



## ECO<sup>2</sup> -SCHOOLS as learning-action living labs

### Deliverable 5.1: Social Value Framework and Self-Reflection Tools



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<b>Abstract</b>	The purpose of this document is to provide details on the Social Impact Assessment of the NEB Lab Eco <sup>2</sup> -School project. The deliverable at hand defines the Social Value Framework (i.e., impact on the community of the buildings), a Self-Reflection Tool (i.e., impact on the organization) and a framework for assessing the impact on the user groups. It describes the tools from a theoretical and methodological perspective with the goal of implementation at other buildings. As such, step-by-step guidance is provided.
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## Executive summary

This document aims to present the reference documentation of the Social Impact Assessment Framework. It introduces the Social Value Framework and proposed the instrument that will be used in the framework of the project, it presents a well-documented Self-Reflection tool to assess the organizational change and the openness of the participating organisations, and an instrument to assess the Sustainability Citizenship which will be used to monitor NEB|Lab Eco<sup>2</sup>-School's effectiveness and potential. Those tools are presented in a way that they can be used from other buildings owners and users. These tools will be used to assess the three levels of the social impact:

- level 1: impact on the community,
- level 2: impact on the organization, and
- level 3: impact on the users of the building,

while relationships between those three dimensions will be explained, thus illustrating their positive feedback loop.

The document will be split into three key areas.

First the document presents the proposed social value framework: It summarizes the existing evidence base, i.e., provide research on social value assessment. The research looks at various disciplines, such as environmental psychology, and displays how social value is assessed on a global, political level via the OECD. Based on this research, there will be a consensus on adequate measurement within the NEB|Lab Eco<sup>2</sup>-School approach. This final tool will be introduced in more detail for implementation in other buildings.

The second focus area refers to a self-reflection tool that has been validated and is suitable for the NEB|Lab Eco<sup>2</sup>-School approach (Sotiriou et al., 2021). It is very important to monitor the context of implementation of the Green Action Plans that will be implemented. We need to assess the openness of the educational buildings as organisations and to explore the key parameters that must be in place to facilitate the foreseen change of culture. The proposed instrument will be introduced from a theoretical and methodological perspective. This will provide information on the tool's use within the NEB|Lab Eco<sup>2</sup>-School framework and help implementation in other projects, so NEB|Lab Eco<sup>2</sup>-School approach serves as a reference model.

The third focus area is the assessment of the impact on the users of the building. For this purpose the research team of the project aims to assess the Sustainability Citizenship Competence. The document describes the Sustainable Citizenship Model by walking the reader through all concepts and constructs of the model. It must be noted that the specific instrument is currently tested in the pilot sites. The document presents the status of the data collection, while it concluded by creating links between the three-assessment level that are supposed to create a positive feedback loop.

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# 1 Introduction

## 1.1 Purpose of the document

This document will be separated into three main sections: The first section introduces the social value created and enhanced by NEB|Lab Eco<sup>2</sup>-School buildings. The second section presents a self-reflection tool to assess the openness level of those buildings. In the third section the document further provides information on the impact on the users of the building. The Sustainable Citizenship Model will be introduced. The overall approach has been designed to assess the impact of the project at three levels: Level 1: impact on the community of the building, Level 2: impact on the organization that the building is hosting, and Level 3: direct impact on the users of the building. Relationships between those three dimensions will be explained, thus illustrating their positive feedback loop. We are providing here a short description of the three impact areas.

**Social Value Framework:** NEB|Lab Eco<sup>2</sup>-School aims to create benefits for a larger community surrounding the educational building; it also aims to be a role model and provide step-by-step guidance for other buildings to follow suit. While social value output refers to the activities done by the organization, which will be displayed in another deliverable, social value outcomes refer to long-term observed effects (see Eurodiaconia), in this case, sustainability. There needs to be an assessment tool to quantify the multiple benefits and success of the project (i.e., social value outcomes). Among the main goals of Work-Package 5 (WP5) are 1) to define such a tool that is called a Social Value Framework, 2) to quantify the benefits of the educational building, and 3) to guide further educational buildings beyond NEB|Lab Eco<sup>2</sup>-School (i.e., such as a modeling tool).

Social value within the NEB|Lab Eco<sup>2</sup>-School project aims to affect all generations within a community and to support the transformation of educational buildings toward low-carbon and climate resilience, based on social, technological, and financial innovation; the whole community will be involved in supporting this transformative process. Core value aspects include:

- Greenhouse gas (GHG) emission reductions
- Job creation
- Net present value
- Reductions in energy poverty
- Productivity improvements
- Reduced exposure to mold and risk of asthma

The document is meant to summarize aspects of the existing evidence base on social value to reach a consensus on assessing the social value within the NEB|Lab Eco<sup>2</sup>-School framework. Subsequently and in later records, data on social values will be collected, analyzed, and displayed. Further, there will be a modeling tool with step-by-step guidance, case studies, and frequently asked questions for others to use and implement the tool.

**Self-Reflection Tool:** As part of the European Clean Energy Package, NEB|Lab Eco<sup>2</sup>-School buildings are seen as energy communities for collective energy actions in an open, democratic format that involves the local community. In this way, the buildings can be regarded as a source of and solution to today's economic, environmental, and social problems. To assess the level of interaction (i.e., within the building, with its local community, and among buildings), there needs to be a tool to measure the status quo and thus allow for improvements. This refers to the openness of a building and will be assessed by a self-reflection tool to be part of the second domain of this document. The purpose is thus to introduce a tool to quantify the openness of buildings, a self-reflection mechanism to allow stakeholders to optimize their approaches to social interaction and distributing knowledge.

**Sustainability Citizenship:** Within level 3 of the social impact assessment – impact on the users of the building – a series of certified instruments are used to assess the effect of the retrofit project to the user communities of the building (e.g., school and university students, visitors of the science center,



teachers, and pedagogues) and their competences (knowledge, skills and attitudes) towards energy efficiency and climate change. After extensive research, a three-dimensional model was built that includes the following main pillars:

- Knowledge (typically curriculum-related and a basis to act upon)
- Attitudes (internal motivators that help for persistent pro-environmental engagement)
- Supportive variables, which is
  - o Psychological distance (tests how relevant topics are to daily life)
  - o Outdoor experience (an indicator of the frequency of past nature interaction)
  - o Salutogenesis (a set of factors that support health and well-being)
  - o Ecological footprint (measurement of negative environmental impact)

## **1.2 Scope and audience of the document**

The audience of this document is broad: While the two tools (social value and self-reflection) should provide feedback for the stakeholders of the buildings to improve the process re-iteratively, the results of those reports should serve as guiding principles for other educational facilities to follow suit. As the word 'lab' indicates, there will be several approaches to eco-renovate buildings in close interaction with the users of the building and the local community to find best practices. Those best practices will be shared to spread experiences and knowledge for more sustainable generations. As such, the document will be public to be broadly accessible.

## **1.3 Structure of the document**

The document is structure in the following way.

The First Chapter introduces the scope of the document. This implies the purpose of the document, which is the theory behind and methodological approach to social impact assessment. It further includes the scope and audience, which is broad given that NEB|Lab Eco<sup>2</sup>-Schools serve as role models for other educational buildings to follow, thus aiming at an audience of researchers and practitioners alike. The first chapter finally introduces the tripartite structure of the document that resonates with the three assessment levels: impact on the community (level 1), impact on the organization (level 2), and impact on the users of the building (level 3).

The Second Chapter presents the Social Value Framework. It first provides a literature review to summarize the existing evidence base and provides a selection of three appropriate tools for the social value assessment within the project. Based on this, the document provides a discussion with all Work Package Leaders to reach a consensus for one tool to be used for NEB|Lab Eco<sup>2</sup>-School, followed by step-by-step guidance for the tool's implementation.

The Third Chapter introduces a self-reflection tool to assess the social impact on the organization and its local community. It provides an evidence base and refers to a previously successful project – OSOS – in which a self-reflection tool was developed and validated. In this regard, the chapter first provides the theoretical background to then cover the methodological approach for measuring the impact on the organization for other educational buildings to follow suit.

The Fourth Chapter describes the expected outcomes of the social value and self-reflection assessment. It then introduces the Sustainable Citizenship Model, which is the tool used for measuring the impact on the users of the building (level 3). The chapter finally relates those three dimensions (levels 1-3), creating hypotheses for their positive, synergetic interaction and expected feedback loop.

The Fifth Chapter concludes the document while delineating the preliminary or expected results of the social value framework and the self-reflection tool. To point at the interconnection of the three assessment levels, the status quo, and a link to the third level assessment (i.e., impact on the users of the building) are provided.



## 2 Social Value Framework

### 2.1 Summary of the existing evidence base

There are multiple disciplines to investigate social value. As a result of extensive literature review and research, this document presents suitable tools for the social value assessment within the NEB|Lab Eco<sup>2</sup>-School project to ultimately reach a consensus on one tool. The following chapters summarize three main approaches: The first chapter highlights the perspective of environmental psychology, introducing established theoretical and methodological approaches. The second chapter moves on a more global, political level with the OECD, which uses the Better Life Index to compare living standards among nations. In this regard, the Better Life Index is an easy tool to implement, and it incorporates elements of environmental psychology, economy, and others. The third chapter will describe a perspective of the economy. While environmental psychology focuses instead on individuals and their changes in social value, the economy focuses on the value created through a building or institution that successively affects those individuals involved.

#### 2.1.1 Measuring social value from an environmental psychology perspective

In environmental psychology, researchers investigate various parameters to encourage pro-environmental behavior: interest, which reflects cognition (Palmer et al., 1998; Potvin & Hasni, 2014); attitudes, which are intrinsic and relatively persistent motivators (Baierl et al., 2023; Kaiser et al., 1999); norms, which are instead externally motivated and change with a reference group of people (Cialdini et al., 1990; Fielding & Hornsey, 2016); and values. Values are 'desirable trans situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity' (Schwartz, 1992, p. 21). As such, they are comparatively stable and trans situationally affect interests, attitudes, norms, and behaviors (Steg et al., 2014). Values are thus more challenging to generate and tend to persist over time.

De Groot and Steg (2007) propose three relevant value orientations for understanding pro-environmental engagement: egoistic, altruistic, and biospheric. People with a pronounced egoistic value orientation consider the cost-benefit-relationship of pro-environmental engagement with a focus on their well-being; if the costs of pro-environmental engagement outweigh personal benefits, chances to engage pro-environmentally are low. People with a pronounced social-altruistic value orientation will engage pro-environmentally based on the perceived cost-benefit relationship with others. People with an apparent biospheric value orientation will likely engage pro-environmentally if their engagement benefits the biosphere or ecosystem, thus overcoming personal or societal obstacles for pro-environmental engagement.

According to De Groot and Steg (2007), people's value orientation can be assessed via 12 manifest items that build the three latent variables of an egoistic, altruistic, or biospheric value orientation (see Fig. 1). To assess the egoistic orientation, values included were authority, influence, and ambition; to assess the altruistic orientation, values included were: equality, world peace, social justice, and helpfulness; to assess the biospheric orientation, values included were: preventing pollution, respecting the earth, unity with nature, and protecting the environment.

Those 12 items are typically presented in a questionnaire format where people have to indicate their degree of agreement on a nine-point rating scale ranging from -1 ('opposed to my values') and 0 ('not important') to 7 ('extremely important'). They must rate to what extent those 12 listed values are important as guiding principles in their life. Participants are also asked to vary scores as much as possible and to rate no more than two values as extremely important.

### Corrected Correlations Between Value Items and Components via Multiple Group Method

Value Item	Egoistic	Altruistic	Biospheric
<b>Egoistic value orientation</b>			
1. Social power: control over others, dominance	.47	-.19	-.09
2. Wealth: material possessions, money	.46	-.22	-.08
3. Authority: the right to lead or command	.50	-.18	-.08
4. Influential: having an impact on people and events	.33	-.10	-.08
Cronbach's alpha = .65			
<b>Altruistic value orientation</b>			
5. Equality: equal opportunity for all	-.06	.54	.45
6. A world at peace: free of war and conflict	-.23	.53	.26
7. Social justice: correcting injustice, care for the weak	-.09	.45	.44
8. Helpful: working for the welfare of others	-.35	.55	.30
Cronbach's alpha = .72			
<b>Biospheric value orientation</b>			
9. Preventing pollution: protecting natural resources	-.22	.49	.68
10. Respecting the earth: harmony with other species	-.08	.34	.65
11. Unity with nature: fitting into nature	.10	.38	.59
12. Protecting the environment: preserving nature	-.19	.39	.73
Cronbach's alpha = .83			

Note: Correlations are corrected for "self-correlations."

**Figure 1: Assessing people's value orientation according to De Groot and Steg (2007), who use 12 manifest items to form three latent variables: egoistic, altruistic, and biospheric value orientation. The table provides Cronbach alpha scores to measure reliability and correlation scores.**

Figure 1 represents De Groot and Steg's (2007) statistical proof of their theoretical framework with a sample of 489 participants. They conducted a factor analysis that reflected their proposed tripartite structure of egoistic, altruistic, and biospheric. While the altruistic and biospheric value orientation, as expected, positively and significantly correlated, there were non-significant correlations between either dimension with the egoistic value orientation. De Groot and Steg (2007) conducted further quality test analyses, e.g., relating the data collected in different countries, which render their tool for consideration within the NEB|Lab Eco<sup>2</sup>-School framework.

De Groot and Steg's (2007) scale stems from Schwartz' (1994) approach, which tried to detect human value's universal structure and aspects. As such, Schwartz listed 52 values people rate on a nine-point frequency scale to indicate each value's importance. The resulting structure captures four main dimensions: Openness to Change, Self-Transcendence, Conservation, and Self-Enhancement (see Fig. 2) with two to three sub-categories. The circle in Figure 2 illustrates the relationship between the value orientations. It points to conflicts and synergies between value orientations, implying that acting upon one value orientation would affect other value types.

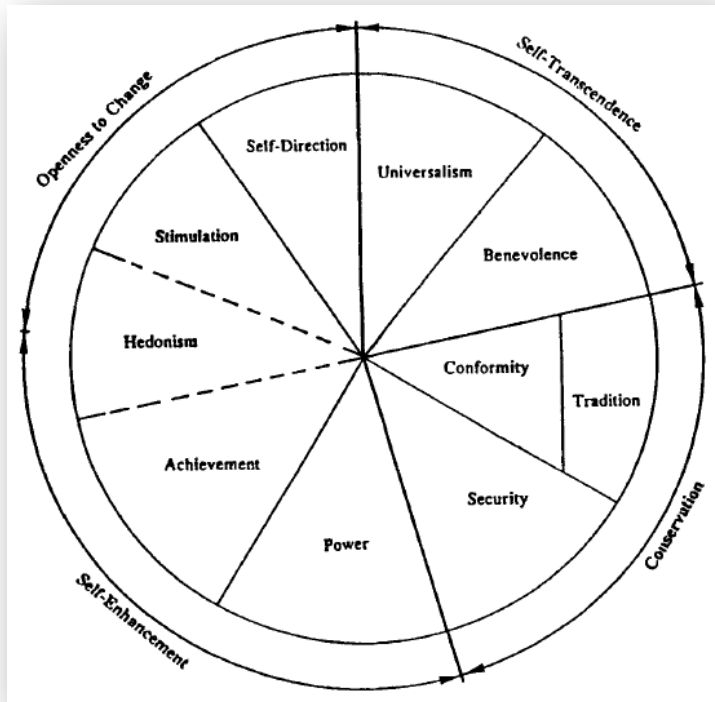


Figure 2: Schwartz' (1994) universal structure of human values captured via 52 domains people have to rate on a nine-point frequency scale according to their perceived importance; the 52 domains are grouped into four central interacting values and two to three sub-categories. The circular model indicates people's value interaction, implying that changing one value domain inevitably affects the other value domains.

Related to De Groot and Steg's (2007) tripartite approach and also stemming from Schwartz (1992; 1994), Schultz (2001) describes a similar structure with three latent variables: egoistic concerns, altruistic concerns, and biospheric concerns. In his study that was conducted via phone, people were introduced to the task as follows:

"People often express concern about environmental problems, but some people differ as to which consequences concern them the most. I am going to read some different areas where environmental problems could have harmful consequences, and for each, please rate how concerned you are about their impact using a scale from 1 to 7. If you are not at all concerned, give a rating of 1. If you are extremely concerned, give it a rating of 7. Of course, you can choose any number between 1 and 7 for your answer." (p. 331)

The items to be rated were the following, presented in random order; Note that the study was conducted in the United States, so 'People in the United States' must be adapted to the country the survey takes place, indicating concern about people living close to the participant's home:

- Marine life
- Plants
- Animals
- Birds
- Children
- People in the United States
- The human race
- People in your community
- Your health
- Your future

- Your lifestyle
- Your prosperity

Another interesting concept in environmental psychology is territory and its associated values. A territory is associated with providing security, privacy, autonomy, or self-identity. As such, territory is a universal need (Hayter, 1981) that further includes not only the physical space but is related to possession, defense, exclusiveness of use, has unique markers, shows signs of personalization, and, as such, can be incorporated in one's identity (Edney, 1974). All those imply a sense of control and perceived ownership (Gifford, 2007).

Transferring the concept of territoriality to NEB|Lab Eco<sup>2</sup>-School buildings, buildings can help develop and strengthen autonomy (i.e., through community involvement and also involving all users of the building in the eco-renovation process), self-identity, etc., through unique markers, personalized aspects, and general involvement in the project; If people are allowed to participate in eco-renovating buildings, they become part of a larger enterprise, experience autonomy, and success, and make the project theirs – the building as their territory. This helps to level up a positive value orientation from which the community and the environment benefit. In this regard, pilot sites draw from markers that help generate territoriality.

From territoriality, we can establish a link to the self-reflection tool and process described in '3. Self-Reflection Tool' within this document. The self-reflection tool allows for measuring the status quo and improvement in self-reflection regarding the buildings' openness level. A building's openness level allows for building a sense of territoriality, which, in turn, we presume to positively contribute to a person's value system.

### **2.1.2 Measuring social value from a political, global perspective: OECD**

The OECD is a global policy forum promoting knowledge and policies to improve economic and social well-being (How We Work - OECD, 2022). For this purpose, it is among the most important comparable statistics resources in this area. As part of their agenda, the OECD measures people's life satisfaction around the globe via the Better Life Index (*OECD Better Life Index*, 2023). The tool evaluates people's profound satisfaction with life rather than current feelings that may change frequently. To do so, people rate the following nouns concerning their perceived importance in life (see also Fig. 3):

1. Housing
2. Income
3. Jobs
4. Community
5. Education
6. Environment
7. Civic Engagement
8. Health
9. Life Satisfaction
10. Safety
11. Work-Life Balance



**Figure 3: The Better Life Index distributed by the OECD (2023) to draw international comparisons. Results score from 0-10 and are typically calculated for countries with the latest average of 6.7.**

The OECD Life Satisfaction measurement does not clearly state psychological dimensions such as attitudes or values. Since the OECD aims at assessing how people regard their satisfaction toward life on a more significant, relatively persistent level instead of assessing feelings, there is a strong inclination toward values. Subsuming items from the tool can help derive, e.g., materialistic/ egoistic values (hedonic value), such as the importance of a person’s job or income, or biospheric values, reflected, e.g., by the noun ‘environment’.

Within the NEB|Lab Eco<sup>2</sup>-School approach, we aim at those dimensions that can be affected through eco-renovating educational buildings: jobs, education, civic engagement, life satisfaction, work-life balance, community, environment, health, and safety. Those dimensions could be used for the social value framework respectively. It would allow a pre-post comparison as a validated tool. It would further allow us to relate the NEB|Lab Eco<sup>2</sup>-School data to results published all around the globe.

### **2.1.3 Measuring social value from an economic-based perspective: Value on built environment projects (UKGBC)**

This guide is based on the idea that buildings, places, and infrastructure can create social value to support environmental, economic, and social well-being, i.e., improving people’s lives (UKGBC, 2022). Based on eight steps, the guide walks the reader through developing a customized social value design. Since this guide was designed for commercial/ economic enterprises, only suitable aspects will be related to the NEB|Lab Eco<sup>2</sup>-School approach.

**Step 1** is about the social value purpose – within the NEB|Lab Eco<sup>2</sup>-School scope – to inspire the community to live more sustainably with increased overall well-being.

**Step 2** identifies the priority stakeholders, which is instead fixed for the NEB|Lab Eco<sup>2</sup>-School approach.

**Step 3** aims at meeting stakeholder needs. This refers to the concept of sustainability with decreased ecological foot- and increased ecological handprints and to the larger impact: NEB|Lab Eco<sup>2</sup>-School serves as a pilot project to inspire others to follow the idea for information to proliferate and accumulate.

**Step 4** targets social value outcomes, which are environmental, economic, and social well-being. Within the suggestions provided by the guide, NEB|Lab Eco<sup>2</sup>-School aims to create a local identity (see *territoriality* in chapter 2.1.1.) with the idea of showcasing. It aims to create employment and develop skills, particularly those that incorporate sustainability. A primary goal is also well-being on a personal level (e.g., hedonic and eudaimonic), on a social level (e.g., connecting people, well-being on a community level, reflected as an altruistic value orientation, see chapter 2.1.1.), and on a specific level (e.g., income, job, and housing, which resonates with an egoistic value orientation, see chapter 2.1.1.). However, critical well-being refers to connecting people, being active, and taking notes and action.

**Step 5** refers to the delivery plan (i.e., ‘Deliverables’). This implies introducing an assessment tool and drawing conclusions through lessons learned. Here, we refer to Chapter 2.1.1. and 2.1.2. in which validated measurements from environmental psychology and a global, economic level were introduced.

**Step 6** describes the measurement framework in more detail. The NEB|Lab Eco<sup>2</sup>-School approach involves a quantitative study approach based on a pre-post-design, for which study participants must answer questionnaires on frequency scales to indicate their degree of agreement or rate their perceived importance of statements or domains. Those items (= manifest variables) help derive values (= latent variables).

**Step 7** is executing a social delivery plan, which this document is.

**Step 8** describes the ongoing measurement, monitoring, and reporting of results, which will be due to M36 within the deliverable of ‘Lessons Learned.’

## **2.2 Consensus on value assessment within the NEB|Lab Eco<sup>2</sup>-School project: A modeling tool**

### **2.2.1 (Plenary) decision on the value instrument**

There are various parameters in environmental psychology research, such as interest (on a cognitive level), norms (on an external level), or attitudes (on an intrinsic level), which are all based on people’s values. Values are guiding principles in people’s lives and motivate behaviors trans-situationally (Steg et al., 2014). As such, values are more complex to generate than other parameters but persist over time. For values to change, there need to be intense interventions to inflict a shift in people’s value orientations, such as the NEB|Lab Eco<sup>2</sup>-School approach.

The literature points out the effects of territoriality on people’s values: If people feel territorial through participating in the NEB|Lab Eco<sup>2</sup>-School project, changes in people’s value orientations can amplify. In this way, NEB|Lab Eco<sup>2</sup>-School provides in-depth experiences for several years for students, their parents, staff, and the community to engage in and learn about eco-renovation and, thus, sustainability through a link to everyday practices. NEB|Lab Eco<sup>2</sup>-School is a rare opportunity to explore the effects on people’s value systems and compare groups that interact differently with NEB|Lab Eco<sup>2</sup>-School buildings.



To quantify the benefits of educational buildings within the NEB|Lab Eco<sup>2</sup>-School buildings approach, measurement tools are used. Extensive literature review and research narrowed down suitable measurement tools to the ones presented in this document: This is Schultz's (2001) tool, De Groot and Steg's (2007) tool, and the Better Life Index (OECD, 2023). This selection of tools was presented at the 2<sup>nd</sup> project meeting at the 9. September 2023 in Lisbon to all Work Package Leaders to discuss those options. The consensus was on Schultz's (2001) concise tool to assess environmental values based on an altruistic, a biospheric, and an egoistic dimension, and to investigate shifts in their weighting successively.

There were several reasons to choose Schultz's (2001) tool: The author's tool is easy to understand and can thus be answered properly by all age groups. Second, the tool can be quickly responded to and does not require a lot of time, which also benefits the reliability of the resulting data. Third, different answer formats (e.g., 7- vs. 9-point frequency scale) might be irritating for study participants and thus at the expense of the quality of the data. Then, the tool is the most established one with more than 2400 citations to this day (Schultz, 2001). There was, on the other hand, critique on the Better Life Index (OECD, 2023) and De Groot and Steg's (2007) tool as they are more complex in their wording and thus more difficult to understand, which further requires more time for study participants to complete the questionnaire. There was a suggestion to add an optional open-ended question for an additional qualitative study approach. We decided to add such an open-ended question at the end of the questionnaire to enrich the data with more information without making the answer obligatory which could be at the expense of the answer quality. For the final questionnaire content, see Appendix 1. Note that the final format – the questionnaire to be answered by study participants – changes in its outline.

That scale is contextualized by the UKGBC guide that helped compile the respective dimensions and create the methodological approach of the study design, which is a pre-while-post-format in a quantitative study approach. Within it, people indicate their degree of agreement or rate their perceived importance on a frequency scale. Overall calculations will then allow for comparisons.

## 2.2.2 Step-by-step guidance

A main goal of the NEB|Lab Eco<sup>2</sup>-School project is to develop step-by-step guidance for other projects to follow so that NEB|Lab Eco<sup>2</sup>-School serves as a role model. Therefore, a guide will be introduced that helps with study implementation at other educational buildings.

The guide for delivering social value on built environment projects (UKGBC, 2022) is a useful document to define project-customized values. Outlined in 2.1.3., it helps 1) define the value purpose, 2) identify priority stakeholders and 3) their needs, 4) formulate social value outcomes, 5) develop a delivery plan, and then 6) frame the measurement. Beyond the scope of the UKGBC-guide and its steps displayed for NEB|Lab Eco<sup>2</sup>-School in 2.1.3. is the step-by-step implementation of the measurement tool.

**Creating a questionnaire:** The measurement is based on a quantitative study approach. People must rate how concerned they are about each domain on a seven-point frequency scale. Schultz's (2001) scale is based on 12 manifest items that reflect three latent variables or value dimensions. Compiling several items to form one latent variable is a common practice to get a proxy for people's value orientations. The manifest items are introduced by the following text:

People often express concern about environmental problems, but some differ on which consequences concern them the most. Please read through the following areas where environmental problems could have harmful consequences. For each area, please **rate how concerned you** are about their **impact** using a scale from 1 to 7.

If you are not at all concerned, give it a rating of 1. If you are highly concerned, give it a rating of 7. Of course, you can choose any number between 1 and 7 for your answer

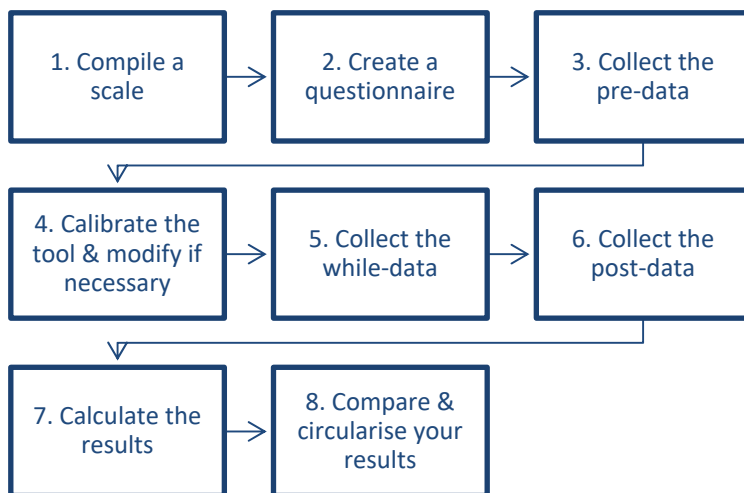


Thank you!

Generally, when creating a questionnaire, some items should be negatively formulated and reverse-coded before the analysis. This reflects whether participants indeed read and adequately responded to questions. Since Schultz's (2001) scale consists of nouns only, the negative formulation is covered by contrasting value orientations (biospheric vs. egoistic).

Making some Anker items obligatory to respond to is also reasonable so that you can draw better comparisons. Since Schultz's (2001) scale is concise, only consisting of 12 items, we will make all items obligatory to rate.

**Data collection:** For NEB|Lab Eco<sup>2</sup>-School, digital questionnaires will be primarily used since those are less time-consuming to fill in and analyze. We will use the platform *Microsoft Forms*. QR codes and links guide the digital questionnaire that can be completed via any electronic device such as a smartphone, tablet, or computer. If necessary, paper-and-pencil questionnaires will be available, which have to be scanned and merged with the Microsoft Forms' digital data.



**Figure 4: Step-by-step guidance to implement the Social Value Framework within the NEB|Lab Eco<sup>2</sup>-School approach as a role model for other educational buildings to follow suit; this is based on Schultz's (2001) scale for value orientation assessment.**

**Data analyses:** For Schultz's (2001) scale, we use SPSS to investigate the scale's structure. Confirmatory factor analyses should reveal three latent factors and calculate factor scores that are fundamental to further analyses. Factor scores are weighted and thus allow for more accuracy than sum or medium scores. Having factor scores (one per person and value dimension) allows comparing data across time and space, thus relating countries or people's development over time to investigate project effects.

## 3 Self-Reflection Tool

### 3.1 Overview of the tool: Development and validation

NEB|Lab Eco<sup>2</sup>-School will use a self-reflection tool to assess the openness level of its buildings. The self-reflection mechanism provided by NEB|Lab Eco<sup>2</sup>-School will aid stakeholders in fine-tuning their strategies and fostering effective interactions with their communities while sharing the knowledge base created by the retrofit project. Openness helps build synergies within an open culture that embraces the users of the building, the institution, and the (local) community. This implies that many people will be involved in the school; students, teachers, and the community are encouraged to participate, challenge traditional beliefs and settings, and guide toward a more open culture and sustainable future.

### 3.2 Self-Reflection tool to assess the openness level of

A self-reflection tool was defined, used, and validated within the European Union project Open Schools for Open Societies framework (Sotiriou et al., 2021). The tool focused on making organizational change visible. The tool has been designed to assess the openness of educational organizations and it is applicable to schools, universities, science centers and museums as well as to research organizations that are offering outreach programmes to their communities. In this way, it can measure the NEB|Lab Eco<sup>2</sup>-School project's impact on the institution at the organizational level.

### 3.3 Schools' Openness

Open schooling covers many areas of everyday life (Sotiriou et al., 2021):

The concept incorporates **cooperation with non-formal and informal enterprises**, including educational set-ups such as universities and industries. The idea is to link science education to topics that meet everyday life's importance; this way, science becomes relevant to everyday life, which induces deeper learning and might affect career choices.

School projects investigate **local community challenges**. Topics relevant to the local community thus become the source of and solution to current challenges. This way, cooperation with local stakeholders is enhanced.

The concept promotes **partnerships to foster expertise** and networking. Open schools should develop innovative applications, use, and distribute research findings, and, this way, foster problem-solving skills and inquiry-based learning. Critical thinking and creativity are part of science education, implemented through innovative frontier topics such as artificial intelligence or sustainable food systems.

**Parents** should be involved in their children's education. Their involvement should be continuous and proactive so parents become empowered to positively influence their children's education, educational building, and its link with the local community and current global challenges. This implies parents can, e.g., be involved in developing school plans.

The concept acknowledges **gender differences** and aims at diminishing them. The pedagogical approach recognizes differences in the users of the building that are supposed to be harmonized.

### 3.2 Previous findings: Study results on the Self-Reflection tool within OSOS

The Self-Reflection tool consists of 24 items. A factor analysis revealed its tripartite structure (see also Table 1):

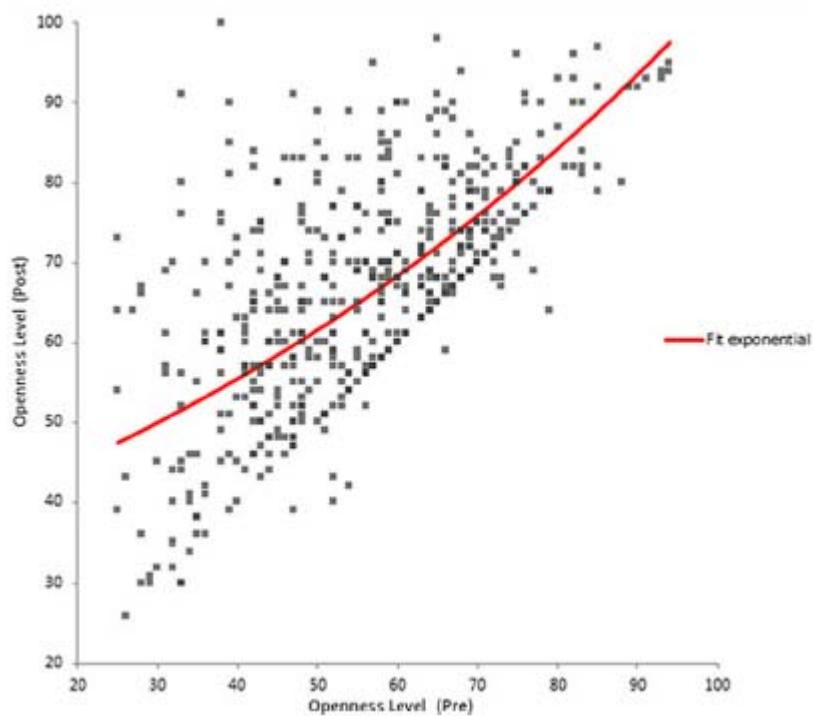
- Management level
- Process level

- Teachers' professional development level

**Table 2: Factor analysis of the Self-Reflection tool ( $N_{\text{items}} = 24$ ,  $N_{\text{schools}} = 500$ ) that has been used to detect changes in school openness after the implementation of an open schooling approach for one academic year**

	Process Level	Teachers' PD Level	Management Level	Item
PL 4	.749			Implementing Projects
PL 5	.666			Parents' and external stakeholders' involvement in the school activities
PL 6	.659			Reflect, Monitor, Debate
PL 7	.569	.487		Learning Processes adaptation
PL 3	.533			Collaborative environments and tools (co-creation, sharing)
PL 8	.520	.427		Established collaboration with local and national institutions
PL 2	.400			Creating an inclusive environment
TPDL 8		.707		Use and reuse of resources.
TPDL 6		.662		Collaborative learning (mobility actions)
TPDL 7		.661		Collaborative learning (ICT Competences)
TPDL 2		.585		Setting expectations
TPDL 1		.573		Teacher Awareness and Participation
TPDL 4		.567		Professional Competences, Capacity Building, and Autonomy
TPDL 5		.546		Leadership Competence
ML 2			.733	Coherence of Policies
ML 4			.702	Education as a Learning System
ML 8			.603	Communication and Feedback Mechanism
ML 5			.580	Responsible Research, Reflective Practice, and Inquiry
ML 1			.536	Vision and Strategy
ML 3			.484	Shared Vision and Understanding

Based on the data of 500 schools that participated for one year in the OSOS project, the Self-Reflection tool revealed significant improvements in their openness. At the same time, the increase was more substantial for schools that began with low levels of openness (see Figure 5). For a complete list of items in a questionnaire format, see Appendix 2.



**Figure 5: Improvements in school openness level ( $N = 500$ ) after participation for an academic year in the open schooling approach of the OSOS project; the average increase is 11.34%, while the growth was much more significant for primarily low-performing schools (Sotiriou et al., 2021)**

## 4 Expected Outcomes and preliminary results of the application of the Sustainable Citizenship Model

### 4.1 Expected outcomes

We expect two main outcomes. This refers to improvements for each pilot site and to relationships between educational buildings and the users of the building or the community involved.

Both social impact assessment tools (i.e., the Social Value Framework and the Self-Reflection tool) are supposed to be tested in a pre-while-post design. This implies that within a quantitative study approach, people complete questionnaires three times. It allows us to measure the status quo and the changes within and around each educational building. Here, we expect improvement in people's value system, and in the openness of the educational buildings. Our hypotheses are:

- Within the NEB|Lab Eco<sup>2</sup>-School framework, people's social value orientation will shift toward an altruistic or a biospheric orientation.
- The NEB|Lab Eco<sup>2</sup>-School approach improves the openness level of educational buildings with larger growths for less advanced buildings.

In the next step, we expect to find relationships between an educational building's openness level and the value orientations of the people involved. We thus expect the openness level of an educational building to affect people's value orientation. The hypotheses are thus:

- The educational buildings differ in their level of openness (assessed via the Self-Reflection tool) and in the average social value orientation (assessed via the Social-Value Framework).
- The higher the openness level of an educational building, the better the social value orientation is.
- Changes in the openness level of educational buildings show in people's changes in their social value orientation.

The two main outcomes reflect the need for both tools to be used. The NEB|Lab Eco<sup>2</sup>-School approach thus benefits from the assessment on several levels, which is the impact on the organization (level 2) and the impact on the community (level 1). Ultimately, those results can be linked to the impact on the users of the building (level 3).

### 4.2 Preliminary results of the application Sustainable Citizenship Model

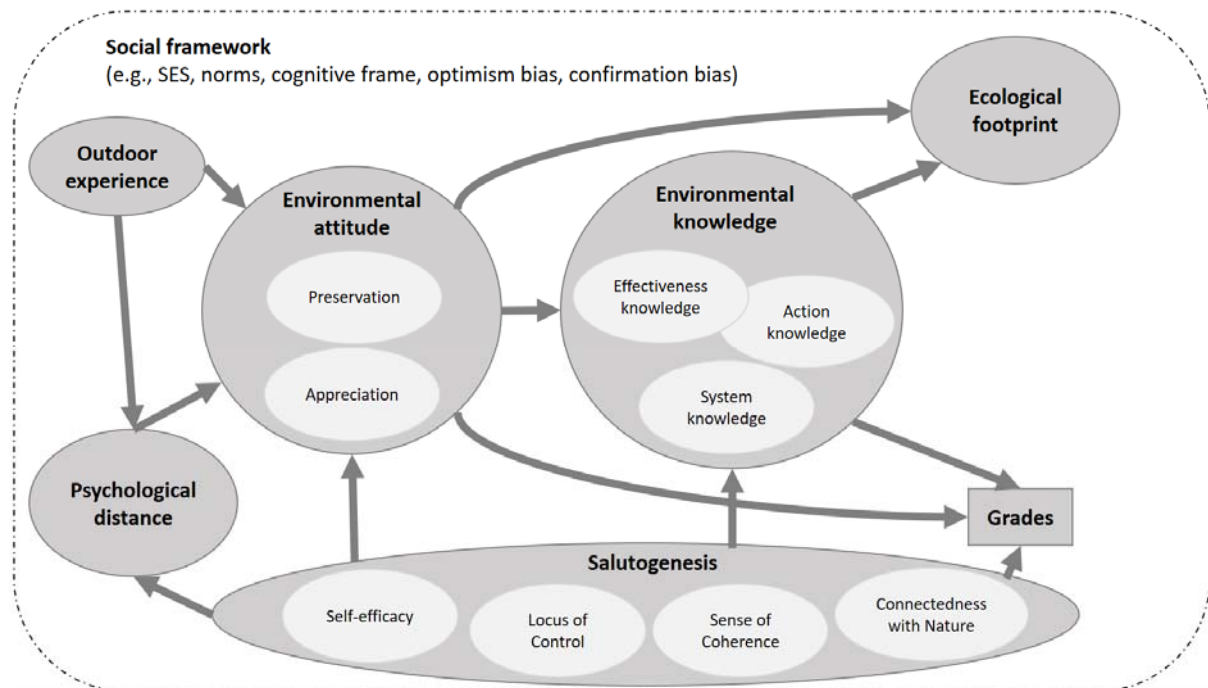
#### 4.1.1 Impact on the users of the building (level 3): Sustainable Citizenship Model

Within level 3 of the social impact assessment – impact on the users of the building – a series of certified instruments are used to assess the effect of the retrofit project to the user communities of the building (e.g., school and university students, visitors of the science center, teachers, and pedagogues) and their competences (knowledge, skills and attitudes) towards energy efficiency and climate change. After extensive research, a three-dimensional model was built that includes the following main pillars:

- Knowledge (typically curriculum-related and a basis to act upon)
- Attitudes (internal motivators that help for persistent pro-environmental engagement)
- Supportive variables, which is
  - Psychological distance (tests how relevant topics are to daily life)
  - Outdoor experience (an indicator of the frequency of past nature interaction)
  - Salutogenesis (a set of factors that support health and well-being)
  - Ecological footprint (measurement of negative environmental impact)

Those factors are embedded within the socioeconomic situation of a person (see Figure 6). The model, however, is mostly concerned with those factors that can be changed through an educational building and teaching. While we do acknowledge the effects of various socioeconomic factors such as

household income (e.g., Shirin, 2005), we assess factors that can be improved through the NEB|Lab Eco<sup>2</sup>-School approach and are likewise fundamental for living a sustainable life.



**Figure 6: Sustainable Citizenship Model used for level 3 of the social impact assessment, i.e., on the users of the building. At the core of the model are environmental attitude and knowledge, while the concept of salutogenesis is fundamental to all other factors.**

In the following, the factors are described subsequently, while all items are listed in Appendix 3:

**Environmental knowledge** is a core factor since people need to know some facts to act upon it. Fact-based knowledge, however, is insufficient for sustainable engagement, so knowledge includes action-based knowledge (i.e., how to use knowledge to act accordingly) and effectiveness knowledge (i.e., on a broader level to grasp the general gains and benefits of sustainable strategies; Frick et al., 2004). A person could, e.g., know the effects of rising carbon dioxide levels in the atmosphere (system knowledge) but lack knowledge on climate-friendly behaviors (action knowledge). For the Sustainable Citizenship Model, 25 items are used to assess environmental knowledge. While some items are derived from Maurer and Bogner (2020), others were designed to match the concept of eco-renovating educational buildings and a sustainable lifestyle within the NEB|Lab Eco<sup>2</sup>-School project.

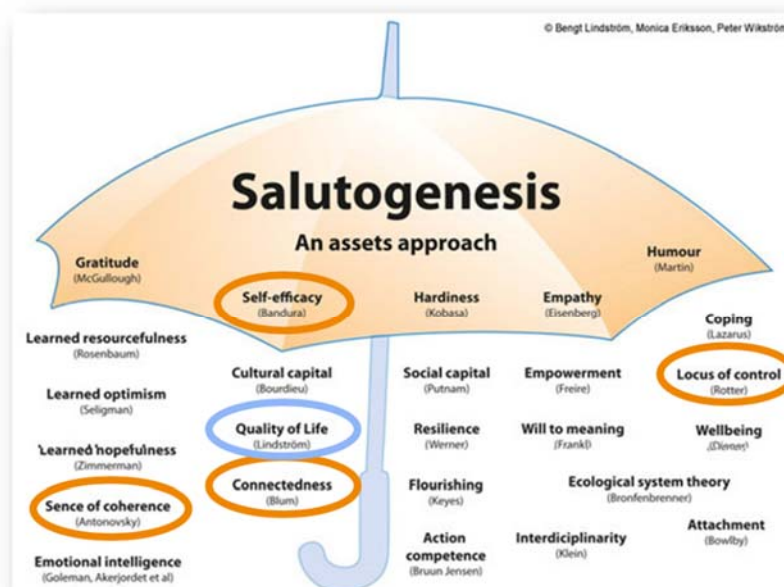
**Environmental attitude** is the second core pillar of the model as it is a mental entity that shows in people's commitment to sustainable engagement (Baierl et al., 2022). It is an internal, motivational factor that makes people acquire and use knowledge. It is thus a driving force that makes people seek learning opportunities and affects their intensity of learning, which shows in the typical positive correlation between attitude and knowledge. Without attitude, knowledge would stand on its own and hardly be used for actual engagement.

**Psychological distance** measures how much an individual feels close to a phenomenon on a geographical, social, hypothetical, and temporal with the idea that if people feel involved or impacted by that phenomenon, changes to become active increase (McDonald et al., 2015). NEB|Lab Eco<sup>2</sup>-School is expected to increase psychological proximity since students, teachers, staff, and the community are involved in eco-renovating buildings, thus linking sustainability to everyday life. Such proximity is expected to strengthen environmental attitudes and thus knowledge acquisition and use, which in turn would lead to more sustainable behaviors. 8 items were used from Spence et al. (2012) and 6 items were used from Jones et al. (2016) since both jointly better meet the NEB|Lab Eco<sup>2</sup>-School project.



**Outdoor experience** measures the frequency of past engagement and to what extent students spent time in their natural environment as a child, with the idea that a strong nature connection can be created throughout childhood when exposed to nature. It is thus expected that the more time spent outdoors as a child, the more positive an environmental attitude becomes, while outdoor experience further helps proximity of phenomenon; spending time outdoors, e.g., helps notice changes in or harmful effects on nature, while there is general greater awareness of what people have grown accustomed to. Although the idea is not new (e.g., Chawla, 2020), there was no suitable measurement tool. Therefore, a 9-item scale was designed within the scope of the NEB|Lab Eco<sup>2</sup>-School which is meant to capture outdoor experience through three dimensions of 1) leisure/ individual experiences, 2) social experiences, and 3) school experiences.

**Ecological footprint** measurements assess the negative impacts human beings have on Earth, while ecological handprint measurements assess the positive impacts human beings have on Earth (Gottlieb et al., 2014; Guillaume et al., 2020). Within a quantitative study approach, the ecological footprint is better and more standardized to assess, e.g., through measurements such as the Footprint calculator (Global Footprint Calculator, 2023) that covers specific, daily behaviors such as food and energy consumption. The handprint, on the other hand, implies all sustainable behaviors a person does. Such a wide range of possible pro-environmental engagement is thus better assessed via a qualitative study approach with an open-ended question that allows people to list all the good they do. The handprint is assessed via the Social Value Framework as an optional open-ended question, though the goal is to include it in the Sustainable Citizenship Model as well in subsequent data collection. The ecological footprint assessed within the Sustainable Citizenship Model covers the domains of 1) food consumption, 2) electricity consumption, 3) consumption of other goods, and 4) transportation. 6 items are used from the Footprint Calculator (Global Footprint Calculator, 2023). Another 8 items are used from Brot für die Welt (2020), the German analog to the Footprint Calculator. 4 items were designed to meet the NEB|Lab Eco<sup>2</sup>-School approach: Rather than asking for facts students can hardly change such as housing, consumption of other goods such as clothes were implemented. For the analysis, 10 items from the attitude scale can further contribute to information on the ecological footprint; those items ask for engagement in pro-environmental behaviors.



**Figure 7: Salutogenesis and factors that contribute to the concepts idea of establishing and sustaining human health and well-being (see Lindstrom, 2020). Elliptic highlights are added to the original figure. Factors highlighted in orange indicate those that are captured within the Sustainable Citizenship Model. The factor highlighted in blue resonates with social value which is assessed via level 3 (i.e., impact on the community) with the idea of integration subsequently.**

**Salutogenesis:** It is the study of the origin of health and comprises factors that support human health and well-being (Lindstrom, 2020). Salutogenesis is thus a concept that summarizes factors that



contribute to human health and well-being such as those displayed in Figure 7. The Sustainable Citizenship Model therefore proposes that the establishment of health and well-being is fundamental to establishing other pro-environmental factors such as the formation of positive attitudes or the potential to acquire knowledge; the idea is that the better people feel, i.e., the more satisfied they are in and with life, the more they engage in sustainable behaviors, the more capacity they have to learn about and care for the earth and sustainability. NEB|Lab Eco<sup>2</sup>-School is expected to contribute to factors of salutogenesis through, e.g., participation in the project that allows for autonomy and can strengthen self-efficacy. So, for NEB|Lab Eco<sup>2</sup>-School, this study focuses on the factors of self-efficacy, locus of control, sense of coherence, and connectedness, which are summarized in the subsequent.

**Salutogenesis: Self-efficacy** is an established concept that describes “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave.” (Bandura, 1994, p. 1). As such, self-efficacy is fundamental to sustainability behaviors since people typically become active if they believe they can achieve their desired outcome. For NEB|Lab Eco<sup>2</sup>-School, a composite scale of self-efficacy and locus of control, a 32-item scale, by Anderson et al. (2007) is used.

**Salutogenesis: Locus of control** is measured within the same tool as self-efficacy, a 32-item scale published by Anderson et al. (2007). The concept describes the perceived control of human beings, i.e., to what extent people feel they have control over their actions. Instead of life being controlled by external factors, a positive locus of control describes an internal belief to control one’s life, thus one’s actions to combat the environmental crisis and act more sustainably. If people believe all their actions were in vain hope – feeling passive and incapable of making a change – chances to engage pro-environmentally are low. If people, on the other hand, have perceived control, changes to engage pro-environmentally increase. Since NEB|Lab Eco<sup>2</sup>-School aims at people’s involvement, it is expected that they experience their control to combat the crisis, live a more sustainable life, and thus show increased locus of control scores through the NEB|Lab Eco<sup>2</sup>-School project.

**Salutogenesis: Sense of Coherence** is fundamental to salutogenesis as it reflects a person’s capability to cope with stressors through resilience (Antonovsky, 1993). It comprises feeling confident that everything happening is structured, thus predictable and explicable, which entails being better able to cope with difficult situations. Sense of coherence not only helps understanding and coping with everyday issues, but entails having access to resources to do so, and also that those challenges are worth engaging. NEB|Lab Eco<sup>2</sup>-School aims to give meaning to sustainability issues, provides people with the resources to combat sustainability issues, and displays the importance and worth of engaging in doing so. Therefore, the Sustainable Citizenship Model contains a 12-item scale to cover the sense of coherence. The version used originates from Antonovsky’s (1993) well-established scale and was adapted by Rajesh et al. (2015) to an abbreviated version for school use, thus targeting the users of the building within NEB|Lab Eco<sup>2</sup>-School.

**Salutogenesis: Connectedness with Nature** is a 1-item scale to assess people’s feeling of connection with nature, the extent to which nature is incorporated in one’s self-concept (Liefländer et al., 2013). The scale thus represents people’s relationship with nature. The scale was included in the Sustainable Citizenship Model since it is quick and easy to respond yet established and validated. People must choose one out of 7 graphics with each depicting 2 approaching circles; the continuum goes from 2 separate circles to 2 overlapping ones.

The questionnaire of to assess the social impact on the users of the building is extensive in its first assessment since sound models require an extensive data base. After analysis, the model will be reduced in its items to test the most promising ones. Those results will be part of a later deliverable.

#### 4.1.2 Preliminary results of the data collection

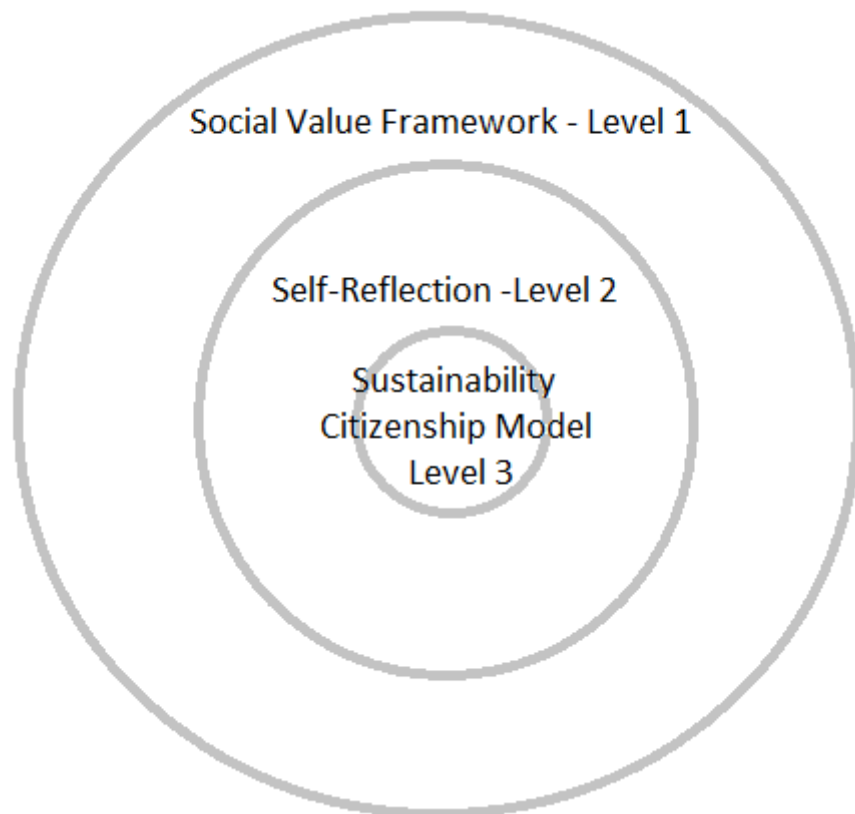
So far, data on level 3 has been collected in three of the five pilot sites. The data collection of the remaining two pilot sites is due. Study participants received digital questionnaires via a QR code that

could be completed by using a smartphone, tablet, or computer. The platform *Microsoft Forms* was used for data collection. The following number of students completed the questionnaires:

- Ellinogermaniki Agogi (Greece): 333
- Sigtuna (Sweden): 142
- Ciência Viva (Portugal): 184

#### 4.2 Link between social impact assessment tools

There are various parameters in environmental psychology research, such as interest (on a cognitive level), norms (on an external level), or attitudes. Preliminary results refer to the third level (i.e., impact on the users of the building) that we expect to interrelate with the data of the Self-Reflection tool and the Social-Value Framework. While the openness level (i.e., level 2: Self-Reflection tool) of the educational building affects the users of the building and the value orientation of the community alike, the users of the building and the community are inevitably interlinked, thus affecting each other which might result in a positive feedback loop.



**Figure 8: The relationship of the 3 levels of the social impact assessment with increasing complexity toward the inner of the circle; while the Self-Reflection Tool is fairly complex to answer and meant for institutional staff to answers, the Social Value Framework is meant for a broad audience as it targets the community of the educational buildings. As such, it is concise and easy to answer. The most complex instrument is necessary to monitor the impact of the proposed activities on the cultural and conceptual change of the users of the educational building.**

Figure 8 illustrates the relationship between the three tools and levels of the social impact assessment. As the circles illustrate, one domain inevitably affects the others, thus creating a positive feedback loop among those domains. One the school, e.g., improves in its openness and participation, the users

of the building and the community will benefit, accessible via the presented measurement tools. The level's relationship is listed as hypotheses:

- I. The more open the educational building (assessed with the Self-Reflection Tool), the more the social values of the community and sustainable citizenship competencies improve.
- II. Improved sustainable citizenship competences and value orientations allow for a school to become better in its openness, provide more activities, and engage more people, thus creating a positive feedback loop. It is thus a drive for overall school improvement, e.g., initiating new ideas.
- III. Improved sustainable citizenship competencies help better understand and thus use open school environments and opportunities for community engagement, thus improving the value orientation of the community.

## 5 Conclusions

The document provides an overview of social value assessment at three levels, at community level, at the organization level and the impact on the users of the building. The complexity of the tools proposed is increasing at each level to monitor the conceptual and the cultural change of the participants in the proposed interventions.

The document presents the main perspectives on social value assessment to select the tool/tools that is suitable for the NEB|Lab Eco<sup>2</sup>-School project. The Social Impact Assessment Tool tool is presented in detail for other buildings to use so NEB|Lab Eco<sup>2</sup>-School serves as a role model. Appendix 1 shows the questionnaire ready for use, while this document further provides step-by-step guidance for implementing the tool and analyzing results.

The document further provides detailed information on a self-reflection tool that helps measure educational buildings' openness for internal modifications and assess the impact of the NEB|Lab Eco<sup>2</sup>-School and other projects. Appendix 2 shows the questionnaire ready for use, while this document provides an overview of the development and validation of this already existing tool that originated from the OSOS project. Thus, it allows for trans-project evaluation.

Within level 3 of the social impact assessment – impact on the users of the building – a series of certified instruments are used to assess the effect of the retrofit project to the user communities of the building (e.g., school and university students, visitors of the science center, teachers, and pedagogues) and their competences (knowledge, skills and attitudes) towards energy efficiency and climate change. Appendix 3 shows the questionnaire ready for use.

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## 7 Annex 1: Social-Value Framework – questionnaire

1. People often express concern about environmental problems, but some differ on which consequences concern them the most. Please read through the following areas where environmental problems could have harmful consequences. For each area, please **rate how concerned you are** about their impact using a scale from 1 to 7.

If you are not at all concerned, give it a rating of 1. If you are highly concerned, give it a rating of 7. Of course, you can choose any number between 1 and 7 for your answer.

Thank you!

	1	2	3	4	5	6	7	
	not at all concerned				very concerned			
Marine life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Plants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
People in the United States*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The human race	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
People in your community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Your health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Your future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Your lifestyle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Your prosperity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note: \*United States refers to the original study and has to be adapted to the country in which the study will be conducted

### Open-ended, optional questions

Are there any other areas you are concerned about? If so, please indicate with the same numbers from 1 (*not at all concerned*) to 7 (*very concerned*) how concerned you are:

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Do you see any solution to the above concerns?

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## 8 Annex 2: Self-Reflection tool – questionnaire

Dear participant,

We would like to thank you for your participation in OSOS Project.

The first step for your involvement in the OSOS activities is to fill in the Self-Reflection Tool.

This tool will help you to identify the status of the school, according to the OSOS approaches, and to give you the needed information in order to choose the relevant strategy to follow during the implementation activities in the next period.

The tool has 24 sections (questions) in which you will have to choose one (1) out of four (4) statements. These statements correspond to the actual situation of the school at the time so you have to select the one that fit your status at the time.

We would like to kindly ask you to answer in each one of the following section. It will take 30-40 minutes of you time.

Your answers will be used only for the purposes of the OSOS Project.

		Enabled	Consistent	Integrated	Advanced
<b>MANAGEMENT LEVEL</b>	<b>Vision and Strategy</b>	The school is planning to develop a strategic plan in order to become an open school	The school has already developed a vision on how to become an open school. Mechanisms for implementations of the vision are being currently developed while teachers are involved in the process.	The school has begun implementing activities according to the defined Open School Approach	The open school approach is already integrated in all the activities of the school
	<b>Coherence of Policies</b>	The school management ensures that the school policies are coherent to the latest developments and also to the needs of the students, the teachers and the general community of the school.	The school considers comprehensive strategies to raise the quality in the teaching inside the organisation, including school leadership, and the attractiveness of careers at school, covering such aspects as teacher competences, qualification requirements, a continuum of teacher education and professional development, teacher evaluation, career perspectives and working conditions;	The school critically reviews policies on teachers and school leaders in line with any major changes to curricula, assessment, school organisation and funding, quality assurance etc., and vice versa, to ensure coherence in line with central policy objectives in school education;	The school involves stakeholder organisations in open and regular dialogue with the goal of increasing policy coherence and benefit from their experience and broad networks.
	<b>Shared Vision and Understanding</b>	The school shapes a common vision for open schooling that is shared between the teachers	The school opens fora or platforms to bring together perspectives from different levels of the system including central authorities, national stakeholder organisations; regional/local authorities and stakeholders, practitioners at school, pupils with their parents and families, local communities;	The school balances school autonomy with measures of accountability that support school development and help teachers and school leaders to shape schools as learning organisations; review quality assurance systems and the role of inspection in this respect	When defining policies and priorities for Continuing Professional Development, the school considers balancing needs at system and school levels with those of individual teachers and school leaders
	<b>Education as a Learning System</b>	The school creates a vision of change management, the school head participates in professional development on change management	The school builds capacity for change management, including the identification of change leaders, offering them professional development on change management, and other forms of support	The school sets up broad and inclusive consultation processes, to build trust and enhance support for reforms among stakeholders, and to inform policy-making;	The school considers regional or local partnerships to stimulate school development or support the implementation of specific reforms, e.g. model regions, local networks.
	<b>Responsible Research, Reflective Practice and Inquiry</b>	The school introduces the principles of responsible research, reflective practice and inquiry in the school practices	The school supports teachers in gaining research qualifications and conducting research, for instance by recognising and encouraging research as part of professional development; through grants for research projects or qualifications (e.g. PhD);	The school supports reflective practice to develop learner-centred teaching and assessment strategies; It rewards and stimulates innovation in teaching, and school practice more generally, for instance through grants, awards;	The school creates partnerships between schools and higher education institutions, focused on research, feedback loops between theory and practice (involving both teacher education providers and faculties of educational science); It instigates and develops training for peer-mentoring.
	<b>Motivation Mechanisms</b>	The school plans to set-up a mechanism aimed at motivating teachers and students undertake innovative projects	The school has already set a mechanism to motivate teachers and students undertake innovative projects	The majority of the teachers and students demonstrate a motivation to undertake innovative projects.	The school's motivation mechanism is evaluated and updated in regular base.
	<b>Plans for Staff Competences</b>	The school develops a plan to identify Teachers' Professional Development needs	The school has appointed a teacher or a team of teachers as responsible to identify and plan the whole school staff Professional Development needs.	The school is realising or participating in Teachers' Professional Development programmes	The school regularly updates the plan for the Teachers' Professional Development programme according to a needs analysis mechanism.

		Enabled	Consistent	Integrated	Advanced
	<b>Communication and Feedback Mechanism</b>	The school introduces a mechanism to communicate its Open School vision and strategy to all the stakeholders	School Management is communicating the vision and the strategy of the school to the teachers and students	School Management is communicating the vision and strategy with support from teachers and students as well as to external stakeholders	The school collects feedback about the vision and the strategy after communicating to all the stakeholders.
<b>PROCESS LEVEL</b>	<b>School Leaders and Teachers Shaping Learning Systems</b>	School leaders and teachers are acknowledged and respected for their expertise and their contribution to every day school activities	The school creates opportunities for school staff to diversify careers by taking on additional roles to classroom teaching/school leadership, at school (coordinating or leadership roles; support to colleagues, including mentoring, professional development, involvement in school development, (international) project work, extracurricular activities, cooperation with external partners);	The school creates opportunities for school staff to become involved in developing the open school approach (school evaluation; policy dialogue; policy development etc.)	The school creates opportunities for/encourage/support school staff to engage in school-to-school networks to share expertise and teaching resources, spread innovation or support school development
	<b>Creating an inclusive environment</b>	School has identified the national or European guidelines concerning inclusiveness	Teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language).	Most of the teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language).	Majority of teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language) and collaborate with schools at local or national level.
	<b>Collaborative environments and tools (co-creation, sharing)</b>	The school sets-up the needed infrastructure to enable teacher and students to create a collaborative working environment	Teachers and students are using collaborative environments for limited classroom activities	Teachers and students are regularly using collaborative environments in their classroom activities and develop and share content.	Teachers and students are regularly use collaborative environments in their classroom activities and co-create content with other schools.
	<b>Implementing Projects</b>	The school has selected the accelerator(s) that aims to implement in one classroom	The school has developed a specific plan to involve several classrooms to implement more than one accelerators.	The majority of teachers incorporate accelerators in their classroom	Teachers have integrated the use of accelerators in all the classrooms and they are developing their own accelerators
	<b>Parents and external stakeholders' involvement in school's activities/projects</b>	Parental and external stakeholders' engagement is evidenced through projects that the school has initiated.	Parental and external stakeholders' engagement is embedded in most of the school's activities.	Parental and external stakeholders' engagement is embedded in the majority of the school's activities. Initiated an ongoing monitoring and evaluation of interventions.	Parental and external stakeholders' engagement is embedded in all the school's activities and is initiated by them. An ongoing monitoring and evaluation of interventions is established.
	<b>Reflect, Monitor, Debate</b>	The school conducts reflection, monitoring and debates as planned/initiated processes in the school's activities (involving teachers and students). These tasks are performed on components that have been identified as critical to the implementation of the OSOS Open School Strategy.	The school performs regular analysis and evaluation of the data collected from the reflection, monitoring, and debates with teachers and students.	The school produces regular reports on the findings of the reflection, monitoring and debates. The reports are distributed to teachers, students, parents as well as the school management and relevant improvements are realized.	The school produces regular reports on the findings of the reflect, monitoring and debates with all the stakeholders. The reports are distributed to all the stakeholders and relevant improvements are integrated in the school's development plan.

		Enabled	Consistent	Integrated	Advanced
	<b>Learning Processes adaptation</b>	There is evidence of teachers (0-25%) adapting learning processes according to implementation results.	Some teachers (25-50%) adapt learning processes according to established feedback mechanism involving all stakeholders	The majority of the teachers (50-85%) are adapting learning processes according to established feedback mechanism involving all stakeholders	All teachers and students propose improvements and adaptations according to feedback from all stakeholders, regularly.
	<b>Established collaboration with local, national institutions</b>	There is evidence of teachers (0-25%) collaborating with local and/or national research/science institutions	Some teachers (25-50%) implement projects with the collaboration of local and/or national research/science institutions	The majority of the teachers (50-85%) are implementing projects with the collaboration of local and/or national research/science institutions	Collaboration of local and/or national research/science institutions is embedded in all the school's activities. An ongoing monitoring and evaluation of interventions is established.
<b>TEACHERS' PROFESSIONAL DEVELOPMENT</b>	<b>Teacher Awareness and Participation</b>	Teachers are introduced and offered to engage in Professional Development opportunities	Teachers are aware of and many have participated in Professional Development programmes (e.g. Summer Schools, Mobility actions)	The majority of the teachers have participated (individually or as whole school) in Professional Development programmes.	Teachers meet their professional needs through active participation in communities of practice, peer to peer networks and accredited practice-based research
	<b>Setting Expectations</b>	The school sets a framework of clear and tangible expectations for each member of the school community	The school creates transparency on the competences required from teachers at different stages of their involvement through frameworks or standards	The school involves teachers and other relevant stakeholders in its development and regular reviews its governance tools to ensure broad buy-in, relevance and usefulness	The school ensures that expectations as set out in the school framework of clear and tangible expectations for each member of the school community are aligned with teacher education curricula, as well as with school curricula
	<b>Professional Culture</b>	The school encourages and supports collaboration among staff for teaching (e.g. team teaching; sharing of teaching resources) and staff learning.	The school encourages cross-school networks and digital platforms to support (a culture of) collaboration in the teaching profession.	The school supports a culture of collaboration by avoiding situations that could encourage counterproductive competition between individuals  The school strengthens recruitment and retention of qualified staff by focusing on school ethos or professional culture	The school encourages links between schools and providers of teacher education; It supports systematic induction of beginning teachers, and teachers new to the school.
	<b>Professional Competences, Capacity Building and Autonomy</b>	The school clarifies the definition of CPD for school staff, with a preference for a broad, open and inclusive concept that is operational at the same time (including formal, informal and non-formal forms of professional learning)	The school considers making CPD an obligation/explicit duty, and allocating working time to it	The school aligns priorities with real needs at different levels (teachers' individual learning needs, school level needs,) and review systems of priority setting if needed (at which level, by whom) It encourages professional development cultures at school: this may include reviewing decision-making on priorities and funding allocation; the use of CPD plans by schools/individual teachers; links to teacher appraisal	The school supports self-regulation of the profession (e.g. through a teaching council or consultation processes)

		Enabled	Consistent	Integrated	Advanced
	<b>Leadership Competence</b>	The school creates transparency on the competences required from school leaders, for instance through competence frameworks or standards	The school ensures transparency and common understanding on the leadership competences of teachers (at different stages of their career)	The school reviews teacher education, including CPD available to ensure it addresses leadership competences	The school promotes forms of distributive leadership with broad involvement of staff at school
	<b>Collaborative learning (mobility actions)</b>	There is limited sharing of innovative practices among the teachers of the school	Teachers in the school are sharing and collaborating in innovative projects in an informal manner	Teacher regularly share their innovative projects and collaborate within the school as well as with other schools	School supports and facilitates peer to peer learning in open schooling practices through mobility actions and other formal approaches.
	<b>Collaborative learning (ICT Competences)</b>	Professional Development is focused on basic ICT skills	Some teachers participate (25-50%) in Professional Development Programmes aimed at introducing collaborative learning through digital platforms	The majority of teachers (50-75%) participate in Professional Development Programmes introducing collaborative learning through digital platforms	School identifies and designs its whole school Professional Development programme for collaborative learning through digital platforms, delivered also to other schools.
	<b>Use and reuse of resources</b>	Teachers are offered the opportunity to engage in web communities and avail of online resources to support teaching practices	Teachers in the school use online resources and share self-developed resources.	Teachers regularly uses online resources from web communities and portals in their classroom.	Teachers confidently share their online resources within their own school and with other schools.





## 9 Annex 3: Sustainable Citizenship Model

### 9.1 Intro

Dear student,

Thank you for participating in this science project.

This questionnaire will be treated **strictly confidential**.

Your teacher will **not** read or grade your answers.

Please work **on your own** by rating your knowledge, feelings, thoughts, or habits on the scales.

Please respond to each question by only marking **one** box.

Thank you!

### 9.2 Demographics

#### Generating codes

1. My date of birth is

- Month \_\_\_\_\_
- Year \_\_\_\_\_

2. My gender is

- Female
- Male
- I prefer not to respond

3. My school grade is

- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Alternative for adults:

3. My relation to the eco-building is:

- Visitor
- Teacher
- Pedagogue
- Other: \_\_\_\_\_

## Further information

4. My **science** grades are:

- not so good
- average
- good
- very good
- excellent

Alternative for adults:

4. In general, my **science** grades at school were:

5. In general, my **school** grades are:

- not so good
- average
- good
- very good
- excellent

Alternative for adults:

5. In general, my **school** grades were:

6. How often do you talk about the **science** you learn at school at home?

- never
- once every few weeks
- two or three times per week
- once per week
- every day

Alternative for adults:

6. How often do you talk about **science** topics at home?

7. How often do you talk about **environmental issues** at home?

- never
- once every few weeks
- two or three times per week
- once per week
- every day

8. I live in:

- a rural area/ village
- in an urban area/ city

9. I live in:

- an apartment/ a flat
- a house

10. I share my room at home with:

- my siblings
- pets
- my siblings and pets
- I don't share my room with anybody.

Alternative for adults:

10. I have pets:

- yes
- no

11. I live

- on my own
- in a shared flat
- with my partner
- with my family

### 9.3 Knowledge

1. Carbon dioxide causes problems because

- it increases the greenhouse effect
- it damages plants
- it destroys the ozone layer
- it irritates the skin

2. What would happen on Earth if there was no greenhouse effect?

- It would be much colder.
- It would be much hotter.
- Temperatures would remain basically the same.
- It would be much darker.

3. How can we reduce carbon dioxide from the atmosphere?

- plant trees
- ride a bicycle
- wear clothes from natural fibres
- use wood as fuel

4. Increasing demand for meat reinforces the greenhouse effect. Which animals are responsible for the highest methane production?

- fish
- chicken
- pigs
- cows

5. Coal, mineral oil, and natural gas originate from

- sand
- stones
- plant materials
- bacteria

6. Which of the following is no renewable energy?

- solar energy
- fossil energy
- wind power
- biomass

7. What does sustainability mean?

- People only use as many resources as can re-grow.
- Resources are used most efficiently.
- Human impact on Earth is tried to be reduced.
- A shift to renewable energies

8. To save energy, it makes sense to...

- turn down the heat when airing a room.
- boil water in a pot without a lid.
- leave electric devices on stand-by.
- eat fast-food instead of cooking.

9. A river flowing over a waterfall has a lot of energy. Which of the following is made from waterfall energy?

- hot water
- solar power
- electricity
- drinking water

**10.** To combat climate change, EU policies demand to...

- increase renewable energy (wind, solar, biomass).
- improve energy emissions in buildings.
- reduce CO2 emissions from new passenger cars.
- address all of the above.**

**11.** Plants grow best in soil that is rich in...

- grains of sand
- lumps of clay
- layers of gravel
- decaying plants and animals**

**12.** Where do plants get energy from to make food?

- air
- soil
- water
- sunlight**

**13.** How can we mitigate climate change consequences on forests?

- impossible
- by planting species-rich mixed forests**
- by cultivating monocultures
- by protecting endangered species

**14.** What will **not** be a long-term effect of the greenhouse effect?

- glaciers will melt
- sea levels will rise
- sea temperature will decrease in oceans**
- global climate zones will change

**15.** How can you remove carbon dioxide from the atmosphere?

- planting trees**
- riding a bicycle
- burning woods
- wearing clothes made of natural fibres

**16.** I think my knowledge on climate change is

- Low
- Average
- Strong
- Very strong

Note: numbers in **bold** are from TIMSS 2019

## 9.4 Attitudes

Do you agree that:		strongly disagree	disagree	not sure	agree	strongly agree
		☹ ☹	☹	☹/☺	☺	☺ ☺
1	Nature is always able to restore itself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	People worry too much about pollution.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Building new roads is so important that trees should be cut down.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Society will continue to solve even the biggest environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Our planet has unlimited resources.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	We must set aside areas to protect endangered species.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	People have the right to change the environment (nature).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Human beings are more important than other creatures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	It makes me sad when nature is cleared to be used by humans.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Humankind will become extinct if we don't live in tune with nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I save water by taking showers rather than baths.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Industrial smoke from chimneys makes me angry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	To feed people, nature must be cleared to grow food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14	Worrying about the environment often holds up development projects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Only plants and animals of economic importance need to be protected.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Please indicate how often you do the following:</b>		never	rarely	some-times	often	always
		☹☹	☹	☹/☺	☺	☺☺
1	I ride a bicycle, take public transportation, or walk to school.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I reuse my shopping bags.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	For short distances (within 15 min), I walk or ride a bike.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	I leave electrically powered appliances (TV, stereo, printer) on standby.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I am a member of an environmental organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I ask my parents to buy seasonal produce.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	If I am offered a plastic bag in a store, I take it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I prefer products with eco-labels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	I collect and recycle used paper.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	In the winter, it is warm enough in my room to only wear a T-shirt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I read books, publications, and other materials about environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I have tried to persuade my parents to buy an energy-efficient car.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



13	On fieldtrips, I bring beverages in single-use packages.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I refrain from using battery-operated appliances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	I have pointed out unenvironmental behavior to someone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Items used from: Baierl, T. M., F. G. Kaiser, and F. X. Bogner (2022). The Supportive Role of Environmental Attitude for Learning about Environmental Issues. *Journal of Environmental Psychology* 81: 101799.#

<b>Do you agree that:</b>		strongly disagree	disagree	not sure	agree	strongly agree
		☹☹	☹	☹/☺	☺	☺☺

1	I like the quiet of nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I would help raise money to protect nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I like a grass lawn more than a place where flowers grow on their own.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	It is interesting to know what creatures live in ponds or rivers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Weeds are as important as beautiful flowers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Please indicate how often you do the following:</b>		never	rarely	some-times	often	always
6	Even when it is very cold or rainy, I go out for a walk.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	I take time to watch the clouds pass by.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I take pictures of nature such as stones, butterflies, or insects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	I feel a need to be out in nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Watching animals is exciting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11	I prefer spending time with friends rather than being alone in nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I enjoy trips to the countryside and nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	I watch TV shows that have animals as main characters.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I hike or run in nearby nature reserves or forests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Items used from: Brügger, et al., 2011, and Bogner & Wiseman, 1999 (for more details, see table below)

Do you agree that:		yes	no	not sure
		☹ ☹	☹	☹/☺
1	I enjoy gardening.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I prefer indoor to outdoor sports.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I prefer living in a city.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	As a child, I spent much time outdoors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	My favorite place is in nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Listening to the sounds of nature makes me relax.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	If there is an insect at home, I try to catch and release it outdoors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I feel the need to be out in nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Pets are part of the family.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	I prefer forest hikes to city strolls.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	The noise of animals gets on my nerves.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12	I personally take care of plants.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Walking through a forest or wilderness area makes me forget about my daily worries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	A cleared forest makes me miserable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	If one of my plant dies, I reproach myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Indoor plants are part of the family.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Items used from: Brügger, A., Kaiser, F. G., & Roczen, N. (2011). One for all? *European Psychologist*, 16(4), 324–333; and: Bogner, F. X., & Wiseman, M. (1999). Toward measuring adolescent environmental perception. *European Psychologist*, 4(3), 139–151.

## 9.5 Salutogenesis

### 9.5.1 Self-efficacy

Included in Locus of Control

### 9.5.2 Sense of School Coherence

Do you agree that:		strongly disagree	disagree	not sure	agree	strongly agree
		☹☹	☹	☹/☺	☺	☺☺
1	I was surprised by the behavior of people whom I thought I knew well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I don't really care about what goes on around me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Until now, my life has had very clear purpose or goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Doing the things I do every day is a source of deep pleasure and satisfaction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I am often in unfamiliar situations and don't know what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	People I counted on have lately disappointed me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	I am being treated unfairly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

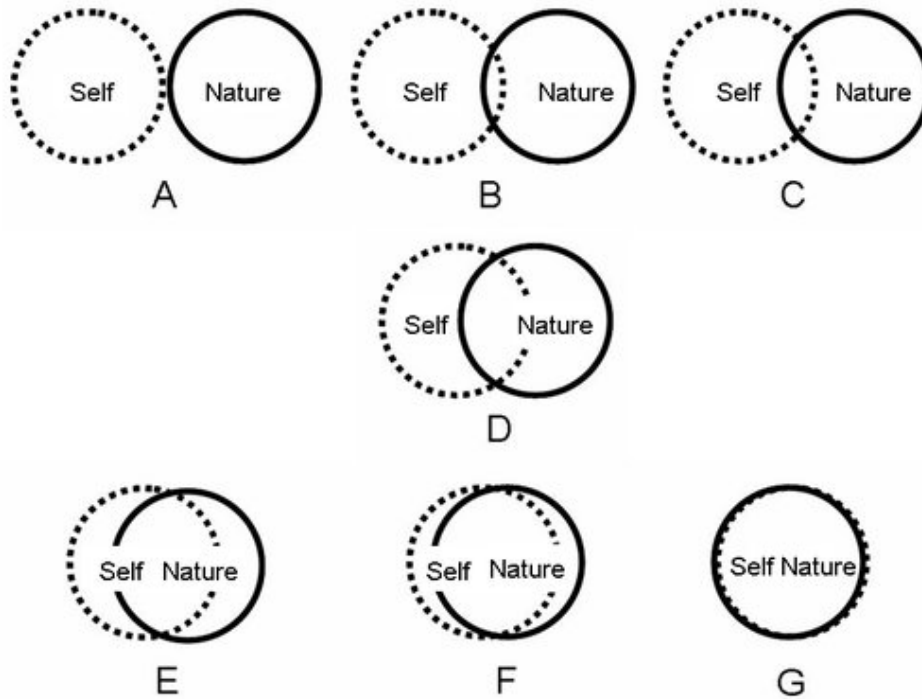
8	I have mixed-up feelings and ideas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	There is little meaning in the things I do in daily life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	I have feelings inside that I would rather not feel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Many people, even those with strong character, sometimes feel like losers in certain situations. I fell the same.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I am often not sure I can keep my feelings under control.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Comprehensibility, Manageability, Meaningfulness

Derived from the original SOC-12 by Antonovsky; copied from Rajesh G, Eriksson M, Pai K, Seemanthini S, Naik DG, Rao A. (2015). The validity and reliability of the Sense of Coherence scale among Indian university students. *Glob Health Promot*, 23(4):16–26.

### 9.5.3 Inclusion with Nature

Please circle the picture below that best describes your relationship with the natural environment. How interconnected are you with nature?



Liefländer, A. K., Fröhlich, G., Bogner, F. X., & Schultz, P. W. (2013). Promoting connectedness with nature through environmental education. *Environmental Education Research*, 19(3), 370–384. <https://doi.org/10.1080/13504622.2012.697545>

#### 9.5.4 Locus of Control & Self-Efficacy

Do you agree that:		strongly disagree	disagree	not sure	agree	strongly agree
		☹ ☹	☹	☹/☺	☺	☺ ☺
1	Whether or not other people respect my wishes is mostly up to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I feel like what happens to me in my life is mostly determined by powerful people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	To a great extent my life is controlled by accidental happenings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Sometimes I feel like I have no ideas and don't want to do anything.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Whether or not I have an accident depends entirely on my behavior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	When I make plans, I am almost certain to make them work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Often there is no chance of protecting my personal interests from bad luck happenings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I don't like ambiguous situations, because I don't know how to behave or what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	When I get what I want it's usually because I'm lucky.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Other people often prevent my plans from becoming reality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I can do a lot to protect myself from disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I often don't know what to do to make my wishes come true.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Much of what happens to me in my life is a matter of coincidence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	My life is chiefly controlled by powerful others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15	Whether or not I have an accident is mostly a matter of luck.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<b>Do you agree that:</b>		strongly disagree	disagree	not sure	agree	strongly agree
		☹ ☹	☹	☹/☺	☺	☺ ☺
16	I know many ways of protecting myself from diseases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	I have very little chance of protecting my personal interests when they conflict with those of other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	It's not wise for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Getting what I want requires pleasing those people above me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	In unclear or dangerous situations I always know what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	It is sheer coincidence when somebody else ever considers my wishes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	My wellbeing depends to a great extent on the behavior of other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	I can pretty much determine what will happen in my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Sometimes I just don't know at all what to do in a given situation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	I am usually able to protect my personal interests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Whether or not I have an accident depends to a large extent on the behavior of others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	When I get what I want, it's usually because I worked hard for it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	I can usually think of many alternative ways of dealing with even difficult situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	In order to have my plans work I make sure that they fit in with the desires of people who have power over me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



30	My life is determined by my own actions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Whether I fall ill or not is a matter of fate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	I can usually think of many ways of solving problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: I = internality, SK = self-concept of own ability, P = social externality, C = fatalistic externality; high scores (= 48) indicate high levels of competency and control; originally six-point Likert type ranging from *not at all true* to *very true*; derived from: Anderson, A., Hattie, J., & Hamilton, R. J. (2007). Locus of Control, Self-Efficacy and Motivation in Different Schools: Moderation, the Key to Success? *Educational Psychology*, 25(5), 517-535.

## 9.6 Psychological Distance

Do you agree that:		strongly disagree	disagree	not sure	agree	strongly agree
		☹ ☹	☹	☹/☺	☺	☺ ☺
<b>1</b>	My local area is likely to be affected by climate change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2</b>	Climate change will mostly affect areas that are far away from here.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3</b>	My first thoughts about climate change are how it will impact my country.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4</b>	Climate change will mostly affect developing countries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>5</b>	Climate change is likely to have a big impact on people like me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>6</b>	I don't think climate change will harm people I know.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>7</b>	Recent impacts of climate change mean we must tackle the issue now.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>8</b>	Climate change is harming people right now all over the world.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>9</b>	Future generations are more likely to feel effects of climate change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>10</b>	I am uncertain that climate change is really happening.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>11</b>	The seriousness of climate change is exaggerated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>12</b>	Most scientists agree that humans are causing climate change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>13</b>	It is uncertain what the effects of climate change will be.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>14</b>	There is a lot of agreement among scientists that climate change is happening.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Geographical/ spatial distance; social distance; temporal distance; hypothetical distance; **bold** numbers indicate items from: Spence, A., Poortinga, W., & Pidgeon, N. (2012). The Psychological Distance of Climate Change. *Risk Analysis*, 32(6),

957-972.; *italics* indicate items from: Jones, C., Hine, D. W., & Marks, A. D. G. (2016). The future is now: Reducing psychological distance to increase public engagement with climate change. *Risk Analysis*, 37(2), 331-341.

## 9.7 Outdoor experience

Please indicate how often you do the following:		never	rarely	some-times	often	always
		☹☹	☹	☹/☺	☺	☺☺
1	I do outdoor sports.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I spend time on my own in nature or natural parks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I spent time to enjoy the quiet of nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	I do trips to the countryside and natural sides.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I walk through forests or wilderness areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I spent my leisure time with friends outdoors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	My family and I go hiking, for nature walks, or do picnicks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	My teachers plan lessons outdoors like in the school garden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	We work with natural objects during school lessons.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: **leisure/ individual experiences**; **social experiences**; **school experiences**; **bold**: from Appreciation

## 9.8 Skills (ecological footprint)

Please indicate how often you do the following:		never	rarely	some-times	often	always
1	I eat unpackaged foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I eat processed foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	My neighbours generate more trash than I and my family do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4	I travel by car.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I use the plane.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I use public transportation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	I eat eggs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I eat meat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	I eat fish.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	I eat dairy products.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I eat organic foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I eat seasonal foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	I throw away leftover foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I eat locally grown foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	I go to the movies or amusement parks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	I buy things I don't necessarily need.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	If possible, I walk or use my bicycle to get somewhere.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	I buy second-hand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	I order fast-food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	I buy clothes to look stylish and trendy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21	I use electric devices (e.g., TV, computer, tablet, smartphone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	I use non-reusable containers for lunches/ food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	I replace my electronic devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Note:** Consumption: foods, electricity, other goods; transportation

No.1-No.6: derived from the footprint calculator, adapted to the same response format (<https://www.footprintnetwork.org/resources/footprint-calculator/>); No.8-No.15 derived from Brot für die Welt (2020). [Teste deinen ökologischen Fußabdruck]. Abgerufen am [13.05.2021] von [<https://www.fussabdruck.de/>]; 16-20: self-developed; 10 **GEB**-items could be used additionally

Are you a

- Meateater
- Vegetarian
- Vegan
- Other (e.g., Paleo, Pegan): \_\_\_\_\_