EMISSION FREE EUROPEAN UNIVERSITIES

Strategic Development of Students' Sustainability Competences

in Engineering Sciences

Work Package #2

State-of-the-art analysis for universities

on their way to emission neutrality

Activity 2.3b

The EFEU Sustainability Awareness Index

DHBW Duale Hochschule Baden-Württemberg Stuttgart

Helsinki Metropolia University of Applied Sciences

Université Polytechnique HAUTS-DE-FRANCE

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REGISTRATION DATA

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List of Abbreviations

ECTS – European Credit Transfer and Accumulation System

EFEU – Emission Free European Universities

ESD – Education for Sustainable Development

DHBW - Duale Hochschule Baden-Württemberg (Baden-Wuerttemberg Cooperative State University)

HEIs – Institutes for Higher Education

IPL – Polytechnic Institute of Leiria

Metropolia - Metropolia University of Applied Sciences

SCF – Sustainable Competence Framework

SD - Sustainable Development

SDGs - Sustainable Development Goals

SDSR - Sustainable Development Social Responsibility

WPs – Work Packages

About this Publication

This publication presents an additional report the second work package of the Erasmus+ Strategic Partnership project, "Emission Free European Universities" (EFEU).

The report introduces an assessment tool – the EFEU Sustainability Awareness Indes (EFEU SAX). The EFEU SAX aims at the continuous assessment of sustainability awareness levels of universities different target groups (students, lecturers, staff). The overarching goal is to measure the impact of implemented measures to develop sustainability awareness of the target groups. The EFEU SAX was piloted first in summer 2024, followed by a survey in summer 2025.

This report is available via the project website at:

https://www.dhbw-stuttgart.de/efeu

EXECUTIVE SUMMARY

The Emission Free European Universities (EFEU) project aims to enhance sustainability competencies and achieve carbon neutrality in engineering programs at four partner institutions: Baden-Württemberg Cooperative State University (DHBW-Stuttgart), Polytechnic Institute of Leiria (IPL) in Portugal, Metropolia University of Applied Sciences in Helsinki, and Polytechnic University of Hauts-de-France (UPHF) in Valenciennes. A key objective is to raise sustainability awareness among students and staff. To this end, the EFEU team developed the EFEU Sustainability Awareness Index (EFEU SAX).

As part of work package #2 within the EFEU Project, a CO2-Calculator was developed, aiming to make environmental behavior measurable. Since environmen tally related behavior can sometimes encompass actions that contradict personal atti tudes, it is crucial to capture awareness of ecological sustainability. The primary chal lenge of the EFEU-SAX activity is to develop a standardized method for meas uring sustainability awareness at higher education institutions. The goal of this devel opment is to capture environmental awareness not only qualitatively but also to make it quantitatively measurable.

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1 Introduction

1.1 Context and Significance

Universities play a pivotal role in the sustainable transition of society. As institutions of education and research, they must lead efforts to equip future professionals with both technical competencies and awareness to act as passionate and dedicated change-makers. To meet these demands, universities must adapt their curricula to prioritise sustainability.

In this context, the Emission-Free European Universities (EFEU) Project aims to transform learning and teaching activities so that the campuses of institutions of higher learning within Europe can evolve into true beacons of sustainability. The project unites four European institutions: Duale Hochschule Baden-Württemberg (Stuttgart, Germany), Instituto Politécnico de Leiria (Leiria, Portugal), Metropolia Ammattikorkeakoulu Oy (Helsinki, Finland), and Université Polytechnique Hauts- de-France (Valenciennes, France).

Through the development of the EFEU Sustainability Awareness Survey, the EFEU team recognised the need to develop a standardised approach to comprehensively assess the sustainability awareness of students and staff among the partner universities. This tool will provide insights into awareness levels and identify the specific competencies that need further development.

1.2 Problem Statement and Objectives

The EFEU SAX framework aims to offer a more vigorous measure of respondents' sustainability awareness, providing a sound basis for adjusting sustainability initiatives and curricula and supporting interoperability among similar institutions.

This study aims to develop a questionnaire and index to assess sustainability awareness, with a particular focus on environmental sustainability, using a methodologically rigorous approach. By reviewing existing studies, it builds on established procedures and explanatory models that have demonstrated effectiveness in related research.

2 Current State of Research Field

The term " awareness" varies across disciplines, but a quite relevant definition was provided by Gier (2021). Gier analysed sustainability awareness based on numerous population-representative studies and defined it as a conscious, verbalised attitude, with attitudes being enduring readiness to react to objects, ranging from tangible items to societal issues. According to Rosenberg and Hovland's (1960) three-compo- nent theory, attitudes consist of affective (emotional), cognitive (beliefs), and cona- tive (behavioural intent) elements, which interact dynamically to shape overall atti- tudes toward sustainability.

Academic studies by Preisendörfer (1999), Franzen (2013), and Sonnberger (2024) were more descriptive when discussing the alignment of environmental awareness to psychological model of attitudes. They specified the major aspects of each dimension and summarised that the cognitive dimension requires an understand- ing of environmental threats, the affective dimension necessitates perceiving threats as undesirable, and the conative dimension involves the willingness to act.

On the issue of measuring awareness, the process remains challenging. Quasi-experiments, like those by Andersen and Mayerl (2022), suggest no clear influence of awareness on behaviour, requiring further causal analysis. The environmental at-titude-behaviour gap has also attracted considerable attention among behavioural and cognitive scientists. Although many studies have been undertaken, Gifford & Chen (2017) and Wyss et al. (2022) concluded that the mechanisms causing this discrep-ancy are not yet fully understood. Additionally, according to several researchers in-cluding Preisendörfer (1996), the measurement of cognitive attitudes is complex due to their hierarchical structures.

Competence, a broader concept than cognitive skills, refers to the ability to apply knowledge, literacy, and skills to address recurring problems (Hofer et al., 2011). A key concept of the sustainability competence discourse is literacy. Stibbe (2009) de- fines sustainability literacy as the knowledge, attitudes, and competencies needed to understand and act on environmental challenges. Interdisciplinary research by Stibbe (2009), Bianci et al. (2022) and Ehlers (2023) have identified a number of key sus-tainability competencies necessary for the 21st century, which will be explored in Chapter 2, as they form the basis for the development of the questionnaire.

Another consideration is that environmental awareness is influenced by socio-demographic factors, such as age, gender, education, and income (Preisendörfer, 1996). Dabija et al. (2017), therefore, argued that understanding the causes and impacts of key factors such as environmental, education, social, etc. including their linkages should be a focal research area for universities.

The literature reveals a number of existing tools dedicated to measuring environmental awareness. The International Social Survey Programme (ISSP) scale, widely used in international surveys, is based on three dimensions: conative, cognitive, and affective (Franzen, 2021). Empirical analysis, however, suggests a focus on two dimensions with no clear distinction between cognitive and affective elements, but the scale shows high reliability and validity. Comparisons with other scales, such as the New Environmental Paradigm (NEP) and Diekmann/Preisendörfer's scale, highlight similar issues and also the need for clarity in construct measurement.

In conclusion, the literature on measuring environmental awareness highlights its complexities. While some progress has been made in understanding its determinants, challenges remain in creating comprehensive measurement tools and defining certain gaps in comprehending awareness, attitude, and behaviour. Sociodemographic factors like age, gender, education, and income play key roles but require further exploration. Understanding environmental awareness remains crucial for furthering competencies that will be required in addressing the environmental challenges that communities face. Therefore, future research should focus on refining measurement tools, exploring causal links between awareness, action, behaviour as well as consid- ering the cultural and contextual factors that affect awareness.

3 Methodology - Development of the EFEU Sustainability Awareness Index

3.1 The Approach

This chapter outlines the methodology for developing a questionnaire to measure the Sustainability Awareness Index (SAX), which quantifies environmental sustain- ability awareness using survey responses. The project follows a systematic approach, starting with a literature review across sociology, psychology, sustainability studies, and relevant surveys (e.g., EFEU SAS – EFEU Sustainability Awareness Survey, ISSP, NEP, WVS – World Values Survey). Psychological concepts of attitudes—cognitive, affective, and conative—are central to the idea of sustainability literacy. Consequently, the research employs a twofold methodology: establishing a theoreti- cal base in literacy and analysing existing measurement tools.This approach ensures a scientifically grounded, empirically substantiated instrument. The evaluation tool is developed for measuring and comparing competencies within groups, particularly within the academic setting. The research undergoes a pre-test to identify weaknesses and will include a critical reflection on findings and future research directions.

3.2 Applied Methodology for Developing SAX

The SAX quantifies sustainability awareness through a structured questionnaire covering three dimensions: conative, cognitive, and affective. Each item is scored from 1 to 5, with higher scores indicating greater awareness. The index is calculated by averaging scores within each dimension, ensuring equal weighting across dimen- sions. The overall SAX score, ranging from 3 to 15, reflects an individual's sustainability awareness level. This approach allows for standardised, comparable assess- ments, and group comparisons can be made using radar charts, as discussed later in the work.

3.3 Survey Development Methodology

This section outlines the methods used to develop the SAX measurement instrument, a survey. Based on a thorough review of relevant studies and literature, the project team created a solid foundation for the instrument. Surveys are a widely used and standardised method to measure sustainability awareness across various popula-

tions, as demonstrated by studies by ISSP, WVS, Diekmann & Preisendörfer, and NEP. Given their established reliability, a similar survey approach is applied here.

The selection of questionnaire items is based on two methods: assessment of questions from existing measuring instruments followed by the combination of similar questions. A selection is made from these similar questions. They are either directly adopted or adapted to meet the needs of the SAX tool. These methods are explained further in the later sections of the paper.

3.3.1 Methodology for Question Formulation

The survey follows a structured approach, integrating relevant scientific principles into a cohesive model. Since environmental awareness is an attitudinal construct, the methodology is based on three domains: Cognition, Conation, and Affection.

Drawing from Stibbe's 2009 work, 26 competencies for environmental sustainability are categorised into 11 key sustainability competence fields. These fields are sourced from recognised literature such as Bianci et al. (2022) and Ehlers (2023). These are then integrated into cognitive, conative, and affective dimensions, reflect- ing core areas of sustainability awareness. These competencies, as illustrated in Figure 1, form the foundation of the questionnaire.

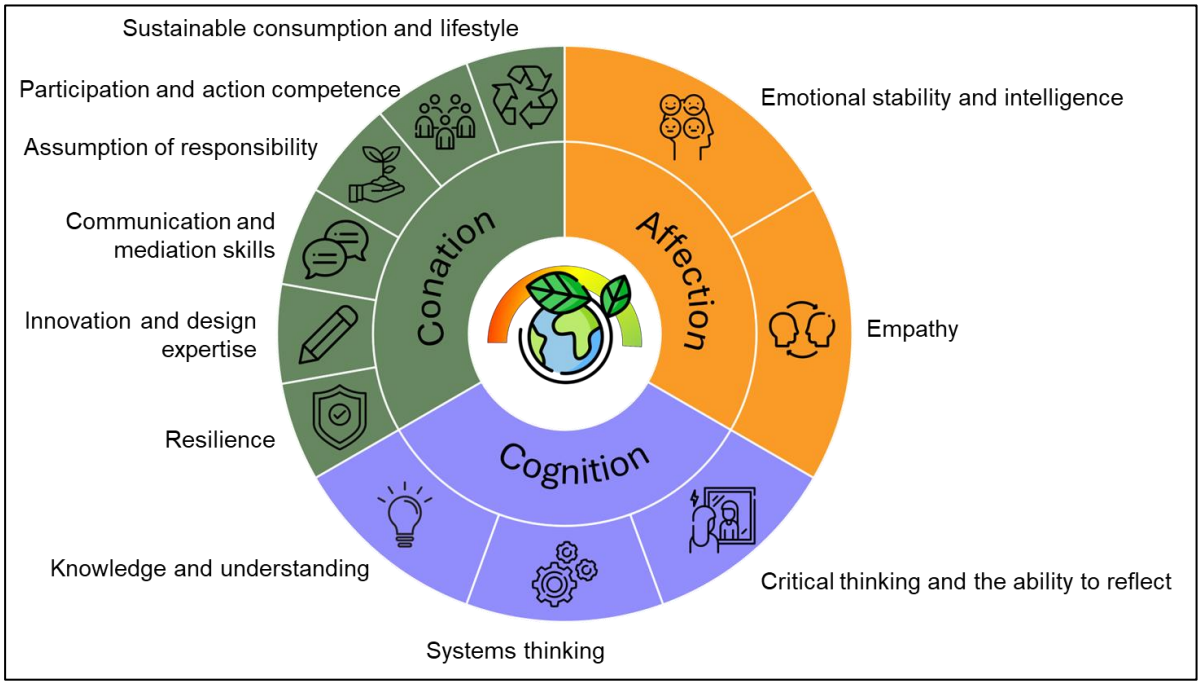


Figure 1: Assignment of Sustainability Competence Fields to Attitudinal Domains

Cognitive dimension and its fields of competence:

Knowledge and Understanding: This domain encompasses the understanding of ecological relationships and scientific findings. Competencies such as Ecocriticism, Grounded Economic Awareness, Ecological Intelligence, Gaia Awareness, and Carbon Capability fall under this area, as they impart foundational knowledge and understanding of ecological systems, their functioning, and the impacts of human activities.

Systems Thinking: This includes competencies like Systems Thinking, Complexity, Systems Thinking and Practice, and Commons Thinking. These fields of competence focus on the analysis and management of complex systems and their interactions. Systems thinking enables individuals to view environmental issues as part of larger systems and understand the effects of various actions on these systems.

Critical Thinking and Reflection: This domain includes competencies such as Advertising Awareness, Technology Appraisal, Values Reflection and the Earth Charter, and Futures Thinking. These competencies foster the ability to think critically about advertising, technology, and ethical principles, and to develop forward-looking strategies. Critical thinking is essential for questioning one's beliefs and actions regarding environmental sustainability.

Conative dimension and its fields of competence:

Sustainable Consumption and Lifestyle: Competencies in this area include Optimization and Effortless Action. They address conscious and resource-efficient consumption, as well as the implementation of ecological goals with minimal effort. This dimension directly relates to the behavioral changes necessary for living more sustainably.

Participation and Action Competence: Competencies such as Transition Skills and Greening Business fall under this domain. These empower individuals to actively contribute to the promotion of sustainability, whether through personal adjustments or initiatives within businesses.

Assumption of Responsibility: The competency Social Conscience promotes awareness of social responsibility towards community and environment. This domain emphasizes the ethical dimension of actions and the assumption of responsibility.

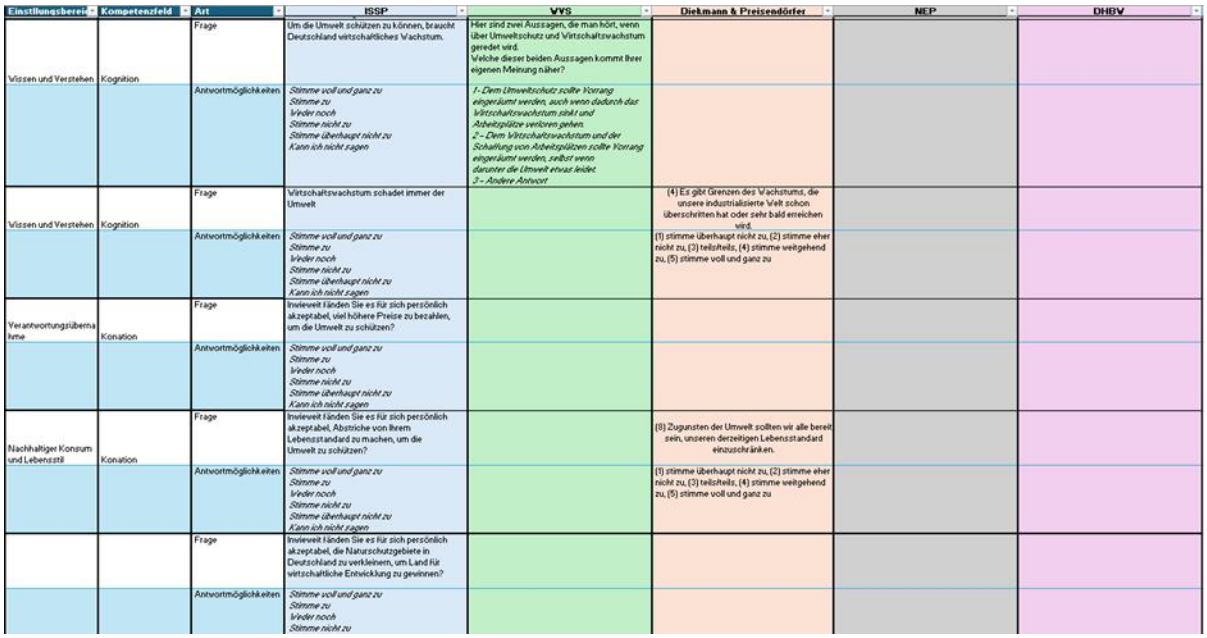
Communication and Mediation Competence: New Media Literacy belongs in this domain, referring to the use of new media to disseminate sustainability messages. This competency is crucial for raising awareness and engaging the public.
Innovation and Design Competence: Appropriate Technology and Design involves the development and adaptation of technologies to ecological conditions. This competency encourages innovative solutions to environmental challenges.
Resilience: Coping with Complexity is listed here, as resilience plays a central role in addressing complex environmental problems. This ability helps individuals embrace challenges and find long-term solutions.

Affective dimension and its fields of competence:

Empathy: Competencies such as Values Reflection and the Earth Charter belong in this domain, as they foster reflection on ethical and moral values. Empathy is essential for understanding and showing compassion towards the impacts of environmental changes on other living beings and future generations.
Emotional Stability and Intelligence: Emotional Well-being and Finding Meaning without Consuming are relevant competencies in this area, as they emphasize emotional well-being and finding meaning outside of material consumption. This dimension helps individuals develop a healthy relationship with the environment and their own consumption habits.

3.3.2 Empirically Grounded Question Development

This methodology systematically evaluates existing questionnaires assessing environmental awareness. First, relevant measurement instruments from previous research are identified and reviewed, including the EFEU survey. These are compared to identify content similarities and duplicates. In the second step, items that cover similar topics or contexts are recognised. Items deemed relevant by at least two studies are selected. Finally, in the third step, duplicated questions are categorised into three attitudinal domains: affection, conation, and cognition, forming the structure for the environmental awareness measure.



Einstellungsbereich	Kompetenzfeld	Art	ISSP	WVS	Diekmann & Preisendörfer	NEP	DHBV
Wissen und Verstehen	Kognition	Frage	Um die Umwelt schützen zu können, braucht Deutschland wirtschaftliches Wachstum.	Hier sind zwei Aussagen, die man hört, wenn über Umweltschutz und Wirtschaftswachstum geredet wird. Welche dieser beiden Aussagen kommt Ihrer eigenen Meinung näher?			
		Antwortmöglichkeiten	*Stimme voll und ganz zu Stimme zu Weder noch Stimme nicht zu Stimme überhaupt nicht zu Kann ich nicht sagen*	*1 - Dem Umweltschutz sollte Vorrang eingeräumt werden, auch wenn dadurch das Wirtschaftswachstum sinkt und Arbeitsplätze verloren gehen 2 - Dem Wirtschaftswachstum und der Schaffung von Arbeitsplätzen sollte Vorrang eingeräumt werden, selbst wenn darunter die Umwelt etwas leidet 3 - Andere Antwort*			
Wissen und Verstehen	Kognition	Frage	Wirtschaftswachstum schadet immer der Umwelt		(4) Es gibt Grenzen des Wachstums, die unsere industrialisierte Welt schon überschritten hat oder sehr bald erreichen wird.		
		Antwortmöglichkeiten	*Stimme voll und ganz zu Stimme zu Weder noch Stimme nicht zu Stimme überhaupt nicht zu Kann ich nicht sagen*		(1) stimme überhaupt nicht zu, (2) stimme eher nicht zu, (3) teilsteils, (4) stimme weitgehend zu, (5) stimme voll und ganz zu		
Verantwortungsübernahme	Konation	Frage	Inwieweit finden Sie es für sich persönlich akzeptabel, viel höhere Preise zu bezahlen, um die Umwelt zu schützen?				
		Antwortmöglichkeiten	*Stimme voll und ganz zu Stimme zu Weder noch Stimme nicht zu Stimme überhaupt nicht zu Kann ich nicht sagen*				
Nachhaltiger Konsum und Lebensstil	Konation	Frage	Inwieweit finden Sie es für sich persönlich akzeptabel, Abstriche von Ihrem Lebensstandard zu machen, um die Umwelt zu schützen?		(8) Zugunsten der Umwelt sollten wir alle bereit sein, unseren derzeitigen Lebensstandard einzuschränken.		
		Antwortmöglichkeiten	*Stimme voll und ganz zu Stimme zu Weder noch Stimme nicht zu Stimme überhaupt nicht zu Kann ich nicht sagen*		(1) stimme überhaupt nicht zu, (2) stimme eher nicht zu, (3) teilsteils, (4) stimme weitgehend zu, (5) stimme voll und ganz zu		
		Frage	Inwieweit finden Sie es für sich persönlich akzeptabel, die Naturschutzgebiete in Deutschland zu verkleinern, um Land für wirtschaftliche Entwicklung zu gewinnen?				
		Antwortmöglichkeiten	*Stimme voll und ganz zu Stimme zu Weder noch Stimme nicht zu*				

Figure 2: Structured analysis of selected questionnaires

Figure 2 illustrates a section of the table used in the structural analysis of selected questionnaires. Columns categorise questions by attitudinal domains, competence fields, and response options, while duplicated questions are aligned in the same row.

3.3.3 Development of a questionnaire through structural integration

The explanations of the competence bundling methodology conclude with the operationalization of the fields of competence categorized into attitudinal domains through specific items. The discussion of contextual duplication similarly ends in the third step with the assignment of the duplicated items to the attitudinal domains. At this point, the structures of the two methodologies are integrated through the "common denominator," the attitudinal domains (Figure 3).

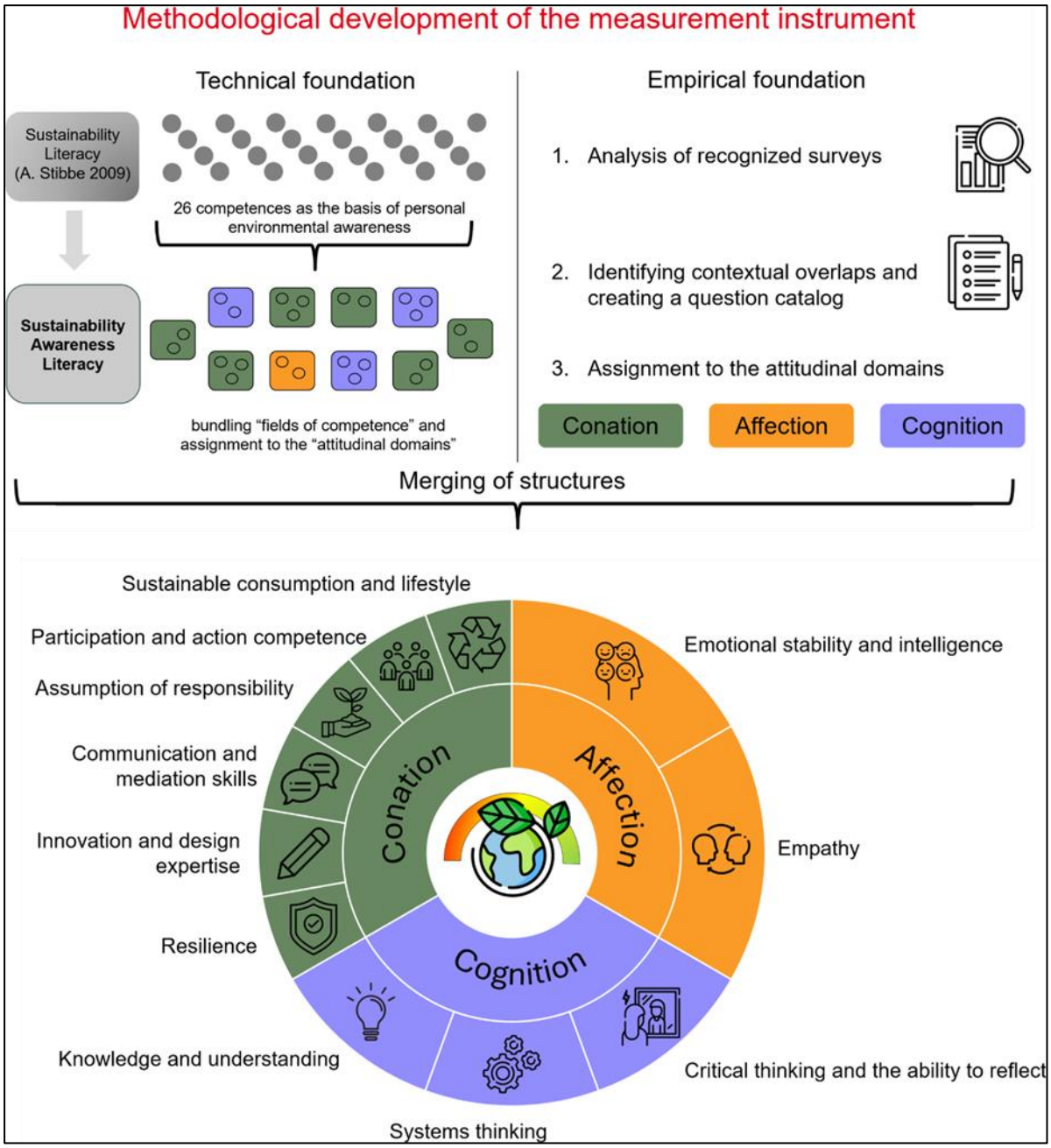


Figure 3: Structural integration of the theoretical and empirical methodological foundations

Based on the empirical foundation of a developed question catalog through the "method of contextual duplication," as well as the theoretical foundation of the developed fields of competence through the "method of field competence bundling," a valid structure is established that allows for a reliable selection of individual items for the questionnaire to be developed.

By systematically assigning the individual items from the developed question catalog to the derived fields of competence and attitudinal domains, it is ensured that the survey comprehensively and accurately measures the environmental awareness of the respondents. This structured approach guarantees the capture of all relevant dimen-

sions of environmental awareness and provides a solid basis for the analysis of the results.

3.3.4 Questionnaire Development: Integrating competence fields and survey reviews

Integrating competence fields and the review of existing and relevant surveys ensures a solid framework for measuring environmental awareness. These fields of competence and attitudinal domains serve as a "common denominator" to ensure comprehensive measurement of environmental awareness. The 16-item questionnaire directly addresses respondents and effectively measures conation, cognition, and affection. A pre-test with 18 participants will refine its clarity and applicability.

The list below provides the final questionnaire items developed for this project, with adjustments integrated from the pre-test exercise. The questionnaire consists of 16 items, and the environmental consciousness domain they measure.

Items 1.1 – 1.5: These items fall under the "Cognition" domain and "Knowledge and Understanding" competence, assessing the individual's understand- ing of climate change effects. For example, item 1.1 asks about the link between droughts and climate change, while other items assess knowledge of impacts on bio- diversity, displaced people, sea level rise, and ocean acidification. These items are taken verbatim from the EFEU survey.

Item 2: Also within the "Cognition" domain and "Knowledge and Understanding" competence, this item examines the conflict between environmental protection and economic growth.

Respondents are asked to formulate their personal stance on goal conflict: Should environmental protection take precedence even if it negatively impacts economic growth, or should economic growth be priori- tized even if it harms the environment? This item assesses whether the individual believes environmental protection or economic growth should take precedence, even if it negatively impacts the other. It measures the understanding of the relationship between environmental and economic issues and is taken from the WVS.

Item 3: Under the "Cognition" domain and "Systems Thinking" competence, this item evaluates the individual's understanding of the long-term global consequences of environmentally harmful behaviour. It is slightly modified from the ISSP.

Item 4: Also under "Systems Thinking," this item examines whether the individ- ual recognises the potential ecological catastrophe if human behaviour doesn't change, assessing understanding of the systemic links between current actions and climate change outcomes. It is taken from Diekmann and Preisendörfer's studies.

Items 5-6: These items fall under "Cognition" and "Critical Thinking and Reflec- tion." Item 5 asks if the individual perceives claims about human-caused climate change as exaggerated, measuring their critical approach to climate change. Item 6 examines whether the individual believes political measures are insufficient to com- bat environmental issues. Both assess reflective and critical thinking and are adapted from the ISSP. The project team combined items from Diekmann and Preisendörfer's study and the NEP to capture the competence field more comprehensively.

Item 7: This item belongs to the "Conation" domain and "Sustainable Consump- tion and Lifestyle" competence and measures the willingness to reduce one's standard of living for the environment. It assesses if environmental knowledge translates into sustainable behaviour and is adapted from Diekmann and Preisendörfer's study.

Item 8: Also in the "Conation" domain but within "Participation and Action Com- petence," this item measures the willingness to take environmental action, even if it requires greater effort. It is adapted from the ISSP, with a slight change in wording.

Item 9: This item, under the "Conation" domain and "Assuming Responsibility" competence, assesses the willingness to pay higher prices for environmental protec- tion, reflecting personal sacrifice for the common good. It is adapted from the ISSP with slight wording adjustments. The decision to include this item was made because it covers the competence field well and is empirically verified through the ISSP.

Item 10: In the "Conation" domain and "Communication and Mediation Compe- tence," this item assesses the individual's ability to convey environmental issues clearly, including using modern media. It was independently developed by the re- search team, as no existing questions met the criteria, and pre-test results confirmed its validity.

Item 11: This "Conation" domain item in the "Innovation and Design Compe- tence" field evaluates whether the individual feels capable of finding innovative so- lutions to environmental problems. It is taken directly from the ISSP and has proven applicability.

Item 12: Belonging to "Conation" and "Resilience," this item measures the indi- vidual's persistence in environmental protection, regardless of others' actions. It is verbatim from the ISSP.

Item 13: In the "Affection" domain and "Empathy" field, this item measures the individual's perception of others' concerns about climate change. It combines formulations from the NEP, ISP, and Diekmann and Preisendörfer studies.
Item 14: Also in the "Empathy" field, this item evaluates whether the individual believes plants and animals have rights similar to humans. It is slightly modified from the NEP.
Items 15–16: In the "Affection" domain and "Emotional Stability and Intelli- gence" field, Item 15 assesses the individual's ability to stay calm despite climate change threats (adapted from Diekmann and Preisendörfer). Item 16 examines emo- tional management regarding environmental issues, developed independently by the research team.

The response options for the items include a total of five levels of agreement: "Strongly agree," "Agree," "Neither agree nor disagree," "Disagree," and "Strongly disagree." This form of scale was adopted from the EFEU survey. Respondents thus have the opportunity to express their agreement in either a weaker or stronger form, to gradate their disagreement accordingly, or to remain neutral. The research team places particular emphasis on formulating the questions in such a way that no systematic correlation exists between the responses and the measured points of environmental consciousness. In some cases, agreement indicates a high level of environmental awareness, while in others, it suggests a lower level. For Item No. 3, a scale ranging from 1 to 5 is provided, which is considered optimal for measuring the perceived severity of impending environmental consequences. This suitability was confirmed in the pre-test.

3.4 Indexing as a Method

An index combines multiple indicators into a single variable, aiding in data anal- ysis by simplifying complex constructs (Latcheva and Davidov, 2014). It enables comparisons and the tracking of changes. The SAX captures cognitive, affective, and behavioural dimensions of environmental awareness, facilitating comparative analyses across student populations, administrative bodies, institutional policies, and universities. The results can be used to inform policy decisions, and ultimately foster more effective approaches to sustainable education.

The survey data collected is exported to Excel, with columns for respondent details and survey responses. For data analysis, the project provides an "evaluation tool," a

formatted and programmed Excel file. Responses are converted into awareness points using predefined rules. The rules are as such: Maximum points (full agreement indicates strong awareness); Minimum points (full agreement reflects low awareness), Scaling: higher scores indicate greater awareness, with "one" earning the lowest, and Thesis selection (choosing Thesis 1 indicates strong awareness, while Thesis 2 reflects lower awareness).

The calculated points and average values are depicted in the "Auswertung" worksheet. Based on this foundation, the index value is generated, and there is also the possibility to evaluate the awareness values across the attitudinal domains (highlighted blue, green, and orange in Figure 4). To calculate the SAX, the average of the responses within each of the three dimensions is determined. This methodology ensures that each dimension is equally weighted in the index, minimising distortions caused by individual responses. The average values of the three dimensions are then summed to represent the overall level. The tool defines a range for the SAX index, between 3 and 15 awareness points

The results are represented in various graphical visualisations. As illustrated in Figure 4, the green-highlighted area offers graphical elements to display the results for each item, while the beige-highlighted area provides direct insight into the cumu- lative attitudinal domains and fields of competencies. These graphical elements are presented in the "Darstellung" worksheet. In the future, this worksheet will be made available in both German and English, eliminating the need for translations for future presentations of the visualisations.

The value network plays a central role in the presentation of results. It is used to compare individual respondents with average values or to directly compare alternative freely definable measurement groups. Another important representation is the graphical overview of the distribution of awareness points per question. This visualisation clearly illustrates how the responses to the posed items are distributed, enabling an immediate comparison of how the average value was derived. Specific trends or focal points in the response behaviour can thus be quickly identified and interpreted in terms of their significance for sustainability awareness.

A pie chart complements the analysis by showing the profile and proportion of attitudinal domains within environmental awareness, highlighting their contribution to the overall index value. Finally, a separate chart illustrates the long-term trends of

sustainability awareness, showing changes in the SAX value over time. This chart assesses whether awareness is increasing, stagnating, or decreasing, revealing fluctuations and trends critical for evaluating effectiveness.

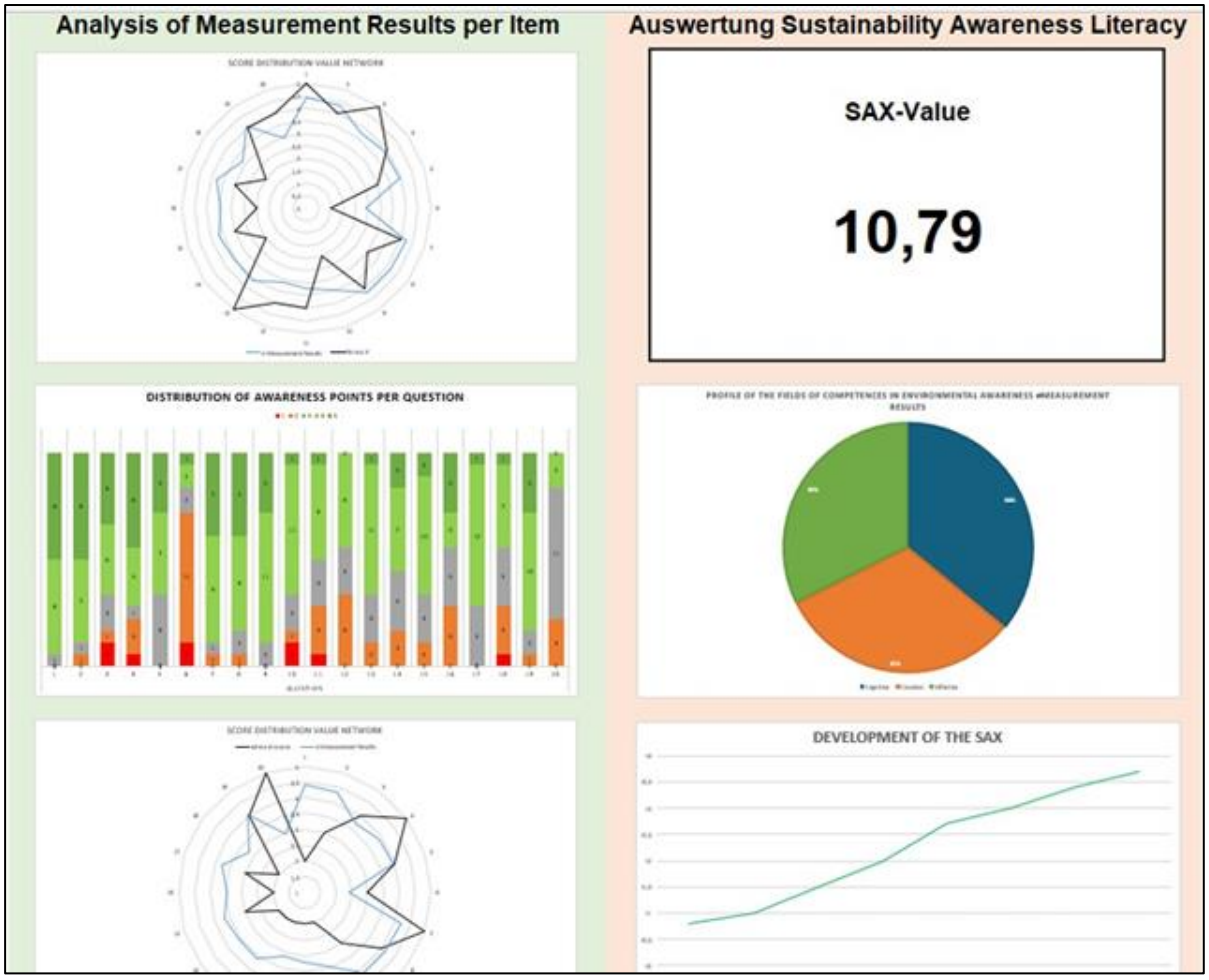


Figure 4: Visualisation of EFEU SAX pre-test results

The SAX framework includes instructions, makes it possible to update formulas, and allows up to 500 responses. The included quality criteria consider: one-dimen- sionality (items focus on distinct competencies), reduction (averages ensure simplic- ity and transparency), multiple indicators (mitigates random variations), weight-free validity (no bias from weighting), transparency (published formulas ensure valida- tion), and objectivity (based on neutral,scientific methods).

The SAX measures environmental awareness in higher education through an 11-competence, 3-domain questionnaire, producing standardised scores (3–15). It, therefore, aids universities in tracking trends, supports research in sustainability educa- tion, and provides evidence for adjusting or optimising sustainability offerings.

4 Conclusion

This project aimed to develop the Sustainability Awareness Index (SAX), a comprehensive tool to assess sustainability awareness across multiple attitudinal domains and incorporating environmental, social, and economic aspects. The development process involved a detailed review of existing frameworks, the creation of a robust questionnaire, and a series of empirical tests, such as pre-testing, to ensure the validity and clarity of the index. The final SAX represents a reliable and scientifically grounded measure of sustainability awareness that can be applied within an academic context .

The significance of the SAX lies in its ability to provide universities with a structured and standardised tool to evaluate sustainability awareness among students and staff. By assessing cognitive, affective, and conative components of sustainability awareness, the SAX allows for nuanced insights into the factors that shape attitudes and behaviours towards sustainability. The tool's potential for international comparisons further enhances its value, enabling universities to track sustainability efforts and share best practices across borders.

However, several challenges were encountered during the development process, particularly concerning the cultural and linguistic adaptation of the index. While the SAX shows promise in its current form, it would benefit from further validation and refinement, particularly in diverse international settings. Future research should fo- cus on enhancing the index's precision and exploring its potential for broader appli- cation, including incorporating additional sustainability dimensions such as social equity and economic factors.

In conclusion, the SAX represents a significant step forward in the measurement of sustainability awareness and serves as a foundation for future efforts to better understand and promote sustainable practices in higher education. By continuing to optimise this tool, universities can more effectively measure and promote sustainability awareness, ultimately contributing to the development of education that addresses the sustainability challenges confronting our communities.

5 The EFEU SAX Summer Study 2025

5.1 Key Results

As part of the European EFEU Project (Emission-Free European Universities), a summer survey was conducted in May 2025 to assess the sustainability awareness of students at the partner universities. The aim was to collect comparable data through a standardized questionnaire and thereby examine the development of the Sustainability Awareness Index (SAX) at different sites.

A total of 183 students participated in the survey. They were distributed across three universities, all of which are part of the international consortium:

- the Baden-Wuerttemberg Cooperative State University (DHBW) Stuttgart, Germany,
- the Polytechnic Institute of Leiria, Portugal,
- and the Université Polytechnique Hauts-de-France (UPHF), France.

The survey was conducted online and included 16 questions covering the dimensions of cognition, conation, and affection. This allowed not only for an assessment of knowledge about sustainability, but also of attitudes, values, and willingness to take personal action.

The overall results present a differentiated picture of sustainability awareness:
Strong basic awareness: A large proportion of respondents demonstrate a solid understanding of ecological challenges, particularly regarding climate change and resource use.
Differences in governance structures: Comparative values between universities suggest that institutions with firmly established sustainability strategies and stronger resource allocation tend to achieve higher SAX scores.
Individual behavioral level: While emotional agreement with sustainability issues is high, some reluctance can be observed in questions relating to personal behavioral change (e.g., consumption, mobility).

Overall, the survey confirms that sustainability is a relevant topic at all three universities, though the extent of institutional embedding has a measurable influence

on students' awareness. These findings provide the basis for further measures, such as strengthening sustainability in teaching, targeted awareness campaigns, and deeper integration of sustainability into everyday university life.

5.2 Structured Sustainability Governance (SSG) of Universities

5.2.1 Context and Sifgnificance

In order to adequately address the overarching research question regarding the potential influence of Structured Sustainability Governance (SSG) on the Sustainability Awareness Index (SAX), it was essential to first operationalize the concept of governance structures within higher education institutions. The degree to which sustainability is institutionally embedded cannot be captured through anecdotal evidence alone, but requires a systematic framework that makes organizational characteristics, strategic commitments, and operational measures both measurable and comparable. For this reason, a specific SSG indicator was developed, designed to reflect not only the formal integration of sustainability into the institutional framework, but also the extent to which governance mechanisms are consistently implemented and communicated across the respective universities.

The rationale behind establishing such an indicator lies in the necessity of creating a valid analytical basis for comparison across different higher education contexts. This measurement does not serve a descriptive purpose alone; rather, it enables an empirical examination of whether variations in structured governance are associated with measurable differences in sustainability awareness among students. By quantifying governance-related aspects, it becomes possible to assess to what extent the presence of clearly defined responsibilities, dedicated strategies, and institutionalized practices in sustainability governance correlate with higher levels of student awareness as reflected in the SAX. Consequently, particular emphasis was placed on ensuring that the measurement process was methodologically robust, transparent, and applicable across different institutional environments, thereby allowing for meaningful interpretation of potential causal relationships between governance and awareness.

5.2.2 Evaluation Criteria for SSG

In order to examine the status of SSG, the project participating universities developed a catalogue of evaluation criteria in the fields of a) strategy and leadership, b) organization and processes and c) fields of action.

Strategy and Leadership:

Strategic Anchoring

Strategic anchoring ensures that sustainability is firmly embedded in the guidelines and objectives of the university. It establishes commitment at the highest level and forms the basis for the long-term and consistent implementation of sustainability measures.

Responsibilities

Clear responsibilities are necessary to define accountability. Only when it is explicitly stated who is in charge of implementing and steering sustainability activities can measures be carried out effectively and monitored properly.

Resources

Without sufficient financial, human, and infrastructural resources, sustainability remains merely a declaration of intent. The allocation of resources demonstrates the actual willingness of the university to put sustainable strategies into practice.

Organization and Processes:

Stakeholder Involvement

The integration of various stakeholders, such as students, faculty, and external partners, enhances the acceptance and scope of sustainability initiatives. Only through the active involvement of stakeholders can a holistic sustainability strategy be successful.

Transparency and Reporting

Transparent decision-making processes and regular reporting ensure traceability and enable continuous improvement. This strengthens the credibility of the institution and builds trust among internal and external audiences.

Guidelines and Regulations

By implementing binding guidelines and regulations, sustainability is firmly anchored in organizational processes. They establish a clear framework and prevent sustainability from being left to voluntary or ad hoc initiatives.

Fields of Action:

Teaching and Research

Teaching and research represent the core responsibilities of a university. By integrating sustainability into these areas, long-term impacts on future generations can be achieved, fostering awareness and supporting the development of innovative sustainable solutions.

Operations and Campus Management

Campus management encompasses direct areas of influence such as energy efficiency, waste management, and facility operations. Here, sustainability becomes visible through the immediate reduction of ecological impacts.

Transfer and Social Responsibility

Transfer refers to the university's interface with society. Through partnerships, knowledge dissemination, and community engagement, the university can contribute significantly to sustainable development beyond its institutional boundaries.

To ensure comparability of results, the same traffic light system used for the Sustainability Awareness Index (SAX) was applied. This enables a standardized assessment and facilitates the analysis of the relationship between SSG and SAX.

5.2.3 SSG Evaluation Results

The evaluation is based on publically available sources (internet) published by the participating universities. The subsequent section outlines the point allocation and provides a cursory rationale for this distribution. A more comprehensive discussion of each individual allocation, complete with pertinent examples, is provided in Appendix 1 "SSG Evaluation – EFEU Summe Study 2025"

Strategy and Leadership

- Strategic Anchoring: DHBW Stuttgart (2.4) scores significantly lower than UHPF (3.5), which has firmly established sustainability as a core strategy. The Polytechnic of Leiria (3.2) is positioned in between.
- Responsibilities: DHBW (3.2) and UHPF (3.5) have clearly defined responsibilities, while Leiria is notably weaker at 2.7

Resources: DHBW (2.5) provides only limited resources, Leiria is even lower at 2.2, whereas UHPF achieves a much higher value of 3.5 with stronger resource allocation.

Strategy and Leadership		
Strategic Anchoring	Responsibilities	Resources
2,4	3,2	2,5
3,2	2,7	3,2
3,5	3,5	3,5

Figure 5: SSG Evaluation – Strategy and Leadership

Organization and Processes

- Stakeholder Involvement: DHBW (2.5) shows limited participation, Leiria is stronger at 3.1, while UHPF (3.6) demonstrates the highest level of participatory structures.
- Transparency & Reporting: DHBW (1.9) performs weakest, Leiria (2.6) is still in the development phase, while UHPF (3.2) is already much more advanced with measurements and publicly accessible reports.

Organization and Processes		
Stakeholder Involvement	Transparency & Reporting	Guidelines and Regulations
2,5	1,9	1,9
3,1	2,6	2,6
3,6	3,2	3,2

Figure 6: SSG Evaluation – Organization and Processes

Fields of Action

- Teaching & Research: DHBW (2.8) has first initiatives, Leiria (3.0) integrates sustainability more specifically, and UHPF (3.3) is most advanced with bachelor's and master's programs.
- Campus Management: DHBW (2.3) has implemented only a few measures, Leiria scores higher at 3.8, and UHPF (3.7) is similarly advanced

- Transfer & Social Responsibility: DHBW (2.6) is limited, Leiria (3.2) is more active in knowledge exchange, and UHPF (3.2) emphasizes societal impact strongly.

Fields of Action		
Teaching & Research	Campus Management	Transfer & Social Responsibility
2,8	2,3	2,6
3	3,8	3,2
3,3	3,7	3,2

Figure 7: SSG Evaluation – Fields of Action

5.3 EFEU SAX Summer Survey - Results

5.3.1 Survey Approach

The determination of the criteria followed a multi-step procedure. The starting point was the survey responses of students and staff, which were collected in a structured manner. The datasets were first cleaned (filtered by relevant groups, e.g., faculty, year/semester, age group) and then systematically analyzed.

The Sustainability Awareness Index (SAX) was applied as the guiding framework, which is based on three dimensions (cognitive, affective, and conative aspects). Responses were converted into numerical values according to predefined rules and evaluated in Excel. The mean values of the respective items generated the index scores, allowing for a standardized comparison between groups. This procedure enabled not only an overall assessment of sustainability awareness but also a differentiated examination of influencing factors such as semester affiliation or social environment.

To ensure comparability between universities and within the surveyed groups, the criteria were divided into eight main categories (e.g., strategic anchoring, responsibilities, resources, stakeholder involvement, transparency, teaching and research, facility management, and societal responsibility). Each category was assessed using a scoring scale, that reflects the respective stage of development. The categorization was guided by international standards (e.g., SDGs, national sustainability initiatives) and existing instruments, such as those described in the EFEU project. The evaluation combined quantitative elements (index values from the surveys) and qualitative aspects (analysis of institutional strategies and frameworks). In this way, a multidimensional picture was created, demonstrating the extent to which sustainability is embedded in the structures, processes, and awareness of university members.

To capture a more holistic view, the analysis will extend to two primary categories of external factors:

Private and Social Environment: An individual's immediate social circle—family, friends, and community—plays a crucial role in shaping their values and behaviors, including those related to sustainability. Research has consistently shown that social norms and peer influence can significantly impact an individual's pro-environmental behavior. For instance, if sustainability is a common topic of discussion within a student's peer group, they are more likely to exhibit higher awareness. This factor will be assessed using survey questions that capture the frequency of sustainability-related conversations and the perceived importance of sustainability within an individual's social network.

Demographic Characteristics: Demographic data provides a foundational layer for understanding potential differences in sustainability awareness across various groups. Factors such as age, gender, field of study, socioeconomic status, and geographic origin can all correlate with varying levels of environmental concern and knowledge. For example, some studies suggest that younger generations and those in fields like environmental science or social sciences may demonstrate higher levels of awareness. Similarly, an individual's socioeconomic background can influence their access to information and resources related to sustainable living, thereby impacting their awareness.

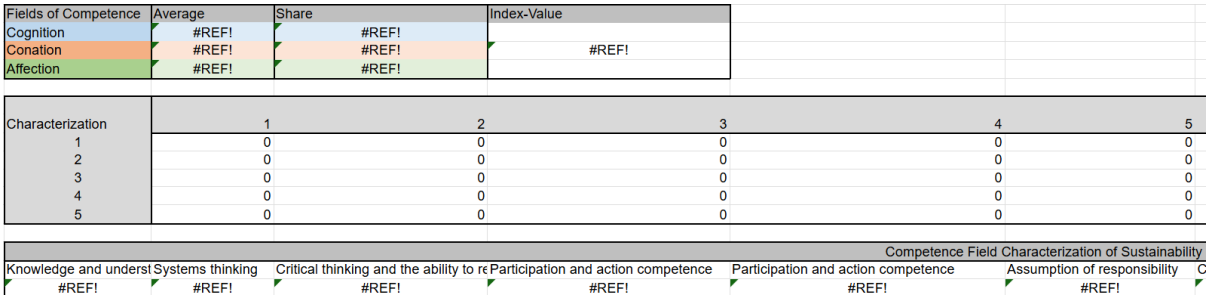
5.3.2 Data Analysis

To systematically analyze these factors, the following methodological steps will be employed:

Data Filtration: The raw dataset, which contains responses from students and staff, will be filtered based on specific criteria corresponding to the factors under investigation. This process allows for the creation of subsets of data, each representing a specific group (e.g., students from different faculties, individuals within a certain age range, or those who report a high level of family support for sustainability). This technique is essential for isolating the effect of each variable.

Calculation of the Sustainability Awareness Index (SAX): For each filtered subset of data, the Sustainability Awareness Index (SAX) will be calculated. This calculation

will be performed analogously to the method described in section 1, which involves aggregating and weighting responses from different survey modules (e.g., knowledge, attitude, and behavior). The resulting SAX for each group will provide a quantitative measure of their sustainability awareness, allowing for a direct comparison across different demographic and social categories.



Fields of Competence	Average	Share	Index-Value
Cognition	#REF!	#REF!	
Conation	#REF!	#REF!	#REF!
Affection	#REF!	#REF!	

Characterization	1	2	3	4	5
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0

Competence Field Characterization of Sustainability					
Knowledge and underst	Systems thinking	Critical thinking and the ability to re	Participation and action competence	Participation and action competence	Assumption of responsibility
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!

Figure 8: Determination of the sustainability awareness index

This comprehensive approach will not only measure the overall sustainability awareness within the university but will also provide nuanced insights into how personal and social factors contribute to or hinder this awareness. The findings will be crucial for developing targeted and effective interventions to promote a more sustainable campus culture.

5.3.3 Data Evaluation and Findings

The analysis of the dataset revealed a distinct and intriguing pattern. The following figures illustrate the key findings from this evaluation.

The results derived from the traffic light system confirm this relationship in a particularly clear way. Universities with green values in SSG, such as UPHF (10.23), also achieve the highest awareness levels in SAX (11.3). In contrast, DHBW Stuttgart shows red values in both categories, with 7.37 in SSG and 10.12 in SAX, demonstrating the weakest performance. Leiria, positioned in the orange range for SSG (9.13), similarly reflects this medium level in its SAX score (10.3). This parallel between governance and awareness values underlines the robustness of the correlation: the stronger the governance structures, the higher the sustainability awareness among students.

Sustainability Awarness Level	
DHBW Stuttgart	10,12
Leira	10,3
UPHF	11,3
Structured Sustainability Governance	
DHBW Stuttgart	7,37
Leira	9,13
UPHF	10,23

Figure 9: EFEU SAX Summer Survey 2025 – Key Findings

A comparative analysis of the Sustainability Awareness Index (SAX) across different semesters reveals a multi-stage trend. The SAX is initially high, experiences a sharp decline in the 2nd semester, and then begins to rise again in subsequent study years (Figure 10).

1st Year	Average	Index-Value
Cognition	2,5	
Conation	2,9	8,22
Affection	2,8	

3rd Year	Average	Index-Value
Cognition	2,4	
Conation	2,9	8,10
Affection	2,8	

2nd Year	Average	Index-Value
Cognition	2,4	
Conation	2,8	7,69
Affection	2,6	

Others	Average	Index-Value
Cognition	2,3	
Conation	2,8	7,56
Affection	2,5	

Figure 10: EFEU SAX Summer Survey 2025 - Key Findings per study year

This finding presents a more nuanced view of how university sustainability governance influences student awareness. Instead of a simple, linear decrease, the data suggests a cyclical pattern of engagement and re-engagement. This effect can be explained by several interconnected factors:

1. **Initial Engagement (Semester 1):** The initial high SAX values can be attributed to a "novelty effect" and the structured orientation phase. New students are highly receptive to campus-wide initiatives, including sustainability, as part of their acclimatization to the academic environment. They are more likely to attend orientation events and engage with general university messaging.
2. **The "Reality Check" (Semester 2):** The sharp decline in the 2nd semester likely corresponds to a "reality check" for students. As the initial excitement

wears off, they are confronted with a full academic workload and the pressures of their first major exams. Their focus narrows to core curriculum and passing their courses, causing extracurricular interests like sustainability to be de-prioritized.

3. **Deeper Re-Engagement (Semester 3 and beyond):** The subsequent increase in the SAX from the 3rd semester onwards indicates a deeper, more mature level of engagement. As students become more comfortable with their academic routine and their field of study, they may have more mental capacity to re-engage with broader topics. Furthermore, this rise is likely correlated with the curriculum structure. Many specialized and elective modules with a strong focus on sustainability are typically offered in higher semesters. Students who choose these courses or whose fields of study integrate sustainability will naturally show a higher level of awareness, contributing to the observed increase in the SAX.

The analysis revealed no evidence of a differential development among the cognitive, affective, and conative domains, as they demonstrated a proportional and correlational relationship across the dataset.

The observed proportionality suggests a strong internal consistency, indicating that as individuals gain more knowledge about sustainability (cognition), their emotional connection and concern (affection) also grow, which in turn leads to a stronger inclination to act sustainably (conation). This supports the notion of a holistic, interconnected process rather than one where knowledge, feelings, or actions develop independently.

These results suggest that a one-size-fits-all approach to sustainability education is insufficient. Instead, a dynamic strategy is needed to address the different stages of a student's academic journey. For the initial semesters, the focus should be on captivating and inspiring students to build a foundational interest. For the critical 2nd semester, interventions could focus on providing easily accessible and low-effort sustainability opportunities to maintain engagement. Finally, in the higher semesters, the strategy should concentrate on integrating complex sustainability topics directly into specialized curricula to foster a deeper, more lasting awareness.

The next part of the analysis addresses the age categories and their influence on the SAX. Following figures (Figure 11)display the distribution of the SAX across two distinct age categories.

Age: 18- 25	Average	Index-Value
Cognition	2,3	
Conation	2,8	7,84
Affection	2,7	

Age: Others	Average	Index-Value
Cognition	2,4	
Conation	2,9	7,83
Affection	2,5	

Figure 11: Age influencing the SAX

For this analysis, age data was consolidated into two categories: individuals aged 18-25 and all other age groups (referred to as "others"). This consolidation was essential for robust statistical analysis, as the older age brackets (25-34, 35-44, 45-54, and 55-64) were significantly underrepresented in the sample. Specifically, they comprised only 19.02% of the total participants, compared to the 18-25 age group's dominant share of 80.98%. A more granular statistical breakdown of the smaller groups would therefore have lacked statistical power and yielded unreliable results (Figure 12).

487	Please select your age.		
488	Under 18	0	0,00%
489	18-24	149	80,98%
490	25-34	23	12,50%
491	35-44	3	1,63%
492	45-54	3	1,63%
493	55-64	4	2,17%
494	Above 64	0	0,00%
495	Do not wish to say	2	1,09%
496	**Total**	**184**	

Figure 12: Age distribution of respondents

The analysis indicates that age does not appear to have a significant impact on an individual's SAX. This finding is particularly noteworthy as it stands in partial contrast

to the results from the semester analysis, which showed a clear correlation between a student's academic stage and their SAX.

While a student's academic journey within the university seems to influence their sustainability awareness, their chronological age does not. This suggests that the institutional environment and the structure of the curriculum are more powerful drivers of awareness than demographic factors like age, at least within the context of this study. It implies that the university's sustainability efforts are equally effective (or ineffective) across different age groups, but their impact may not be sustained effectively throughout an entire degree program. The findings underline the importance of programmatic and institutional interventions over demographic targeting to foster a lasting culture of sustainability.

The following section details the analysis of gender as a factor influencing sustainability awareness. The data was evaluated to determine if there is a difference in the Sustainability Awareness Index (SAX) between male and female participants.

For this analysis, a clear distinction was made between two categories: male and female. The gender distribution of the survey participants was found to be uneven, with male respondents being overrepresented at 71.2% of the total sample. This uneven distribution is a key consideration for the interpretation of the results, as it may introduce a sampling bias (Figure 13).

472	Please select your gender.		
473	Female	49	26,63%
474	Male	131	71,20%
475	Other	0	0,00%
476	Do not wish to say	4	2,17%
477	**Total**	**184**	

Figure 13: Gender distribution of respondents

The conducted analysis revealed the results shown in (Figure 14).

Female	Average	Index-Value
Cognition	2,4	
Conation	2,8	7,65
Affection	2,5	

Men	Average	Index-Value
Cognition	2,4	
Conation	2,8	7,91
Affection	2,7	

Figure 14: Gender influencing SAX

The analysis reveals that the differences in the SAX between the two genders are negligible. This leads to the conclusion that gender does not have a significant influence on an individual's Sustainability Awareness Index. This finding is consistent with a growing body of research that suggests while demographic factors can play a role, their influence is often minor compared to educational and institutional interventions.

The results indicate that sustainability awareness is not a gender-specific trait within this academic environment. The university's sustainability initiatives appear to be equally effective in influencing the awareness of both male and female students. This suggests that outreach and educational programs do not need to be tailored specifically for one gender but can be developed for the entire student population. The focus should be on creating inclusive, engaging, and accessible programs that resonate with all students, regardless of gender.

The analysis revealed no evidence of a differential development among the cognitive, affective, and conative domains, as they demonstrated a proportional and correlational relationship across the dataset.

The observed proportionality suggests a strong internal consistency, indicating that as individuals gain more knowledge about sustainability (cognition), their emotional connection and concern (affection) also grow, which in turn leads to a stronger inclination to act sustainably (conation). This supports the notion of a holistic,

interconnected process rather than one where knowledge, feelings, or actions develop independently.

5.4 EFEU SAX Summer Survey - Conclusions

5.4.1 Corelation between semester affiliation and students´ suctainability awareness

The investigation has shown that semester affiliation is a significant factor in the development of sustainability awareness (SAX). The systematic framework presented in the text, which shows a pattern of initial engagement followed by a subsequent decline or a complex re-engagement phase, provides strong evidence that the institution's learning environment has a direct influence on individuals' sustainability consciousness. This dynamic confirms that the university's efforts to promote sustainability are effective, but they can be further optimized for sustained impact throughout the entire degree program.

In contrast, the analyses of the demographic factors of age and gender demonstrate that they have no significant influence on the SAX. The findings indicate that sustainability awareness is not substantially affected by the chronological age or gender of the respondents.

In conclusion, the university's institutional environment and the structure of its academic curriculum emerge as the primary determinants of sustainability awareness within the university community, while individual demographic characteristics are negligible in this regard. These findings suggest that the university's efforts should be focused on the continuous and strategic integration of sustainability topics into the curriculum to ensure a long-term and effective formation of awareness. This approach is likely to yield better results than targeting specific demographic groups.

5.4.2 Corelation between SSG and students´ suctainability awareness

The analysis demonstrates a clear and consistent relationship between Structured Sustainability Governance (SSG) and the Sustainability Awareness Index (SAX). Universities with a higher degree of institutionalized governance structures, such as clearly defined responsibilities, sufficient resource allocation, and systematic reporting, also show significantly higher levels of sustainability awareness among their students.

This correlation suggests that awareness is not merely the result of individual attitudes or demographic factors but is strongly shaped by the institutional framework in which students operate. In other words, where governance structures provide visibility, resources, and opportunities for participation, awareness is fostered and reinforced on a measurable scale.

Looking ahead, the findings highlight the importance of strategically strengthening governance mechanisms as a means of cultivating a more sustainable academic culture. Future initiatives should therefore not only focus on awareness-raising campaigns at the individual level but also on embedding sustainability holistically into organizational processes, teaching, and campus operations. By aligning governance structures more closely with educational objectives, universities can create a reinforcing cycle in which structured governance enhances awareness, and heightened awareness, in turn, generates greater demand for robust governance. This dynamic interplay underscores the role of universities as key drivers of societal transformation toward sustainability.

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Appendix

Annex 1: SSG Evaluation – EFEU Summe Study 2025

Criteria	DHBW - S	IPLP	UPHF
1. Anchoring in Concept (Strategy, Mission Statement)	**2.4** – Sustainability strategy introduced in 2024, aligned with UN SDGs; implementation still at an early stage.	**3.2** – Sustainability institutionally anchored: participation in national initiative “Campus Sustentável”; holistic sustainability emphasized in mission.	**3.5** – Strong strategic anchoring: goal to become a socially responsible university by 2030; multi-year plan 2023–2026 with 72 concrete measures adopted.
2. Responsibilities (Officers, Committees, Structures)	**3.2** – Clear responsibilities: Vice-Rectorate for Research, Transfer & Sustainability; Green Office with students & staff.	**2.7** – Responsibilities under development: Sustainability Council and engaged leadership; working groups active, no dedicated department yet.	**3.5** – Dedicated governance: Vice-President for “Sustainable & Inclusive University”; DDRS department with specialized staff, e.g. energy manager.
3. Resources (Staff, Budget, Infrastructure)	**2.5** – Limited resources: Green Office mainly voluntary; few dedicated budget lines or staff positions.	**3.2** – Noticeable investments: ~€4M (PRR funding) for energy efficiency & renewables; coordination integrated into existing roles.	**3.5** – Substantial resources: new staff hired, external consultants involved; €12.5M invested in campus renovation & digital energy management.

Criteria	DHBW - S	IPLP	UPHF
4. Stakeholder Involvement (Students, Partners, Citizens)	**2.5** – Internal involvement: Green Office open to all; workshops with hundreds of participants. External stakeholders only sporadically included.	**3.1** – Broad involvement: student projects (Eco-Escolas), collaboration with local/regional actors and international partners.	**3.6** – Very broad participation: strategy developed jointly with community & partners; inclusive approach with strong social measures (support for disadvantaged groups).
5. Transparency & Reporting	**1.9** – Limited transparency: no sustainability report yet; strategy communicated but without clear indicators.	**2.6** – Progress communicated via news/projects; no full report, but guidelines and participation in rankings require transparency.	**3.2** – Commitment to reporting: signed sustainability charter; collects key data (e.g. CO_2 footprint), partial results published.
6. Sustainability in Teaching & Research	**2.8** – Initial steps: plans for a voluntary sustainability certificate; some teaching/research projects (e.g. mobility).	**3.0** – Visible integration: specific study programs/modules; faculty certified for sustainability; research on renewables & circular economy.	**3.3** – Strong integration: sustainability in curricula and research; action plan with 15 educational and 16 research initiatives; first successes visible.

Criteria	DHBW - S	IPLP	UPHF
7. Sustainable Campus Management (Energy, Buildings, Mobility)	**2.3** – Limited action so far: older buildings, few renovations; some pilot projects (e.g. mobility day, living lab).	**3.8** – Major renovations and energy measures underway (~€5.2M invested); PV systems, water-saving, waste management implemented.	**3.7** – Comprehensive plan: mobility plan with CEREMA, biodiversity protection, CO_2 monitoring; large renovation projects ongoing.
8. Transfer & Societal Responsibility	**2.6** – Regional cooperation limited: dual university model strong in business ties, but sustainability only gradually integrated.	**3.2** – Active role: projects with municipalities & NGOs; strong focus on technology transfer, including international cooperation (e.g. Brazil).	**3.2** – Strong cooperation: works with CEREMA on mobility; nationally visible via charters & memberships; recognized for social sustainability (heE Impact Ranking, SDG 10).