023). *Einführung in die qualitative Sozialforschung* (7th ed.). Beltz.
- Michelsen, G., & Adomßent, M. (2014). Nachhaltige Entwicklung: Hintergründe und Zusammenhänge. *Springer eBooks* (pp. 3–59). Retrieved from https://doi.org/10.1007/978-3-642-25112-2_1
- Müller-Christ, G., Giesenbauer, B., Tegeler, M. K., & Universität Bremen. (2017). *Studie zur Umsetzung der SDG im deutschen Bildungssystem*. Retrieved from https://www.nachhaltigkeitsrat.de/wp-content/uploads/2017/11/Mueller-Christ_Giesenbauer_Tegeler_2017-10_Studie_zur_Umsetzung_der_SDG_im_deutschen_Bildungssystem.pdf

- OECD. (2005). Definition and Selection of Competencies (DeSeCo). *OECD*. Retrieved April 25, 2024, from <https://www.oecd.org/education/skills-beyond-school/definitionandselectionofcompetenciesdeseco.htm>
- OECD. (2020). *OECD LERNKOMPASS 2030*. Retrieved from https://www.oecd.org/education/2030-project/contact/OECD_Lernkompass_2030.pdf
- Redman, A., & Wiek, A. (2021). Competencies for advancing transformations towards sustainability. *Frontiers in Education*, 6. Retrieved from <https://doi.org/10.3389/feduc.2021.785163>
- Rieckmann, M. (2021). Bildung für nachhaltige Entwicklung. Ziele, didaktische Prinzipien und Methoden. *Merz - Zeitschrift Für Medienpädagogik*, 10–17. Retrieved from https://www.researchgate.net/profile/Marco-Rieckmann/publication/355381694_Bildung_fur_nachhaltige_Entwicklung_Ziele_didaktische_Prinzipien_und_Methoden/links/616dd9b3b90c51266269dcfa/Bildung-fuer-nachhaltige-Entwicklung-Ziele-didaktische-Prinzipien-und-Methoden.pdf
- Rockström, J., Steffen, W., Noone, K. J., Persson, Å., Chapin, F. S., Lambin, É. F., Lenton, T. M., et al. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472–475. Retrieved from <https://doi.org/10.1038/461472a>
- Sächsische Carlowitz-Gesellschaft, & Grober, U. (2013). *Die Erfindung der Nachhaltigkeit: Leben, Werk und Wirkung des Hans Carl von Carlowitz. Von Freiberg Nach Rio – Carlowitz Und Die Bildung Des Begriffs ›Nachhaltigkeit‹* (p. 288). oekom Verlag. Retrieved from https://www.oekom.de/_files_media/titel/leseproben/9783865814159.pdf
- Schmidt, W. (2016). Dokumentenanalyse in der Organisationsforschung. *Springer eBooks* (pp. 1–24). Retrieved from https://doi.org/10.1007/978-3-658-08580-3_16-1
- Schneidewind, U. & Bergische Universität Wuppertal. (2013). *Transformative Literacy. Gesellschaftliche Veränderungsprozesse verstehen und gestalten* (journal-article). *GAIA - Ecological Perspectives for Science and Society*. Retrieved from <https://www.researchgate.net/publication/252930463>

- Stenfors, T., Kajamaa, A., & Bennett, D. (2020). How to ... assess the quality of qualitative research. *The Clinical Teacher*, 17(6), 596–599. Retrieved from <https://doi.org/10.1111/tct.13242>
- Stifterverband für die Deutsche Wissenschaft e.V. (2024). Future-Skills-Framework. *Future Skills*. Retrieved June 12, 2024, from <https://future-skills.net/framework>
- The Sustainable Development Goals Report 2023: Special Edition*. (2023). *The Sustainable development goals report*. Retrieved from <https://www.un-ilibrary.org/content/books/9789210024914/read>
- Umweltbundesamt. (2023). SDGs: Herausforderung für die Nachhaltigkeitspolitik. *Umweltbundesamt*. Retrieved March 27, 2024, from <https://www.umweltbundesamt.de/themen/nachhaltigkeit-strategien-internationales/sdgs-herausforderung-fuer-die-1>
- UN-Dekade*. (2011). *UNESCO*. Retrieved from https://www.unesco.de/sites/default/files/2018-05/UN_Bro_2011_NAP_110817_a_02.pdf
- UNESCO. (2017). *Education for Sustainable Development Goals: Learning Objectives*. *UNESCO*. Retrieved from <https://doi.org/10.54675/cgba9153>
- UNESCO. (2020). *Education for Sustainable Development: a roadmap*. *UNESCO*. Retrieved from <https://doi.org/10.54675/yfre1448>
- UNESCO. (2023). What you need to know about education for sustainable development. *UNESCO*. Retrieved June 12, 2024, from <https://www.unesco.org/en/sustainable-development/education/need-know>
- UNESCO. (n.d.). Whole Institution Approach – der ganzheitliche BNE-Ansatz. *Deutsche UNESCO-Kommission*. Retrieved June 12, 2024, from <https://www.unesco.de/node/6100>
- United Nations. (1987). *Our common future*. Retrieved from https://www.publicspaceinfo.nl/media/uploads/files/VN_1987_0001.pdf
- United Nations Development Programme. (2015). *Sustainable development goals*. Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/publications/SDGs_Booklet_Web_En.pdf

- Vare, P., & Scott, W. (2007). Learning for a change. *Journal of Education for Sustainable Development*, 1(2), 191–198. Retrieved from <https://doi.org/10.1177/097340820700100209>
- Weinert, F. (Ed.). (2001). *Leistungsmessungen in Schulen*. Retrieved from <https://homepage.univie.ac.at/henning.schluss/seminare/053-SE-Diplomandinnenseminar/Texte/weinert-2002-vergl-leistungsmessung.pdf>
- Wiek, A., Bernstein, M. J., Foley, R. W., Cohen, M., Forrest, N., Kuzdas, C., Kay, B., et al. (2015). Operationalising Competencies in Higher Education for Sustainable Development. In Mathias Barth, G. Michelsen, M. Rieckmann, & I. Thomas (Eds.), *Routledge Handbook of Higher Education for Sustainable Development* (pp. 265–284). Retrieved from <https://www.routledgehandbooks.com/doi/10.4324/9781315852249.ch16>
- Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science*, 6(2), 203–218. Retrieved from <https://doi.org/10.1007/s11625-011-0132-6>

Appendix A: Explanation of IDG Competencies

Being

The first category deals with oneself and explains the importance of a healthy relationship with one's feelings, thoughts, and body.

Inner Compass

It is not a skill, but rather a deep awareness and commitment. It influences how people prioritize and make decisions and consider the well-being of the bigger picture, such as the global ecosystem or humanity.¹⁰⁸

Integrity and Authenticity

Integrity and authenticity are based on values with which you identify and which you have committed yourself to put into practice. These qualities are strongly linked to personal maturity. A deep awareness of one's inner processes and a strong self-confidence are particularly important for developing and maintaining these values.¹⁰⁹

Openness and Learning Mindset

Openness and willingness to learn describe the ability to be open to new insights and to be curious about alternative perceptions and interpretations. A high degree of personal robustness is essential for this, as there is a close connection between this competence and the development processes in adulthood. These characteristics not only promote continuous growth but also the ability to successfully navigate a complex and ever-changing world.¹¹⁰

Self-awareness

Inner thoughts and emotions play an essential role in coping with complex situations, especially when confronted with differing views. Self-awareness refers to the awareness of our emotional and cognitive states during such interactions.

¹⁰⁸ Jordan et al. (2021), p. 13

¹⁰⁹ Jordan et al. (2021), p. 13

¹¹⁰ Jordan et al. (2021), p. 14

A deeper understanding of ourselves often promotes improved self-acceptance and leads to more appropriate responses in challenging contexts. ¹¹¹

Presence

Being mindful and empathetic towards others without adopting a judgmental attitude. At the same time, it requires the ability to worry less about how one's own views can be defended or how one presents oneself. ¹¹²

Thinking

Deals with cognitive skills, which are developed by adopting different perspectives. An important prerequisite for making smart decisions and developing these skills is to perceive the world as an interconnected system. ¹¹³

Critical Thinking

Describes the ability to question various statements, assertions, and not to believe everything directly, and to focus on evidence-based statements. ¹¹⁴

Complexity Awareness

Complexity awareness involves recognizing that issues can be multi-layered and arise in interwoven systems. It goes beyond simple cause-and-effect relationships and considers the interactions and patterns within complex systems. This awareness promotes holistic thinking and is crucial for critical thinking, strategy development, and the ability to tackle complex problems. ¹¹⁵

Perspective Skill

Perspective skills can be divided into gradations, ranging from basic skills that deal with the fact that our vision is limited to very pronounced perspective skills that enable us to recognize complex patterns as well as our own and others' perspectives. Openness to learning, critical thinking, and an awareness of

¹¹¹ Jordan et al. (2021), p. 14

¹¹² Jordan et al. (2021), p. 15

¹¹³ Jordan et al. (2021), p. 15

¹¹⁴ Jordan et al. (2021), p. 15 - 16

¹¹⁵ Jordan et al. (2021), p. 16

complexity are thus closely linked to perspective skills and also demonstrate a very pronounced perceptive ability.¹¹⁶

Sense-making

A higher form of sense-making is necessary in order to see it as a competence. Finding meaning is about recognizing patterns, gathering information, and linking one's own experiences in different ways. Through dialog with others, people arrive at a deeper understanding.¹¹⁷

Long-term orientation and visioning

Complex problems, such as those described in the 2030 Agenda, are the result of complex systems, such as economic systems, social structures, or political systems, and require sustained efforts and change over a long period of time. Accordingly, those who face these challenges must also have a long time horizon in order to recognize long-term processes and formulate visions.¹¹⁸

Relating

By cultivating appreciation, care, and a sense of connection with others, it contributes to the creation of a fairer and more sustainable system and society.

¹¹⁹

Appreciation

A relationship dynamic with people and the environment can be strengthened through conscious efforts. An appreciative attitude promotes trust and connection between people, which in turn fosters cooperative collaboration.¹²⁰

Connectedness

The awareness of connectedness describes being part of something bigger and taking care of and improving it. It is not a classical skill that can be learned but

¹¹⁶ Jordan et al. (2021), p. 16

¹¹⁷ Jordan et al. (2021), p. 17

¹¹⁸ Jordan et al. (2021), p. 17

¹¹⁹ Jordan et al. (2021), p. 18

¹²⁰ Jordan et al. (2021), p. 18

can be experienced by manifesting the connection between living beings and the environment.¹²¹

Humility

The focus of this competence lies solely on the situation and the resulting necessary measures, without considering one's own self-image or seeking the approval of others.¹²²

Empathy and Compassion

Empathy describes the ability to empathize with the feelings of others and to understand them better. Compassion, on the other hand, describes the ability to empathize with others by taking their needs into account and working for their well-being.¹²³

Collaborating

To achieve common goals, we must work together. Interest groups with different skills must be taken into account and included.¹²⁴

Communication Skills

There are various points of contact that speak to strong communication skills, such as listening attentively, asking questions, or conveying positive intentions. However, understanding personal values, empathy, and paying attention to context is also a crucial component, as it can be used to build trust.¹²⁵

Co-Creation Skills

Creating good conditions for productive collaboration describes the competence of co-creation skills. As this competence encompasses many sub-competences, a creative and generative aspect is also emphasized.¹²⁶

¹²¹ Jordan et al. (2021), p. 18 - 19

¹²² Jordan et al. (2021), p. 19

¹²³ Jordan et al. (2021), p. 19

¹²⁴ Jordan et al. (2021), p. 20

¹²⁵ Jordan et al. (2021), p. 21

¹²⁶ Jordan et al. (2021), p. 21

Inclusive Mindset and Intercultural Competence

Attitudes and skills are combined. Intercultural competence involves the active inclusion and understanding of people with different backgrounds and views. This requires an awareness of cultural differences and good communication skills. An inclusive mindset also includes a willingness to listen to local knowledge and share decision-making and influence.¹²⁷

Trust

Trust is often seen as an outcome rather than a skill, yet there are skills associated with the trust dimension, such as striving to build trust by being transparent and communicating goodwill. However, it should be noted that the ability to build trust can be used for both positive and negative purposes and should be linked to other traits such as empathy and compassion.¹²⁸

Mobilization Skills

The ability to mobilize includes addressing different groups, arousing their interest, and offering opportunities to actively participate in processes to achieve the SDGs.¹²⁹

Acting

An effective ability to act is strengthened by enabling courage and optimism to overcome obstacles and develop creative ideas.¹³⁰

Courage

Courage can be encouraged and developed through targeted strategies but must be guided by a deep awareness of complexity and goodwill. Courage means questioning entrenched patterns and views and acting decisively to achieve positive results.¹³¹

¹²⁷ Jordan et al. (2021), p. 21

¹²⁸ Jordan et al. (2021), p. 21 - 22

¹²⁹ Jordan et al. (2021), p. 22

¹³⁰ Jordan et al. (2021), p. 22

¹³¹ Jordan et al. (2021), p. 22

Creativity

Creativity is closely linked to developmental processes in adulthood. It encompasses the ability to be innovative and break through conventional patterns, without being considered a classic cognitive ability. Creativity encourages thinking outside established frameworks and opens up new paths and possibilities.¹³²

Optimism

Optimism focuses on the ability to inspire hope. This relates both to oneself and to others. It is about focusing people on positive possibilities and putting aside depressing realities.¹³³

Perseverance

There is a strong link between perseverance and long-term orientation and vision, as this competency focuses on sustained commitment to achieve long-term positive results.¹³⁴

¹³² Jordan et al. (2021), p. 23

¹³³ Jordan et al. (2021), p. 23

¹³⁴ Jordan et al. (2021), p. 24

Appendix B: Coding Guide

Code	Description	Anchor Example	Coding Rule
System Thinking Competence	Graduates who are able to think systemically are able to analyze sustainability problems in different areas and at different scales using systems concepts such as cause-effect structures, cascading effects and feedback loops. They can explain the need for systemic thinking in solving sustainability problems, including predicting future developments, identifying areas of intervention and evaluating transition strategies. In addition, they can explain how different professional roles play a part in addressing or mitigating sustainability issues. (see chapter 2.3.3)	Complexity Awareness	Analyze sustainability problems by applying concepts Understand systemic thinking in sustainability forecasting and strategy development Recognize how different professional roles contribute to solving sustainability problems.
Anticipatory Competence	Future-thinking competence is the ability to create detailed visualizations of the future concerning sustainability challenges and solutions. It involves understanding and describing the structure, key elements, and dynamics of these future visions. Evaluating these visions requires comparing them to the latest advancements, and crafting them involves utilizing creative and constructive abilities. This competence is supported by knowledge of future-oriented concepts like time and uncertainty, and techniques like simulation and scenario analysis. These skills are specifically developed to address critical sustainability concerns, including unintended harmful effects and fairness across generations. (see chapter 2.3.3)	Long term orientation and visioning	Develop visions of future sustainability challenges and solutions Skills based on knowledge of future-oriented concepts such as time, uncertainty, techniques to address key sustainability concerns.
Normative Competence	This competence enables groups to assess the sustainability of current and future states of socio-ecological systems and to develop visions for a sustainable future. It includes the ability to jointly define, apply and negotiate values, principles, goals and targets for sustainability. The focus is on maintaining system integrity and ensuring fairness within and between generations. (see chapter 2.3.3)	Inner Compass	Enables groups to assess the sustainability of current and future socio-ecological systems and to develop visions for a sustainable future The ability to jointly define, apply and negotiate values, principles, goals and targets for sustainability Maintaining system integrity and ensuring fairness within and between generations

Code	Description	Anchor Example	Coding Rule
Strategic Thinking Competence	Graduates are able to develop and test complex strategies. They consider potential impacts of their own actions as well as unforeseen consequences and cascading effects. In addition, graduates use their skills to develop plans and measures aimed at reducing sustainability problems and making progress towards a sustainable future. (see chapter 2.3.3)	Co-Creation Skills	Develop and test complex strategies Considering the impact of own actions as well as unforeseen consequences and cascading effects Using skills to plan measures to reduce sustainability problems and promote progress towards a sustainable future
Interpersonal Competence	Graduates with strong interpersonal skills can facilitate various forms of collaboration, including teamwork and the involvement of different stakeholders in sustainability efforts. They can also explain how different stakeholder groups can contribute to addressing sustainability issues. Graduates are adept at communication, can meaningfully complement the knowledge of others and are successful in interacting with stakeholders from government, business and civil society.(see chapter 2.3.3)	Empathy and Compassion	Facilitating teamwork and the involvement of different stakeholders in sustainability initiatives Different groups contribute to solving sustainability problems Communicators, meaningfully add to the knowledge of others and interact successfully with representatives from government, business and civil society
Integrated Problem Solving Competence	Graduates trained in integrated problem solving are familiar with different solution frameworks and can use them to address complex sustainability problems in order to develop workable solutions. This ability allows them to effectively combine problem analysis, sustainability assessment, vision development and strategy formulation. They are also able to explain the importance of integrated problem-solving approaches and how different competencies support these efforts and thus contribute to the promotion of sustainability. This skill complements their ability to describe the specific contributions of the previous five competencies to solving sustainability problems. (see chapter 2.3.3)	Complexity Awareness	Applying solution frameworks to address complex sustainability problems with workable solutions Effectively combining problem analysis, sustainability assessment, visioning and strategy formulation Being aware of the importance of integrated problem-solving approaches and how different competencies support these efforts and contribute to the promotion of sustainability

Statutory Declaration

I assure on oath that I have developed and written the enclosed thesis entitled

“Raising the bar for education for sustainable development:

A synthesis of frameworks for transformational skills”

entirely by myself and have not used sources or means without declaration in the text. Any thoughts or quotations which were inferred from these sources are clearly marked as such. This thesis was not submitted in the same or in a substantially similar version, not even partially, to any other authority to achieve an academic grading and was not published elsewhere.

Hannover, the 21st of June 2024



Malena Stanko