



Climate Virtual Exchange: Enhancing Climate awareness
in Europe and the South Mediterranean Area

D5.1 Evaluation Handbook



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



soliya



Co-funded by
the European Union



About ClivEx

The overarching goal of ClivEx - Climate Virtual Exchange: Enhancing climate awareness in Europe and the Southern Mediterranean Area, is to enhance intercultural dialogue between students from Europe and the Southern Mediterranean area on the topic of climate change.

Consortium members

- UNIMED, Mediterranean Universities Union, Italy – coordinator
- SPF, Sharing Perspectives Foundation - The Netherlands
- SOLIYA, Association Soliya Tunisia - Tunisia
- UNIPD, Università di Padova - Italy
- ANNU, An-Najah National University - Palestine
- LIU, Lebanese International University - Lebanon

More at <https://clivex.eu>



**Co-funded by
the European Union**

Funded by the European Union. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)



Executive Summary

D.5.1, the Evaluation Handbook outlines all the tools used to evaluate participant, cohort and facilitator learning in the Virtual Exchange course Climate Justice: From Inequality to Inclusion. It begins by introducing how the programme developers evaluate individual participants' learning and provides advice on how educators and coordinators can evaluate student learning to ensure quality participation and completion of tasks. It then provides an overview of the survey tools used to measure change in participants' knowledge, attitudes and skills both in relation to climate awareness and transversal skills, and to measure participant satisfaction. Trained facilitators are key to the success of this Virtual Exchange, hence the evaluation tools for facilitator training are also provided. The handbook provides information on recognition of participant and facilitator learning through open badges. In addition, the handbook provides guidelines and formulae for analysing data gathered from cohorts, and finally tools used for the Life Cycle Assessment of the Virtual Exchange.



Document Information	
Project Title	CLiVEX - Climate Virtual Exchange: Enhancing climate awareness in Europe and the Southern Mediterranean Area
Project number	101111937
Work Package	5
Deliverable Name	D.5.1 Evaluation handbook
Description	Evaluation Handbook
Due date	30 June 2024
Delivery date	30 August 2024
Dissemination Level	PU - Public
Author(s)	UNIPD Francesca Helm, Marianne Araneta (UNIPD) Bart van der Velden, Casper van der Heijden (SPF)
Contributors	UNIMED, SOLIYA, LIU, ANNU

Review history

Version	Name/Partner	Date	Summary of changes
V1	UNDP	30.08.2024	First version of the deliverable
V2	SPF	09.09.2024	Updated content
V3	All	28.09.2024	Consolidated revisions
V4	UNDP	30.09.2024	Final version



Table of Contents

1. Introduction	6
2. Evaluation for teachers/coordinators	7
Reflective journals	8
Evaluation of cohort learning through Virtual Exchange	9
Development of/Rationale for pre and post-exchange tool	9
Pre- Post-exchange Survey Structure	12
Evaluation of sessions	12
3. Evaluation of Facilitation Training	13
4. Recognition	14
Climate Justice	14
Facilitation training	15
5. Analysing data	17
Survey Structure	17
Data Preparation	17
Composite scores	18
Descriptive Statistics	19
Pre- and Post-Course Comparisons	19
Paired Sample t-tests	19
Differences over demographics	19
Predicting outcomes	19
Conclusion	20
6. Life cycle assessment	21
Appendix 1	22
Cohort Evaluation Survey items	22
Appendix 2	30
Introduction to Online Dialogue Facilitation Trainee Evaluation	30
Advanced Training – End of Training Evaluation Form	31
Appendix 3	34
R analysis script	34
Appendix 4	37
Life Cycle Assessment	37



1. Introduction

This handbook outlines the evaluation methodology used for CLiVEX and the tools used to evaluate student and facilitator learning.

CLiVEX is a dialogue-based virtual exchange which brings together students from different parts of the world to engage with materials related to climate justice, to participate in weekly facilitator-led dialogue sessions and to collaborate with peers on a project related to climate justice.

This handbook starts with a chapter on how educators integrating CLiVEX in their curricula can evaluate their student participation in the project. Chapter 2 then outlines how student learning was evaluated in the CLiVEX project through a mix of quantitative and qualitative research tools: Pre and post-exchange surveys with closed and open questions, evaluation of the dialogue sessions. Facilitation is a key part of the CLiVEX process, with facilitators following a training programme before facilitating. A brief overview of the training and the tools used for evaluation are provided in chapter 3. Chapter 4 illustrates the system of recognition of the skills and competences that students and facilitator trainees acquire through their participation in the CLiVEX activities in the form of Open Badges. Chapter 5 provides information on the methodology suggested to analyse the data, as well as how to change certain evaluation methods based on a varying target audience. Chapter 6 regards the overall environmental sustainability assessment (ecological, economic, and social) of CLiVEX, in particular a Life Cycle Assessment on the course development and facilitation process.



2. Evaluation for teachers/coordinators

Participants are assessed by Sharing Perspectives Foundation (SPF) through a point system of attendance and assignment submission/completion. Assignments consist of responding to the weekly resources (videos, podcasts, texts...), writing a weekly reflection journal and working in a small group in order to develop a Climate Action Project.

Participants can score a total of 100 points.

- 35 points through full participation in the online group sessions.
- 10 points through weekly resource review and response.
- 10 points through reflection journal submissions.
- 45 points through completing the Climate Action Project.

Depending on the points reached at the end of the course, participants are awarded badges as a form of certification.

Instructors and coordinators of ClivEx have access to the ClivEx platform (a dedicated Brightspace LMS) and can view students' progress and their assignments. The points awarded by Sharing Perspectives Foundation are for timely completion of the activities in sufficient length. NO evaluation is made on the quality of the participants' work as prior experience has informed us that there can be no criteria that would be fair for ALL students since they come from a range of settings with diverse academic backgrounds, teaching cultures and objectives for participation. Facilitators do check, however, that what is written is coherent with the scope of the assignment.

Instructors may choose to evaluate (some of) the quality of assignments in order to give students a grade. This is recommended, as it would ensure commitment from the students and a high quality of student work. Alternatively, instructors could ask students to build on the ClivEx assignments in order to produce a final piece of work to be graded, for example a final reflective paper, or a presentation of their Climate Action Projects in class. Some examples of how universities have evaluated student work are provided below.

An Najah National University

The course midterm included an assignment in which students were asked to give a summary on one of the topics covered in the ClivEx project and reflect on the topic specific to the context of Palestine.

The course final exam included a reading passage selected from the weekly readings assigned to them through the ClivEx project and reflection questions.

Additionally, a percentage of their grade was devoted to their weekly reflections submitted to ClivEx and their final overall grade by ClivEx.

Limerick University

The students have to submit a critical reflective essay about their participation in ClivEx. The students have some questions and prompts that guide their essay.



Reflective journals

We believe that reflective journals are particularly important for learning from virtual exchange as they allow participants to document their 'virtual exchange' journey, which is a learning process. Writing regular reflexive journals allows the participants to look back on what they felt like at the beginning of the exchange, and see the change they have gone through. It also supports the learning process, for example by consolidating the language and other information learnt, specific terminology related to climate justice and also more general English, as well as the knowledge they have acquired through their oral interactions and interactions with video and reading materials.

In CLiVEX, a single diary prompt is provided for all the weeks of the exchange. The rationale for this was that it is broad enough and provides a range of issues that participants could focus on to allow for variety over the weeks. However, teachers may prefer to write their own diary prompts to reflect the specific issues addressed in the different weeks of the programme. Students could be asked to write and submit a final reflective paper based on their journal entries, which could form the basis of an instructor's evaluation of student learning, together with the feedback received from SPF.

Instructions for reflective journal entries

Each week, reflect and record your experience of the week's session by answering the question in the online form linked below. This will create a personal record of your experience and development through the 10-week Virtual Exchange process. When read together, they will showcase what you have learnt.

Use this opportunity to reflect honestly on valuable insights, strong feelings towards an issue, significant moments in the group process, or key turning points in your thinking.

You could reflect on one of the following topics:

- Your expectations
- The relationships and emotions in the group
- You and your fellow participants' beliefs, values and experiences
- The specific topics of the video lectures
- Moments that have inspired you
- Your understanding of others and of yourself
- Challenging moments
- Negative experiences
- Climate justice

Your reflections should be 1-2 paragraphs in length. Please make sure to use a minimum of 75 words in order to receive points for this assignment.



Evaluation of cohort learning through Virtual Exchange

The aims of the CLiVEX project are to enhance participants' climate awareness and transversal skills and competencies, such as global awareness, digital literacy, effective communication skills, leadership and collaboration, intercultural sensitivity, social responsibility, and sustainability competences.

We use pre- and post-exchange surveys to measure changes in participants' knowledge, attitudes, and behaviours related to CLiVEX programme aims. This approach was also adapted in the Erasmus+ Virtual Exchange pilot project and provided insights into the impact of the programme¹. The surveys begin by asking participants about their previous experience with virtual exchange and international study. This is followed by questions related to environmental sustainability. The post-evaluation surveys repeat the pre-survey items, together with additional post-survey items, including open questions that allow participants to provide further details on their learning, satisfaction and challenges with the exchanges.

Development of/Rationale for pre and post-exchange tool

The starting point in developing items for the survey related to learning about environmental sustainability was the European Commission's GreenComp², "a framework for learning for environmental sustainability that can be applied in any learning context" developed by the European Commission. GreenComp set out to identify a set of sustainability competences to feed into education programmes and to "help learners develop knowledge, skills and attitudes that promote ways to think, plan and act with empathy, responsibility, and care for our planet and for public health".

The GreenComp Framework comprises four interrelated competence areas: 'embodying sustainability values', 'embracing complexity in sustainability', 'envisioning sustainable futures' and 'acting for sustainability'. Each of these comprises three competences that are interlinked and equally important. Descriptors for these competences are provided in the framework and examples of knowledge, skills and attitude are provided. In the pre- and post-evaluation tool developed for CLiVEX we sought to include at least one item based on each of these competences.

We adapted some of the GreenComp descriptors into statements that participants have to state their level of agreement with using a 5 point Likert scale. We also developed some statements that focus on the extent to which climate justice is a key concern for the students - given the geo-political situation and the other challenges participants may be facing in their lives. An additional issue we decided to address was the question of responsibility and inequality in relation to climate justice and the global north-global south divide, issues not addressed in GreenComp.

¹ <https://op.europa.eu/en/publication-detail/-/publication/34293a1f-45ca-11ec-89db-01aa75ed71a1/language-en>

² <https://publications.jrc.ec.europa.eu/repository/handle/JRC128040>

Table 1. *GreenComp* areas, competences, and descriptors.

AREA	COMPETENCE	DESCRIPTOR
1. <i>Embodying sustainability values</i>	1.1 Valuing sustainability	To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values.
	1.2 Supporting fairness	To support equity and justice for current and future generations and learn from previous generations for sustainability.
	1.3 Promoting nature	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.
2. <i>Embracing complexity in sustainability</i>	2.1 Systems thinking	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
	2.2 Critical thinking	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.
	2.3 Problem framing	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.

AREA	COMPETENCE	DESCRIPTOR
3. <i>Envisioning sustainable futures</i>	3.1 Futures literacy	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.
	3.2 Adaptability	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.
	3.3 Exploratory thinking	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.
4. <i>Acting for sustainability</i>	4.1 Political agency	To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.
	4.2 Collective action	To act for change in collaboration with others.
	4.3 Individual initiative	To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet.



Pre- Post-exchange Survey Structure

The complete survey, which can be found in [Appendix 1](#), is divided into three sections, with the pre-course survey, the post-course survey, and the items on demographics.

Pre-Course Survey

- Items: Q1-Q40

Post-Course Survey

- Items: Q41-Q97

Demographics

- Items: Q98-Q103

Evaluation of sessions

In addition to the pre- and post-course surveys, participants were offered the opportunity to provide immediate feedback on the quality of the programme through weekly session surveys.

These comprise the following elements.

Please tell us how you would rate the following aspects of this week's session on a scale from Very Bad (1) to Very Good (5)

	1	2	3	4	5
Your facilitators					
The discussions					
The materials of this week					
The overall quality of the session					

Do you have any other comments?

What group are you in?



3. Evaluation of Facilitation Training

Facilitators are key to the success of ClivEX and follow a two-step facilitation training programme developed by Soliya. These trainings are designed for professionals and those new to dialogue facilitation, sharpening key skills to facilitate and promote constructive engagement that aims at deep, authentic communication that celebrates diversity and grows from conflicts.

The Introduction to Online Dialogue Facilitation training is primarily asynchronous and instils participants with strong foundational skills to facilitate successfully online, including functions of dialogue and virtual exchange and key principles of facilitation. It consists of 12-16 hours of asynchronous, paced, and interactive online learning provided through weekly learning materials, activities, and personalised feedback.

Facilitators elicit self-group awareness, understanding, and constructive cross-cultural communication by being multipartial process leaders who incubate safe and effective learning environments. Facilitators are trained to apply diverse engagement tools to foster awareness and learning and address various group dynamics.

To evaluate the facilitation training, a combination of post-training surveys and individualised trainer feedback on each trainee is used to determine the successful completion of the training and the effectiveness of the training on the skill development of trainees to become online dialogue facilitators in Virtual Exchange. See [Appendix 2](#) for the Post-Training Evaluation survey.

A system of digital badges is used to acknowledge the development of the skills obtained (see Section 5). This recognition of the achievement of the necessary skills to facilitate online dialogue sessions in Virtual Exchange programming leads to a community of facilitators which can be deployed by our project as well as by other Virtual Exchanges funded under this and future calls for proposals.

4. Recognition

The skills and competences students and trainees acquire through their participation in the CLiVEX activities are recognized by the organisers in the form of Open Badges. An Open badge is a “standard and verifiable digital credential whose metadata aligns with the Open Badge standard created by the Mozilla Foundation”³. Open Badges are issued to recognize competences, skills or any other achievements by their recipients.

Climate Justice

For the Climate Justice virtual exchange, three levels of Open Badges were issued based on the points scored by the participants through completing the assignments and attending the online dialogue sessions.

Badge of completion



To acquire this badge, students should have scored between 40-59 points and have a minimum attendance of 8/10 sessions. It is estimated that students are required to have put in a minimum workload of 50 hours to acquire that score by having attended most to all of the dialogue sessions and submitted some to all of the weekly assignments.

Badge of completion with Merit



To acquire this badge, students should have scored between 60-79 points and have a minimum attendance of 8/10 sessions. It is estimated that students are required to have put in a minimum workload of 60 hours to acquire that score by having attended most to all of the dialogue sessions and submitted the Climate Action Project assignment.

Badge of completion with Distinction



To acquire this badge, students should have scored between 80-100 points and have a minimum attendance of 8/10 sessions. It is estimated that students are required to have put in a minimum workload of 90 hours to acquire that score by having attended most to all of the dialogue sessions and submitted the Climate Action Project assignment and some or all of the weekly assignments.

³ <https://openbadgefectory.com/en/about-open-badges/>



All three badges recognize the skills and competences students acquired through their participation, which are mentioned on the badge:

“By combining different elements of this course, students will gain valuable transversal skills and competencies, including:

- **Global Awareness and Systems Thinking:** Students will develop a comprehensive understanding of global climate challenges, sociopolitical issues, and the interconnectedness of various systems to understand the complexity and nuances of local issues.
- **Digital Literacy:** Students improve their competency in utilising tech platforms, building multimedia products, and engaging in digital communication effectively.
- **Effective Communication:** Students will enhance their verbal communication and active listening skills, resulting in higher confidence and effectiveness in communication and collaboration in culturally diverse groups.
- **Leadership and Collaboration:** Students develop leadership qualities and the ability to work collaboratively in diverse and remote teams to achieve common goals.
- **Intercultural competence and intercultural sensitivity:** Students learn to reflect on personal biases and value diverse perspectives, experiences and backgrounds.
- **Creativity and Innovation:** Students are encouraged to think creatively and adopt innovative approaches to addressing challenges.
- **Civic Engagement and Social Responsibility:** Students will foster a sense of civic responsibility and active engagement in addressing societal issues.
- **Sustainability Competences:** Students will gain sustainable values, such as valuing sustainability and supporting fairness, improve their critical thinking and problem-solving skills, and act towards sustainability through collective action and individual initiatives.”

Facilitation training

For each of the facilitation trainings offered as part of ClivEx, the “Introduction to Dialogue Facilitation Course” and the “Advanced Dialogue Facilitation training” trainees who successfully complete the training receive an Open Badge.

Introduction to Dialogue Facilitation Course



The badge is awarded for successful completion of the 5-week online course 'Introduction to Online Dialogue Facilitation'.

Successful completion of all the course assessments and at least 80% of the course activities that showcased active learning and engagement in the course.



The skills gained include the understanding of the foundational functions of dialogue and facilitation and the application of the foundational facilitation toolbox.

Participation also developed transversal competencies such as curiosity, self-awareness and reflection and the ability to communicate in intercultural and virtual environments.

Advanced Dialogue Facilitation Training



The badge is awarded for successful completion of the 20-hour online training 'Advanced Dialogue Facilitation Training'.

Successful completion of the 20-hour live training and at least 80% of the training activities that showcased active learning and engagement.

The skills gained include the understanding of and the ability to apply advanced facilitation techniques; and the ability to manage difficult group dynamics and generate effective group collaboration.

Participation also developed transversal competencies such as curiosity, self-awareness and reflection and the ability to communicate in intercultural and virtual environments.



5. Analysing data

This guide provides a comprehensive methodology for analysing the pre- and post-course survey data collected from participants. The survey aims to measure changes in knowledge, attitudes, and behaviours related to CLiVEX programmes. The data consists of both Likert scale items and open-ended questions, with a focus on quantitative analysis for the closed-ended questions. In [Appendix 3](#) you will find an example R script that runs some analysis based on the structures as presented here. If you follow the order of the survey items as they are laid out in Appendix 1 this script will need minimum user input to produce some findings.

Note on composite scores:

The items of the pre- and post-course survey, and the factors they make up, are based on the greencomp survey. We however do not currently have enough data to run a factor analysis. This will be done after we have run more cycles of the CLiVEX programme. At that point the calculation of the composite scores is likely to change as items are likely to be removed from certain factors. These changes will be made to upcoming versions of this handbook. Some further attention will be given to this in the section on composite scores.

Survey Structure

The item numbers for the pre-course survey, the post-course survey, and the demographics are as follows:

Pre-Course Survey

- Items: Q1-Q40

Post-Course Survey

- Items: Q41-Q97

Demographics

- Items: Q98-Q103

Data Preparation

Data Cleaning:

Ensure that all responses are complete, and that open questions are cleaned in a way that helps interpretation. For instance, in our files the country of residence is recorded as an open question, so we recode this to have consistent spelling of all countries. Recode Likert scale values from the text value to the numerical representation. **Note that there are items that need to be coded in**



reverse, these are Q12, Q14, Q25, Q42, Q44, and Q65, so Strongly Disagree needs to be coded as 5 for these questions.

You will need to decide at this point how to handle missing data.

We use mode imputation in this instance as we imagine a set with quite some missing data that would make composing composite scores almost impossible. However you need to determine the appropriate solution for your dataset.

Composite scores

As was laid out in the introduction of this section the calculation of the composite scores might change in future versions of this document. The composite scores here are calculated based on the factors as determined in the greencomp. We are treating the four competence areas of the Greencomp as factors for now. The competence areas are marked by the number before the decimal point in the column factor in the table of questions. In practice that means we have the following composite scores in the data set:

Pre Course - Embodying sustainability values = Q11 + Q12 + Q13 + Q14 + Q15 + Q16 + Q17 + Q18 + Q19 + Q20

Pre Course - Embracing complexity in sustainability = Q21 + Q22 + Q23 + Q24

Pre Course - Envisioning sustainable futures = Q25 + Q26 + Q27 + Q28

Pre Course - Acting for sustainability = Q29 + Q30 + Q31 + Q32 + Q33 + Q34

Post Course - Embodying sustainability values = Q41 + Q42 + Q43 + Q44 + Q45 + Q46 + Q47 + Q48 + Q49 + Q50

Post Course - Embracing complexity in sustainability = Q51 + Q52 + Q53 + Q54

Post Course - Envisioning sustainable futures = Q55 + Q56 + Q57 + Q58

Post Course - Acting for sustainability = Q59 + Q60 + Q61 + Q62 + Q63 + Q64

Whether or not you want to use the sum or the mean as the composite score is largely a matter of taste, unless you want to compare differences between the impact on the different factors. In that case use the mean as a composite score to ensure that the differences are not caused by the differences in the amount of questions per composite.



Descriptive Statistics

It is important to produce accurate descriptive statistics about your programme. These by themselves can often already provide you with great insight into how well your programme is performing. You can of course create frequency distributions and plots for all the data. We recommend you certainly do so for the items Q91 to Q95, which measure the satisfaction with the programme. Of course producing these for the demographics, or any other questions, might also be desirable. The code in the appendix produces the frequency tables for items Q91 to Q95

Pre- and Post-Course Comparisons

Note that for this section we assume that your data meets the requirements needed for the statistical analysis. In order to test for the normality of the data we recommend a sample size of at minimum 30.

For items that are included in both pre- and post-course surveys, we recommend that you use comparative methods to determine whether growth has taken place. From this section onward we shall no longer include sample code, as what method you use is determined in part by the data, and you have to check whether the methods are appropriate for use on your data set.

Paired Sample t-tests

We recommend that you perform paired sample t-tests for all the composite scores. The Null hypothesis is that there is no significant difference between the pre- and post-course scores, and the alternative hypothesis is that there is a significant difference. If you find significant differences, report these, and also report the effect size. We recommend that you use Cohen's *d*.

Differences over demographics

You might have the hypothesis that there are significant differences between the pre- and post-course surveys to be seen across different demographics. In order to test this we recommend using ANOVA, which tests mean differences across groups.

Predicting outcomes

Perhaps you want to use the data that you have collected to identify key predictors of some post-course outcomes. For instance, you might be interested in what determines whether a participant will recommend the course to a friend or colleague (Q96). We recommend that you use multiple regression analysis for this task.



Your regression model should include all of your demographic variables as predictors, as well as other items you might find to be of interest. Perhaps you believe that a person's familiarity with climate justice will influence their enjoyment of the course, and so you add Q11 and Q12 to your model.

Example Regression Model:

$$Q96 = \beta_0 + \beta_1(Q11) + \beta_2(Q12) + \beta_3(\text{Age}) + \beta_4(\text{Gender}) + \beta_5(\text{Nationality}) + \beta_6(\text{Country of Residence}) + \beta_7(\text{Partner Institution}) + \beta_8(\text{Role in University})$$

This model can give you some insight into why people recommend your course. Of course you do need strong theoretical underpinnings as to why you suspect a relation in the data.

Conclusion

We hope that this analysis guide can be of use to your CLiVEX implementation. It should provide you with all the tools to quickly roll out a report of descriptive statistics using the code provided in the appendix with minimal additions. We strongly recommend that you analyse the data to a deeper level, and have provided some tools to guide you.



6. Life cycle assessment

Given that the theme of the exchange is climate justice, both the content and delivery needed to reflect and practise climate justice. Thus, one of the objectives of the ClivEx virtual exchange was to understand the climate change impact of online forms of learning compared to onsite learning settings by measuring their carbon footprint through a Life Cycle Assessment (LCA). The ClivEx VE was compared with a traditional face to face course.

To ensure accuracy and rigour in the data collection process, the LCA will follow the rules, requirements, and guidelines stipulated by the ISO-certified Product Category Rule (PCR), which is used in the development of Type III environmental declarations and footprint reporting for one or more product categories. It is based on the requirements of ISO 14040⁴ and ISO 14044⁵ and the framework rules regarding the category of a product/service being analysed. To study the climate impact of an educational training course, the PCR EPD ITALY 030 - EDUCATIONAL SERVICE will be used.

The PCR is developed as follows:

1. Functional or declared unit: First, we specify the functional or declared unit.
2. System boundaries: Then this is followed by demarcating the system boundaries
3. Inventory analysis (LCI): The third step is to conduct an inventory analysis. Once we know the data we need to collect (both quantitative and qualitative), we are ready to prepare our survey.
4. Impact assessment - LCI life cycle inventory and LCIA life cycle impact assessment: Once the data has been collected and studied, we can assess the amount of CO₂eq released by the activity being carried out, in this case, a training course. The total amount of CO₂ will be reported in three (3) different impact categories:
 - a. Co₂eq Fossil
 - b. CO₂eq Biogenic
 - c. CO₂eq Land use and LU change

The last step in the process is the interpretation of data. From here we can see the parts in the process that record a higher carbon footprint, which are potential areas for improvement.

Since the data means little if there is nothing it can be compared to, based on the PCR, a survey was developed and sent to two groups of students, those attending the ClivEx virtual exchange and those attending a traditional face to face course. See [Appendix 4](#)

⁴ EN ISO 14040:2006. Environmental management - Life cycle assessment - Principles and framework.

⁵ EN ISO 14044:2006. Environmental management - Life cycle assessment - Requirements and guidelines

Appendix 1

Cohort Evaluation Survey items

The following table lists all the survey items, in what questionnaire they appear, and the possible answer categories. In addition to likert scale questions aimed at gaining a quantitative metric of learning and impact, open questions are present to gather deeper insights and understanding into the learning that took place.

Survey	No.	Question	Answers	Factor
pre-course	Q1	Which statement would best describe your prior experience with Virtual Exchange (VE)? A VE is "a pedagogic approach that uses technology and pedagogic designs to facilitate dialogue, discussion and collaboration amongst students who are situated in different geographic contexts often with the aim of fostering intercultural/global learning as well as disciplinary knowledge"	This is the first time I've heard about VEs I've heard about VEs before (or similar programs such as Collaborative Online International Learning, e-tandem, virtual mobility, computer-assisted language learning) but I've had no prior experience I've had two to three VE experiences I've experienced VE once I've had more than three VE experiences	
pre-course	Q2	For those with prior experience in a VE, which statement would best describe the VE set-up of previous VEs? Check all that apply:	Not applicable It was a dialogue-based VE, where the focus was on engaging in dialogue with others It was a challenge-based VE, where we were required to work with others on a particular task or challenge It was a comparative VE, where we used a theme or topic and compared it according to different cultural/geographic contexts	
pre-course	Q3	Which statement would best describe your experience with international, university, or school-sponsored mobility?	I have not yet gone abroad through a university or school-based international mobility program I have gone abroad once through a university or school-based international mobility program I have gone abroad two to three times through a university or school-based international mobility program I have gone abroad more than thrice through a university or school-based international mobility program	
pre-course	Q4	For those with international, university, or school-sponsored	Less than a month 4-6 months	

		mobility experience, on average, how long would the mobility last?	1-3 months 7-12 months Over a year NA	
pre-course	Q5	Aside from university or school-based international mobility, how much have you travelled outside your country of residence?	I've never travelled outside my country of residence More than 10 times 3-5 times 1-2 times 6-10 times	
pre-course	Q6	For those with experience travelling abroad aside from university or school-based international mobility, on average, how long would this trip last?	Not applicable 3-4 weeks More than 10 weeks Less than a week 1-2 weeks 5-10 weeks	
pre-course	Q7	For those with experience travelling abroad aside from university or school-based international mobility, which countries have you visited?	Open	
pre-course	Q8	How would you define sustainability?	Open	
pre-course	Q9	What are your expectations for the VE? What do you look forward to?	Open	
pre-course	Q10	Do you have any fears, doubts, or hesitations about the VE? Could you describe them?	Open	
		To what extent do you agree or disagree with the following statements?		
pre-course	Q11	I am familiar with the concept of climate justice.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.1
pre-course	Q12	Climate justice is not presently an essential issue for my well being.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.1
pre-course	Q13	Justice for current and future generations is related to protecting nature.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
pre-course	Q14	There are more important issues than climate justice for future generations in my context.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
pre-course	Q15	Climate change does not impact everyone the same way.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
pre-course	Q16	I have experienced environmental inequality.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2

pre-course	Q17	I am committed to respecting the interests of future generations.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
pre-course	Q18	Our wellbeing, health and security depend on the wellbeing of nature.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.3
pre-course	Q19	I can assess my own impact on nature.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.3
pre-course	Q20	A harmonious relationship between nature and humans is important.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.3
pre-course	Q21	I am concerned about the short- and long- term impacts of personal actions on others and the planet.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.1
pre-course	Q22	I trust science even when lacking some knowledge required to fully understand scientific claims.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.2
pre-course	Q23	It is important to look at sustainability problems from different stakeholder perspectives to identify fair and inclusive actions.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.3
pre-course	Q24	Collaborating with others to frame current and potential sustainability challenges is important.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.3
pre-course	Q25	I cannot anticipate how sustainability problems might evolve or occur over time (scenarios).	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.1
pre-course	Q26	Local circumstances should be considered when dealing with sustainability issues and opportunities.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.2
pre-course	Q27	I am willing to discontinue unsustainable practices and try alternative solutions.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.2
pre-course	Q28	It is important to consider sustainability challenges and opportunities from different angles.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.3
pre-course	Q29	I can identify relevant social, political and economic stakeholders in my own community and region to address a sustainability problem.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.1

pre-course	Q30	Political accountability for unsustainable behaviour is essential.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.1
pre-course	Q31	I know how to work with diverse participants to create inclusive visions for a more sustainable future.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.2
pre-course	Q32	I am willing to engage with others to challenge the status quo.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.2
pre-course	Q33	I am confident about anticipating and influencing sustainable changes.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.3
pre-course	Q34	I recognize my own emotions, desires, thoughts, behaviours, and personality when engaging in sustainability issues.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.4
pre-course	Q35	Gender equity is an important issue for me.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
pre-course	Q36	Thinking about the future of the planet makes me feel anxious.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
pre-course	Q37	I feel the impact of climate change in my daily life.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
pre-course	Q38	The global north/Western countries/Europe has greater responsibility for climate change.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
pre-course	Q39	The global north/Western countries/Europe should do more for climate justice.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
pre-course	Q40	How does climate justice and sustainability rank among your priorities/key concerns today? 1 (very low) - 10 (very high)	1 (very Low) / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 (Very High)	
post-course	Q41	I am familiar with the concept of climate justice.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.1
post-course	Q42	Climate justice is not presently an essential issue for my well being.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.1
post-course	Q43	Justice for current and future generations is related to protecting nature.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
post-course	Q44	There are more important issues than climate justice for future generations in my context.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
post-course	Q45	Climate change does not impact everyone the same way.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2

post-course	Q46	I have experienced environmental inequality.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
post-course	Q47	I am committed to respecting the interests of future generations.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.2
post-course	Q48	Our wellbeing, health and security depend on the wellbeing of nature.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.3
post-course	Q49	I can assess my own impact on nature.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.3
post-course	Q50	A harmonious relationship between nature and humans is important.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	1.3
post-course	Q51	I am concerned about the short- and long- term impacts of personal actions on others and the planet.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.1
post-course	Q52	I trust science even when lacking some knowledge required to fully understand scientific claims.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.2
post-course	Q53	It is important to look at sustainability problems from different stakeholder perspectives to identify fair and inclusive actions.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.3
post-course	Q54	Collaborating with others to frame current and potential sustainability challenges is important.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	2.3
post-course	Q55	I cannot anticipate how sustainability problems might evolve or occur over time (scenarios).	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.1
post-course	Q56	Local circumstances should be considered when dealing with sustainability issues and opportunities.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.2
post-course	Q57	I am willing to discontinue unsustainable practices and try alternative solutions.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.2
post-course	Q58	It is important to consider sustainability challenges and opportunities from different angles.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	3.3
post-course	Q59	I can identify relevant social, political and economic stakeholders in my own	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.1

		community and region to address a sustainability problem.		
post-course	Q60	Political accountability for unsustainable behaviour is essential.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.1
post-course	Q61	I know how to work with diverse participants to create inclusive visions for a more sustainable future.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.2
post-course	Q62	I am willing to engage with others to challenge the status quo.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.2
post-course	Q63	I am confident about anticipating and influencing sustainable changes.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.3
post-course	Q64	I recognize my own emotions, desires, thoughts, behaviours, and personality when engaging in sustainability issues.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	4.4
post-course	Q65	Gender equity is an important issue for me.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q66	Thinking about the future of the planet makes me feel anxious.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q67	I feel the impact of climate change in my daily life.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q68	The global north/Western countries/Europe has greater responsibility for climate change.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q69	The global north/Western countries/Europe should do more for climate justice.	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q70	How does climate justice and sustainability rank among your priorities/key concerns today? 1 (very low) - 10 (very high)	1 (very Low) / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 (Very High)	
post-course	Q71	I have benefitted from my participation in the programme through the acquisition of skills and knowledge, producing educational, personal or professional development.	Yes / No / <<< / Recorded as TRUE and FALSE by the D2L platform	
		Participating in this virtual exchange has:		
post-course	Q72	Increased my English communication skills	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q73	Increased my capability to work with international peers	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	

post-course	Q74	Increased my knowledge of digital tools	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q75	Improved my knowledge and/or interest in global events	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q76	Improved my knowledge about the relationship between and across different societies	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q77	Increased my interest in taking part in an educational programme abroad	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
		As a result of this programme I have:		
post-course	Q78	Lowered my energy usage	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q79	An increased awareness of the environmental impact of my consumer behaviour	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q80	I have changed my consumption behaviour	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
		How much do you agree or disagree with the following statements?		
post-course	Q81	I am familiar with the EU Green Deal	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q82	I believe young people can act to make an impact in society	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q83	I am interested in having further opportunities to engage in virtual exchange	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree	
post-course	Q84	Has your understanding of sustainability and climate justice changed? If yes, how?	Open	
post-course	Q85	What do you think contributed to this change? Was it a particular person, activity, moment in the dialogue session, concept, and/or resource? Please describe in detail.	Open	
post-course	Q86	Besides the themes of climate justice and sustainability, what else do you feel you learned through CliveX?	Open	
post-course	Q87	What do you feel the Collaborative Action Project contributed to your VE experience and learning? How	Open	

		was your collaboration experience?		
post-course	Q88	What did you like most about the VE?	Open	
post-course	Q89	What challenges did you encounter during the VE?	Open	
post-course	Q90	How have you shared and/or applied what you've learned in the VE to your community? (How do you foresee yourself sharing and/or applying what you've learned in the VE to your community?)	Open	
		To what extent were you satisfied with:		
post-course	Q91	The overall course?	Very Dissatisfied / Dissatisfied / Neutral / Satisfied / Very Satisfied	
post-course	Q92	Your facilitators?	Very Dissatisfied / Dissatisfied / Neutral / Satisfied / Very Satisfied	
post-course	Q93	The quality of the course materials?	Very Dissatisfied / Dissatisfied / Neutral / Satisfied / Very Satisfied	
post-course	Q94	The learn.dialoguex.online platform?	Very Dissatisfied / Dissatisfied / Neutral / Satisfied / Very Satisfied	
post-course	Q95	The structure of the course?	Very Dissatisfied / Dissatisfied / Neutral / Satisfied / Very Satisfied	
post-course	Q96	On a scale of 1 to 10, with 1 being very unlikely, and 10 being very likely: How likely are you to recommend this course to a friend or colleague?	1 (Very Unlikely) / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 (Very Likely)	
post-course	Q97	How would you evaluate your group members' intercultural competence?	Open	
Demographics	Q98	Age - How old are you?	18-21 / 22-25 / 26-30 / Above 30	
Demographics	Q99	Gender - To which gender identity do you most identify?	Female / Male / Gender variant / non-conforming / non-binary / I prefer not to say	
Demographics	Q100	Nationality - What is your nationality?	Open	
Demographics	Q101	Country of residence - In which country do you currently live?	Open	
Demographics	Q102	Affiliation - With which university or youth organisation are you affiliated?	Option of partner institutions. Will depend on the partners in the current iteration	
Demographics	Q103	Role in university	BA student / MA student / PHD student	



Appendix 2

Introduction to Online Dialogue Facilitation Trainee Evaluation

Give us your feedback!

As the final step for the Soliya training, you will fill in the **training evaluation**. In the evaluation, you can share your thoughts and feedback with us on the training, which we can then use to improve the experience for the next round.

This feedback is very valuable for us - thank you in advance for sharing your feedback!

Please select one answer with 0 meaning "not at all likely" and 10 meaning "most likely" [0 – 10 scale](#)

Demographics

- **Email ***
- **First Name ***
- **Last Name ***
- **Country of residence ***
- **Nationality ***
- **Age**
- **Gender**
 - Male / Female / Prefer Not to Say

Ratings

How would you rate? * [Very low](#) - [Low](#) - [Neither low nor high](#) – [High](#) - [Very high](#)

- Quality of the trainers
- Your learning experience through written interactions
- Course content
- Overall experience of the course
- Your experience with Brightspace

Participating in this course helped me develop: * [Strongly disagree](#) – [Disagree](#) - [Neither agree nor disagree](#) – [Agree](#) - [Strongly agree](#)

- communication skills
- active listening skills
- digital competences
- leadership skills
- language skills
- facilitation skills



To what extent do you agree with the following statements? * Strongly disagree – Disagree - Neither agree nor disagree – Agree - Strongly agree

- The training improved my understanding of Virtual Exchange.
- I shared information about what I was learning in this course with colleagues, friends and/or family.
- The course improved my confidence to communicate or work in a culturally diverse setting.
- I have acquired the necessary tools and knowledge to use basic facilitation tools.
- The knowledge and/or skills I have acquired could be applied in other contexts.
- As a result of this course, I feel more comfortable approaching discussions around culturally/politically sensitive or divisive issues in my community.
- I am interested in having further opportunities to engage with Soliya's Virtual Exchange activities.

Open questions

- Please identify what you consider to be the strengths of the course. *
- Please identify area(s) where you think the course could be improved. *
- Is there any one moment in the course or a resource used that stands out for you as particularly important in contributing to your learning process? Which one? Why? *
- Would you recommend this course to a colleague or friend, why (not)? *

Advanced Training – End of Training Evaluation Form

- **Email ***
- **First Name ***
- **Last Name ***
- **Please select one answer with 0 meaning "not at all likely" and 10 meaning "most likely" * 0 – 10 scale**

How likely is it that you would recommend this training to a colleague or friend?

How likely is it that you would recommend Soliya to a colleague or friend?

- **How would you rate: * Very low - Low - Neither low nor high – High - Very high**
 - Your facilitation skills
 - Your leadership skills
 - Quality of the trainer performance during the live sessions
 - Your learning experience during the synchronous live sessions using Zoom
 - Quality of the asynchronous trainer performance on Brightspace
 - Your asynchronous learning experience using Brightspace
 - Your ability to facilitate a group in conflict
 - Course content



- Support from the training team
 - Overall experience of the training
 - Your overall experience with Brightspace
- **Participating in this training helped me develop:** * Strongly disagree – Disagree - Neither agree nor disagree – Agree - Strongly agree
 - Communication skills
 - Active listening skills
 - Digital competences
 - Leadership skills
 - Language skills
 - Facilitation skills
 - Understanding of the dialogue process
- **To what extent do you agree with the following statements:** * Strongly disagree – Disagree - Neither agree nor disagree – Agree - Strongly agree
 - The training prepared me to manage conflict dynamics that could occur in my online group
 - The training prepared me to manage power dynamics in my online group
 - The training improved my understanding of Virtual Exchange
 - I shared information about what I was learning in this training with colleagues, friends and/or family
 - This training improved my ability to work with a group and encourage collaboration
 - The training improved my confidence to communicate or work in a culturally diverse setting
 - As a result of this training, I feel more comfortable approaching discussions around culturally/politically sensitive or divisive issues in my community
 - I feel more motivated to try to engage with difference constructively
 - I have acquired the necessary tools and knowledge to facilitate in Virtual Exchange programs
 - The knowledge and/or skills I have acquired could be applied in other contexts
 - My self awareness has increased as a result of the training
 - The training has helped me develop a deeper understanding of others' perspectives and emotions, and enhancing my ability to engage empathetically with others
 - My ability to constructively manage emotions has improved due to the training
- **Open questions**
 - Please identify what you consider to be the strengths of the training *
 - Please identify area(s) where you think the training could be improved *
 - Is there any one moment in the training or a resource used that stands out for you as particularly important in contributing to your learning process? Which one? Why? *
 - Would you recommend this training to a colleague or friend, why (not)?
 - Were there any frustrating part/aspect in the training? If yes, what were they? *
 - How was the quality of your trainer(s) and the support they provided you? *



- What additional skills/training/materials do you feel that you need before you will be fully prepared to work with your Virtual Exchange group? *
- Are there things that you will do differently in the future as a result of this training? Please explain *
- Do you feel the skills gained through this training are relevant to you outside the role of a virtual exchange facilitator? Have the skills gained benefited you professionally/personally? Please explain *
- Do you have any additional comments about the program? Thank you!



Appendix 3

R analysis script

R script clivex

```
#uncomment the install packages comments the first time running the script
#install.packages("readr")
#install.packages("missMethods")
#install.packages("questionr")

library(questionr)
library(readr)
library(missMethods)

#this script assumes that the item names are in the top row, and that they are named Q1, Q2, Q3,
etc.

#this reads your data into r, if using rstudio you can also easily use the file explorer to do this
Survey <- read.csv("yourfilename.csv")

#this recodes nationalities, in this case only "Nederlands" to "Dutch", but you can copy this
Survey$Q100 <- gsub("Nederlands", "Dutch", Survey$Q100)

#recodes country of residence
Survey$Q101 <- gsub("Nederland", "the Netherlands", Survey$Q101)

#sets numeric values for the Likert items
Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)][Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)]=="Strongly Disagree"] <- "1"
Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)][Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)]=="Disagree"] <- "2"
Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)][Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)]=="Neutral"] <- "3"
Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)][Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)]=="Agree"] <- "4"
Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)][Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)]=="Strongly Agree"] <- "5"
```



```
Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)] <-  
lapply(Survey[,c(11,13,15:24,26:39,41,43,45:64,66:69,72:83)],as.numeric)
```

```
Survey[,c(91:95)][Survey[,c(91:95)]=="Very Dissatisfied"] <- "1"  
Survey[,c(91:95)][Survey[,c(91:95)]=="Dissatisfied"] <- "2"  
Survey[,c(91:95)][Survey[,c(91:95)]=="Neutral"] <- "3"  
Survey[,c(91:95)][Survey[,c(91:95)]=="Satisfied"] <- "4"  
Survey[,c(91:95)][Survey[,c(91:95)]=="Very Satisfied"] <- "5"
```

```
Survey[,c(91:95)] <- lapply(Survey[,c(91:95)],as.numeric)
```

#note that the following codes the negatively stated items in reverse order

```
Survey[,c(12,14,25,42,44, 65)][Survey[,c(12,14,25,42,44, 65)] == "Strongly Disagree"] <- "5"  
Survey[,c(12,14,25,42,44, 65)][Survey[,c(12,14,25,42,44, 65)] == "Disagree"] <- "4"  
Survey[,c(12,14,25,42,44, 65)][Survey[,c(12,14,25,42,44, 65)] == "Neutral"] <- "3"  
Survey[,c(12,14,25,42,44, 65)][Survey[,c(12,14,25,42,44, 65)] == "Agree"] <- "2"  
Survey[,c(12,14,25,42,44, 65)][Survey[,c(12,14,25,42,44, 65)] == "Strongly Agree"] <- "1"
```

```
Survey[,c(12,14,25,42,44, 65)] <- lapply(Survey[,c(12,14,25,42,44, 65)], as.numeric)
```

#Uses mode imputation to handle missing data

```
Survey[,c(11:39,41:69,72:83,91:95)] <- impute_mode(Survey[,c(11:39,41:69,72:83,91:95)])
```

#creates the composite scores

```
Survey$embody_pre <- apply(Survey[,c(11:20)], 1, mean)
```

```
Survey$embrace_pre <- apply(Survey[,c(21:24)], 1, mean)
```

```
Survey$envision_pre <- apply(Survey[,c(25:28)], 1, mean)
```

```
Survey$acting_pre <- apply(Survey[,c(29:34)], 1, mean)
```

```
Survey$acting_pre <- round(Survey$acting_pre,2)
```



```
Survey$embody_post      <- apply(Survey[,c(41:50)], 1, mean)
Survey$embrace_post     <- apply(Survey[,c(51:54)], 1, mean)
Survey$envision_post    <- apply(Survey[,c(55:58)], 1, mean)
Survey$acting_post      <- apply(Survey[,c(59:64)], 1, mean)
Survey$acting_post      <- round(Survey$acting_post,2)
```

```
#creates a couple of frequency tables
```

```
table_q91 <- questionr::freq(Survey$Q91, cum = TRUE, sort = "dec", total = TRUE)
table_q92 <- questionr::freq(Survey$Q92, cum = TRUE, sort = "dec", total = TRUE)
table_q93 <- questionr::freq(Survey$Q93, cum = TRUE, sort = "dec", total = TRUE)
table_q94 <- questionr::freq(Survey$Q94, cum = TRUE, sort = "dec", total = TRUE)
table_q95 <- questionr::freq(Survey$Q95, cum = TRUE, sort = "dec", total = TRUE)
```



Appendix 4

Life Cycle Assessment

General information

1. What is the title of your course?
2. Where do you usually attend the course from? Choose one answer
 - Home
 - University space (e.g. classroom, university library)
 - Public space (e.g. library, internet café)
3. How many hours do you spend on the course each week? (including dialogue sessions, videos, readings, and assignments)
 - 2 hours
 - 3 hours
 - 3 hours
 - 4 hours
 - 5 hours
 - Others: _____

Materials

4. What electronic devices do you use to support your learning throughout the course? Check all that apply
 - Computer
 - Refurbished computer
 - Laptop
 - Refurbished laptop
 - Tablet
 - Refurbished tablet
 - Smartphone
 - Refurbished smartphone
 - Others: _____
5. How much paper do you use to support your learning throughout the course?
 - None
 - 1 - 10 sheets of paper
 - More than 10 sheets of paper
6. Is this paper recycled?
 - Yes, it's recycled paper
 - No, it isn't recycled paper
7. What other writing instruments or materials do you use for this course? Check all that apply
 - Pen
 - Pencil
 - Marker
 - Others: _____

Food and beverage

8. Do you bring/consume packaged food to/during the class? If yes, please specify the type of packaging.
 - No, I don't bring/consume packaged food to class
 - Plastic
 - Recycled plastic



- Paper
 - Recycled paper
 - Aluminium
9. Do you bring/consume packaged/bottled drinks to/during the class? If yes, please specify the type of packaging.
- Plastic
 - Recycled plastic
 - Paper
 - Recycled paper
 - Glass
 - Recycled glass
 - Aluminium
 - Glass
 - Recycled glass
10. Do you bring/use plastic bottles of water? If yes, what size?
- No, I don't bring/consume packaged food to class
 - 0.5 L
 - 1 L
 - 1.5 L
 - 2 L

Transport

11. If not attending from home, what mode of transport do you normally use to "attend" the course?
- I attend the course from home
 - Car (personal use)
 - Carpool/car sharing
 - Train
 - Tram
 - Bus
 - Cab/taxi
 - Bicycle
 - Motorcycle
 - Walking
 - Others: _____
12. How far is this destination from your home? Enter the distance of a round trip in km

Energy consumption

13. Is there a lighting system switched on while attending the course? If yes, what type of lighting is used?
- None
 - LED
 - Energy-saving bulbs
 - Neon
 - Others: _____
14. Is any heating or air conditioning system used? If yes, what type?
- None
 - Heating pump system
 - Cold air conditioner
 - Radiator
 - Electric fans
15. Is your device constantly attached to an energy source during the course?
- No



- Yes

16. If not, how long does it take for you to recharge the battery of your laptop/technological device after the course?

- Not more than 30 minutes
- 30 minutes – 1 hour
- More than 1 hour