



NATURE AND ASSESSMENT OF ENGAGEMENT (PR2)

Leading organization:

University of Valladolid, Spain



Co-funded by
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Understanding Climate Engagement and Open Recognition in European Higher Education: A Mixed-Methods Study Across Four Countries

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Information

Project Impact evaluation of eco-pedagogy towards Individual and Collective Engagement through the implementation of a European Open Badges Passport for Climate and Planet – OpenPass4Climate

Project N° 2022-1-FR01-KA220-HED-000089354

Work Package Work package n°3 – Nature and Assessment of Engagement

Date June 2025

Type of Document Report

Language English

Consortium



Universidad de Valladolid



Network of Universities
from the Capitals of Europe



Co-funded by
the European Union



Executive summary

The OpenPass4Climate project seeks to advance climate change education by implementing an open recognition alliance system that fosters innovative teaching and learning methods. Work Package 3 (WP3) aimed to collect critical insights into students' engagement with climate issues, assess key climate commitments, and evaluate perceptions of open recognition systems across four European countries: France, Italy, Portugal, and Spain.

Utilizing a mixed-methods approach —comprising a survey (n=630), one-to-one interviews (n=69), national focus groups (n=45), and a transnational focus group (n=16) — the study uncovered several pivotal findings. Students exhibit significant climate concern and a strong acknowledgment of human contributions to climate change. However, a persistent gap exists between their environmental values and reported actions, underscoring the need for educational strategies that effectively link theoretical knowledge with practical application.

The research highlighted notable cross-country variations in climate attitudes and educational preferences, emphasizing the necessity for contextually tailored implementation strategies. Students expressed robust support for embedding climate education within formal curricula while advocating for flexible informal learning pathways. Perceptions of open badge systems revealed moderate familiarity but considerable interest in their potential, particularly when supported by institutional endorsement and rigorous quality assurance.

These findings guide the development of the OpenPass4Climate platform, with immediate next steps including:

- Refinement of badge system design based on user feedback
- Establishment of assessment criteria that balance standardization and adaptability
- Preparation for pilot testing across participating countries

Successful implementation will demand coordinated efforts among educational institutions, policymakers, and stakeholders to drive meaningful transformation in climate education recognition systems.



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1. INTRODUCTION

The fight against climate change is a cornerstone of the EU Erasmus+ program, with education recognized as a vital tool in confronting this global challenge (European Commission, 2021a). The environmental crisis confronting humanity today transcends scientific boundaries, encompassing profound social and political dimensions (Vare & Scott, 2007). As we approach the mid-2020s, the urgency of climate change and the associated loss of biodiversity necessitate an educational response, yet many schools and systems grapple with effective strategies (UNESCO, 2021). Research consistently shows that merely imparting knowledge about environmental issues is insufficient to spur meaningful change; shifts in attitudes and perceptions of the natural world are essential to catalyzing behavioral transformation (Ajzen, 1991; Bamberg & Möser, 2007; Kollmuss & Agyeman, 2002).

The European Union has responded decisively through initiatives such as the European Green Deal, launched in 2019, which outlines a roadmap for sustainable development (European Commission, 2019). Moreover, its commitment has been further reinforced by policy recommendations that stress the importance of education for environmental sustainability and advocate for incorporating youth perspectives in tackling climate and biodiversity challenges—most notably, the Council Recommendation on Learning for the Green Transition and Sustainable Development (Council of the European Union, 2022a) and the Council of Europe Recommendation on Young People and Climate Action (Council of Europe, 2024). Complementing these efforts, the European Commission's GreenComp framework provides a structured approach to fostering sustainability competencies across educational contexts (Bianchi et al., 2022).

Within this framework, the OpenPass4Climate project emerges as an innovative initiative under the Erasmus+ program, introducing an open recognition alliance system to enhance climate education. By leveraging Open Badges and the OpenPass4Climate platform, the project aims to elevate climate-related activities from awareness to actionable commitment and justice. It seeks to evaluate the tangible impacts of these efforts on advancing climate justice and to identify mechanisms that accelerate the adoption of positive behaviors. A core objective is the creation of a lifelong, portable OpenPass4Climate system, empowering individuals to engage actively in climate initiatives.

To ensure the system's efficacy, WP3 focused on understanding students' engagement with climate issues, assessing key climate commitments, and exploring perceptions of both implicit

and explicit recognition mechanisms. This comprehensive study spanned four European countries —France, Italy, Portugal, and Spain— and employed multiple research methods: an online survey, one-to-one interviews, national focus groups, and a transnational focus group. These efforts provide insights into youth perceptions of climate change, educational preferences, and attitudes toward open recognition systems, informing the co-design of an effective Open Badge system.

This report details the research methodology, presents findings from all study components, analyzes results within the context of contemporary European environmental and educational frameworks, and offers recommendations for the OpenPass4Climate system's implementation. The findings aim to support the development of student-centered curricula and flexible learning pathways that bridge knowledge and action, fostering a generation of environmentally conscious citizens.

2. RESEARCH METHODOLOGY

This study adopted a mixed-methods design, integrating quantitative and qualitative approaches across four phases: an online survey, one-to-one interviews, national focus groups, and a transnational focus group. This multifaceted strategy ensured both broad data collection and in-depth exploration of participants' perspectives on climate education and open recognition systems.

2.1. Survey Design and Implementation

A comprehensive 20-question survey (Annex I) was administered to students from four European countries (France, Italy, Portugal, and Spain). The survey, designed by consortium members and crafted in compliance with the European Union's General Data Protection Regulation, investigated seven key constructs:

'Climate change views' examined students' acknowledgment of scientific evidence attributing climate change to human activity and their perception of it as a significant threat. *'Environmental values and identity'* explored the importance students attribute to environmental protection and their self-identification as environmentally friendly (Bogner & Wiseman, 2006; Johnson & Manoli, 2010). *'Personal responsibility and emotional responses'* investigated students' sense of responsibility for mitigating climate change effects and their confidence in making a positive impact. *'Social norms'* explored perceptions of others' expectations and behaviors regarding environmental issues. *'Eco-pedagogical activities'* investigated prior formal and informal climate education. *'Learning interests and training preferences'* assessed interest in climate change learning and preferred approaches. The *'Open badges system/awareness'* examined familiarity with open badges for recognizing climate-related achievements.

Responses were provided on a Likert scale (1-5), with extreme scale values explicitly defined for all questions. Given that assumptions of homogeneity and homoscedasticity were not met (verified by Shapiro-Wilk and Levene tests), the Kruskal-Wallis non-parametric test was employed to determine statistically significant differences among groups. *Post hoc* multiple pairwise comparisons used the Conover-Iman test.

Internal consistency and reliability were assessed using Cronbach's alpha coefficient.

2.2. One-to-one interviews

Interview participants were selected from survey respondents who had indicated willingness to participate in follow-up research and provided contact information after reviewing data protection consent information. The final sample comprised 69 participants:

- 17 from France (UniLaSalle Beauvais),
- 23 from Italy (CSCI Novara),
- 10 from Portugal (Nova School of Business and Economics),
- and 19 from Spain (Universidad de Valladolid).

A set of 12 questions (Annex III), designed by consortium members based on feedback from each partner institution's teaching staff and students, structured the interviews into four blocks: '*Climate change views*', '*Eco-pedagogical activities*', '*Learning interests and training preferences*', and '*Open badges system/awareness*'. Interviews were conducted in participants' native languages without time constraints, allowing respondents to elaborate as needed for each question.

2.3. National focus groups

National focus groups were conducted in each participating country with a total of 45 participants:

- 17 French undergraduate students,
- 6 Italian vocational and high-school students,
- 12 Portuguese students across different levels,
- and 10 Spanish undergraduate and Master-level students.

The focus groups addressed 12 questions (Annex IV) organized into four thematic blocks: '*Climate change views*', '*Personal responsibility and social norms*', '*Learning interests and training preferences*', and '*Open badges system/awareness*'.

Each consortium member conducted the focus group in their country using the participants' native language. As in the case of the one-to-one interviews, to comply with GDPR requirements, personally identifiable information and full transcripts were only accessible to the educational institution to which students belonged, with anonymized reports shared among consortium members.

2.4. International focus group

The transnational focus group involved 16 students, four from each country, selected to ensure diverse educational representation: Italian high school/vocational students, French undergraduates, Portuguese Master's students, and Spanish PhD-level students. The session was conducted using Miro as the online meeting platform, chosen for its EU GDPR compliance.

Participants were contacted by their institutions regarding purpose, objectives, and expected outcomes, with informed consent obtained for participation and research data use. Rather than recording the session, Miro's notes feature captured relevant information and insights during discussions, facilitating free and open dialogue while maintaining participant privacy.

2.5. Data analysis

The analysis followed a sequential mixed-methods approach. Quantitative survey data underwent statistical analysis using non-parametric tests due to violations of normality assumptions. Qualitative data from interviews and focus groups were subjected to thematic analysis, with initial coding conducted in the original language before the translation of key themes. The integration phase employed a convergent design, wherein quantitative and qualitative findings were compared and contrasted to identify areas of convergence and divergence.

To address potential methodological limitations, several measures were implemented. The sample's composition, while diverse, showed some inherent limitations that were accounted for in the analysis. Categories with limited sample sizes were excluded from the summary of survey results. Furthermore, since age and educational level categories substantially overlapped, only the more detailed educational level data was retained in the analysis.

Translation and interpretation across multiple languages required careful attention. While interviews and focus groups were conducted in participants' native languages to ensure authentic expression, subsequent translation of findings into English for cross-consortium analysis involved review by multiple consortium members fluent in both the source language and English to maintain the accuracy and consistency of findings.

3. RESULTS

3.1. Survey findings

3.1.1. Reliability and sample characteristics

The survey garnered responses from 630 participants, with demographic analysis (Figure 1) revealing that 69% fell within the 18-24 age bracket. Gender distribution showed 60% female respondents compared to 37% male respondents. The sample's educational composition included Bachelor's degree students (35%, with 150 from Spain, 43 from France, and 27 from Portugal), A-level students (34%, predominantly from Italy), and Master's degree students (28%, with 134 from France, 19 from Portugal, and 18 from Spain).

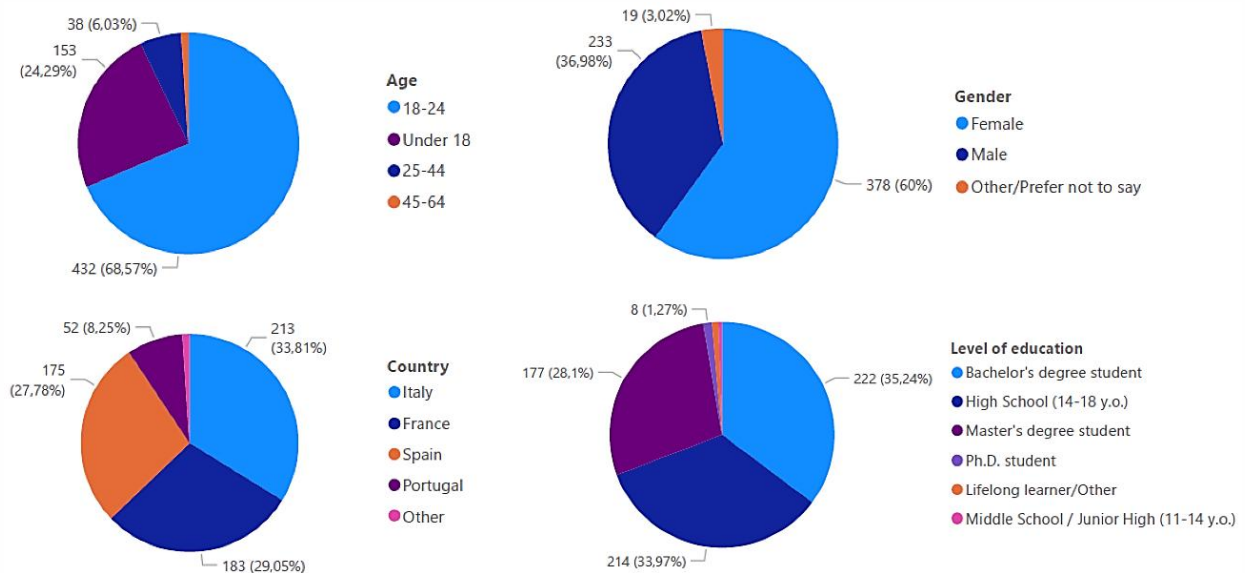


Figure 1 - Profile of the survey respondents

The survey's internal consistency, assessed through Cronbach's alpha coefficient (0.847) and standardized Cronbach's alpha (0.848), demonstrated strong reliability in measuring latent factors among subjects.

3.1.2. Climate attitudes and values

Climate change views (questions 1-4; Annex II, Tables S1 and S2)

Respondents expressed significant concern about climate change (mean=4.0/5), with strong consensus acknowledging human activities as major contributors (4.4/5). Participants generally believed in an individual capacity to impact climate change (3.7/5) and strongly endorsed government intervention (4.4/5). Statistical analysis revealed:

- Significantly higher scores among female students across all four questions
- Higher concern levels among university students compared to other educational levels
- Country-level variations with Italian students showing the lowest scores and Portuguese students consistently highest

Environmental values and identity (questions 5-7; Annex II, Tables S1 and S2)

Environmental protection received high importance ratings (4.5/5), though prioritizing it over economic growth garnered less support (3.8/5). Respondents reported medium-high alignment between actions and environmental values (3.6/5), with notable variations:

- Female students showed the highest scores for environmental values items
- No significant gender differences in action alignment
- Master's students and French students reported the lowest alignment
- Portuguese students demonstrated the highest alignment scores

Personal responsibility and emotional responses (questions 8-9; Annex II, Tables S1 and S2)

Results showed a moderate sense of responsibility for reducing climate change effects (3.2/5), with:

- Significantly higher scores among female respondents
- Lowest scores among French students
- Highest scores among Portuguese students
- General lack of hope about the environmental future (2.6/5)
- Greater optimism among the youngest respondents and Portuguese/Italian students

Social norms (questions 10-11; Annex II, Tables S1 and S2)

Participants reported medium levels of environmental concern in their social circles (2.9/5), with:

- Highest scores among Master's students
- Lower perceptions (2.4/5) of environmental care by authority figures
- Lowest scores in France
- Highest scores in Italy and Portugal

3.1.3. Educational engagement

Eco-pedagogical activities (questions 12-14; Annex II, Tables S3 and S4)

Formal climate change training was rated as moderate (3.2/5), while informal education scored slightly higher (3.5/5). Key findings included:

- Higher scores among female and Master's students
- Higher participation rates in France and Portugal
- Low overall participation in eco-pedagogical activities (2.3/5)

Learning interests and training preferences (questions 15-17; Annex II, Tables S3 and S4)

Students showed moderate-to-high interest in climate-related learning (3.8/5), with:

- Strong support for formal curriculum integration (4.1/5)
- High endorsement of informal learning effectiveness (4.1/5)
- Higher scores among female and Master's level students
- Particularly strong interest in France and Portugal

3.1.4. Open recognition systems

Open badges system/awareness (questions 18-20; Annex II, Tables S3 and S4)

Results indicated:

- Moderate valuation of climate-related learning recognition (3.5/5)
- Limited motivation for earning open badges (3.2/5)
- Neutral stance on employability impact (3.0/5)
- Higher optimism among Portuguese students (3.5/5)

Statistical analysis revealed significant country-level differences for 12 out of 20 items, emphasizing the importance of considering national contexts in implementation strategies.

3.2. Interview and focus group findings

3.2.1. One-to-one interviews

Participant profiles

The interviews involved 69 participants across four countries:

- France: 17 respondents (14 females, 3 males), primarily second-year Environmental Engineering and Agri-Food degree students
- Italy: 23 respondents (14 males, 9 females) aged 17-18, representing diverse educational fields including Administration, Finance, Marketing, Agriculture, and others
- Portugal: 10 Master-level students (5 females, 5 males) from the School of Business and Economics
- Spain: 19 respondents (11 females, 8 males) across undergraduate (11), Master's level (3), and PhD-level (5) programs

Common themes across countries

Pressing environmental issues emerged as a primary concern, with climate change universally recognized as the most critical issue. Participants specifically highlighted global warming, CO₂ emissions, pollution across multiple domains (air, water, soil), deforestation, biodiversity loss, and waste management challenges.

Individual actions were emphasized across all interviews, with participants identifying key behavioral changes such as reducing meat consumption, using public transportation, practicing recycling, raising awareness through education, and adopting responsible consumption habits.

Participants across countries supported regulatory measures and environmental taxes to drive change, emphasizing the role of politicians, governments, and corporations. Most respondents reported receiving climate-related training through both formal university courses and informal methods such as workshops and documentaries.

Country-specific insights

Italian participants provided detailed insights into local waste management practices and emphasized the need for improved energy efficiency systems. French students demonstrated a strong interest in innovative sustainability solutions and emphasized the importance of robust government policies. Portuguese respondents highlighted community-driven initiatives and advocated for comprehensive educational reforms. Spanish participants showed clear preferences for experiential and practical learning methods, with a strong dislike for purely online learning formats.

3.2.2. National focus groups

Participant distribution

The national focus groups comprised:

- France: 17 undergraduate students (14 females, 3 males)
- Italy: 6 vocational and high-school students (3 females, 3 males)
- Portugal: 12 students (7 females, 5 males) across Bachelor's (5), Master's (5) and PhD (2) levels
- Spain: 10 undergraduate and Master-level students (8 females, 2 males)

Key findings

Participants across all countries acknowledged the severity and urgency of climate change, citing issues such as global warming, extreme weather events, pollution, and biodiversity loss. There was strong consensus regarding climate change's impact on future generations, particularly concerning food security, health issues, economic instability, and increased migration.

Education emerged as crucial in fostering environmental awareness and promoting sustainable practices. Participants advocated for integrating environmental education into school curricula from an early age, ensuring comprehensive approaches beyond superficial treatment of topics.

Country-specific variations revealed:

- Italian participants emphasized economic consequences, particularly agricultural impacts
- French participants discussed eco-anxiety and psychological effects
- Portuguese participants focused on greenwashing issues and corporate transparency
- Spanish participants provided detailed insights into local climate impacts

3.3. International focus group

The transnational focus group involved 16 students (4 per country) representing different educational levels. Discussions focused on badge design, implementation preferences, and potential concerns.

3.3.1. Badge design and comprehension

Participants critiqued the badge design, noting readability challenges with white text on light backgrounds. They suggested green and orange hues to reflect nature and confidence, respectively, alongside clearer classification descriptions and refined graphics and logo sizes for visual clarity.

3.3.2. Implementation recommendations

For implementation, they advocated user-friendly features, such as progress-tracking tools and detailed tutorials, as well as highlighting training hours in metadata for EU-wide recognition. They also proposed gamification (e.g., weekly challenges) and integration with LinkedIn and university transcripts to enhance utility.

3.3.3. Potential concerns

Participants raised concerns about employer preferences for traditional certificates, uncertainty about badge value in job applications, and risks of superficial learning focused on badge acquisition rather than genuine knowledge gain. They emphasized the need for technical support and guidance for organizations implementing the badge system.

These findings provided insights for developing the badge system's design and implementation strategy while highlighting important considerations for ensuring its effectiveness and credibility.

4. DISCUSSION

The multi-method approach of this study provides robust insights into youth climate attitudes, educational preferences, and perceptions of open recognition systems. Building on prior European research, such as the Special Eurobarometer 501 (European Commission, 2020a) and 538 (European Commission, 2023), the findings reveal both encouraging trends and persistent challenges in climate education and competency development, particularly within educational contexts and among younger populations.

4.1. Environmental attitudes and climate awareness

Concerning the first construct on '*Climate change views*', a comparison of our survey results with the Eurobarometer findings reveals important insights into youth climate attitudes within the broader European context. Our student respondents demonstrated high climate concern (Q1, mean=4.0/5), which aligns with but intensifies the general public sentiment captured in Eurobarometer 538 (QC2, '*How serious a problem do you think climate change is at this moment?*'), where 77% of EU citizens view climate change as a very serious problem. Country-specific trends (Portugal, 4.48 > France, 4.11 > Spain, 3.91 > Italy, 3.76) were quite consistent with those obtained in the Eurobarometer 538 (Portugal, 89% > Spain, 86% > France, 85% > Italy, 83%), with Portugal and Italy ranking first and last, respectively.

The OpenPass4Climate survey (Q2) provided unique insight into students' strong belief in human responsibility for climate change (4.4/5 overall, with Portugal's highest at 4.8/5), a perspective not directly measured in the Eurobarometer surveys.

When examining individual roles in tackling climate change (Q3), student respondents showed a stronger belief in individual impact (3.7/5) compared to the relatively low percentages in Eurobarometer 538 (QC3, '*In your opinion, who within the EU is responsible for tackling climate change?*'), in which only 35% of respondents (EU27-average) felt personally responsible for tackling climate change. This suggests that students may feel more empowered than the general population. Interestingly, Portugal showed the highest belief in our survey (3.98/5), and lower than the EU27 average (28%) in the Eurobarometer, while Italy showed the lowest belief in both surveys (3.57/5 and 20%, respectively).

Students showed strong support for government intervention (Q4, 4.4/5) in tackling climate change. This aligns with the aforementioned Eurobarometer 538 (QC3) responses, in which national governments and the EU were chosen by 56% of the respondents as responsible for

tackling climate change. This also connects with strong support for coordinated intervention, with Eurobarometer 501 (QA8) showing that 70% of the respondents favor joint EU decision-making on environmental issues. As for country differences, Portuguese students' strong support in our survey (4.63/5) contrasts with the lower support in Eurobarometer 538's QC3 (47% and 52% for national governments and the EU, respectively), while Italy's lowest scores in both surveys are consistent.

With regard to the '*Environmental values and identity*' construct, the relationship between environmental values and actions revealed interesting patterns across surveys. Younger populations demonstrated heightened endorsement of environmental protection (Q5, 4.5/5) compared to national averages: in Eurobarometer 501 (QA1, '*How important is protecting the environment to you personally?*'), only 53% — EU-27 average value— of the respondents chose 'very important'. The highest score among Portuguese students (4.75/5) aligns with the results from the TIMSS 2023 survey where Portugal ranked better (522 ± 2.6) than Italy (517 ± 3.7) and France (511 ± 4.3) in terms of 'Students Value Environmental Preservation' (von Davier et al., 2024).

However, despite strong endorsement of environmental protection, alignment between values and actions was moderate (Q7, 3.6/5), highlighting a 'value-action gap' (Uitto et al., 2015). Focus groups further elucidated this gap, pointing to structural and institutional barriers, a phenomenon well-documented in environmental psychology (Kollmuss & Agyeman, 2002). This disconnect finds parallels in Eurobarometer 538 (QC5, '*Have you personally taken any action to fight climate change over the past six months?*') where only 63% of the respondents said 'yes', with concrete actions varying significantly (QC6), and with Eurobarometer 501 (QA9), in which 67% of the respondents recognized that —as citizens— they were not doing enough to protect the environment. Italy's highest action-value alignment in our survey (3.71/5) contrasts with its lowest value in Eurobarometer 538 (52%), suggesting that in this country the gap may be reduced among more environmentally aware youth populations.

For the '*Personal responsibility and emotional responses*' construct, a dimension not covered in the Eurobarometer surveys, our survey shows students felt only moderately responsible for reducing the negative effects of climate change (Q8, 3.2/5), with a lower value than the one indicated above for Q3 on how much individuals can make a difference in addressing climate change (3.7/5). This further supports that they predominantly place the onus for climate action on governments while underestimating potential individual responsibility and contributions. Regarding the hopefulness about the future of the environment (Q9), they were mostly pessimistic (2.6/5). This prevailing sense of hopelessness about the environment's future is consistent with

their perception of those in leadership positions within their countries, which they consider can make a difference, as indifferent to environmental issues (see below).

Analysis of the '*Social norms*' construct reveals that respondents in our survey considered that people in their social circle cared less than them about the environment and climate change (Q10, 2.9/10 vs. Q5, 4.5/5), which does not align with the actual perception in their countries according to Eurobarometer 538 QC2 (83 to 89% of respondents considered climate change a very serious problem). Their view on how much people in positions of responsibility (national government, regional government) in their country care and take action to protect the environment and climate change yielded a very low value (Q11, 2.3/5). This aligns with Eurobarometer 538 (QC7), in which 67% (EU27-average) of the respondents believed their governments are not doing enough, and with Eurobarometer 501 (QA9), in which 72% and 68% of the respondents considered that their national governments and the EU were not doing enough to protect the environment.

As for other aspects not analyzed in the Eurobarometer surveys, gender differences emerged in our survey, with female respondents consistently scoring higher on environmental values, aligning with established research (McCright, 2010; Zelezny et al., 2000), though Portugal's uniformly high scores suggest cultural and educational contexts may mitigate such disparities.

The educational level also emerged as a significant factor in environmental engagement. Master's students showed the highest rates of climate awareness and advocacy, which aligns with UNESCO's analysis of how specialized education enhances pro-environmental behavior, particularly among STEM graduates (Nair-Bedouelle, 2021).

4.2. Eco-pedagogical activities, learning interests, and training preferences

Results from the '*Eco-pedagogical activities*' construct indicate that students rated their informal climate change education (Q13, 3.5/5) more highly than their formal training (Q12, 3.2/5). This preference for informal learning sources mirrors Eurobarometer 501's QA4 findings, where respondents primarily relied on television news (66%) and the internet (38%) for environmental information rather than formal educational channels. The higher scores for perceived climate change training in France (Q12, 3.51/5; Q13, 3.66/5), with Portugal ranking second, do not align with the results from the TIMSS 2023 survey where Portugal ranked better (520 ± 2.9) than Italy (504 ± 3.8) and France (492 ± 3.6) in terms of 'Average Environmental Knowledge' score (von Davier et al., 2024).

Despite high interest in climate-related learning (Q15, 3.8/5), participation in eco-pedagogical activities was low (Q14, 2.3/5). This participation gap mirrors the findings from Eurobarometer

501, in which eco-pedagogical activities (e.g., attending a workshop about environmental issues or a collective beach or park cleanup) showed consistently low engagement rates across member states (7% EU-27 average). Moreover, in Eurobarometer 501's QA10, providing more information and education was only chosen as an effective way of tackling environmental issues by 24% of the respondents. Our student survey suggests a higher valuation of educational interventions among university students compared to the general population, highlighting the potential role of higher education in fostering environmental engagement, and that barriers remain to convert students' strong interest in climate education into active participation in educational initiatives.

On the topic of training preferences, participants strongly favored hybrid learning models, valuing formal curriculum integration (Q16, 4.1/5) and informal pathways (Q17, 3.8/5). National focus groups underscored the complementary roles of structured and experiential learning, with students advocating for a balance that combines theoretical knowledge with practical, community-based activities. This preference aligns with the European Commission's emphasis on flexible learning pathways (European Commission, 2021a) and the GreenComp framework's call for holistic sustainability education that fosters critical thinking, problem-solving, and collaboration (Bianchi et al., 2022).

4.3. Open recognition systems: bridging theory and practice

The identified value-action gap suggests that recognition systems could incentivize action, even though the initial survey showed that students only moderately valued recognition for completing climate-related learning activities (Q18, 3.5/5) and showed even less interest in open badges as a motivation tool to learn about climate-related topics (Q19, 3.2/5). As subsequently evidenced during the one-to-one interviews and national focus groups, this was partly due to the students' limited understanding of the open badges system and its value for recognizing and showcasing climate-related learning achievements (underscoring the need for targeted awareness campaigns and educational initiatives regarding its purpose and applications) and partly due to real-world applicability concerns, a notion supported by the transnational focus group's emphasis on quality assurance, institutional credibility, and alignment with existing qualification frameworks. Participants expressed concerns about employer recognition of badges, technological barriers (e.g., lack of access to digital platforms in rural areas), and the risk of superficial learning if badges are awarded without rigorous assessment. These challenges resonate with broader EU competency framework efforts (European Commission: Joint Research Centre, 2025) and UNESCO's call for transformative education that fosters deep, meaningful engagement (UNESCO, 2021).

On the question of employability (Q20, 3/5), the survey's neutral perception contrasts with evidence from the World Economic Forum's 2023 Future of Jobs Report, which indicates growing employer recognition of sustainability-focused credentials (Di Battista et al., 2023). This discrepancy aligns with critiques of poor institutional communication about credential portability (Oliver, 2022). However, Portuguese students were more optimistic (3.5/5), which may be tentatively attributed to Portugal's comprehensive digital education strategy, particularly the Digital Transition Action Plan (PDE) adopted in 2020, which the European Schoolnet highlighted as a transformative System Change Case Study (Wastiau et al., 2024). This initiative, complemented by the National Digital Skills Initiative e.2030 (INCoDe.2030) and the Portuguese government's strategic funding of Universidade Aberta, has created an integrated approach to digital micro-credentials and open education for certifying competencies (Griffiths et al., 2024). Such coordinated national efforts align with and advance broader EU initiatives to embed Open Badges in educational frameworks (Council of the European Union, 2022b; EQAR, 2023).

Addressing these concerns will require careful design, ensuring that badges are credible, user-friendly, and integrated with existing educational and professional frameworks. For example, badges could be aligned with the European Qualifications Framework (European Commission, 2018) to enhance their recognition across borders. The European Council's emphasis on whole-institution approaches (Council of the European Union, 2022a) provides a supportive context for such developments, encouraging universities to adopt open recognition systems as part of their sustainability strategies.

4.4. Policy implications

The research findings advocate for coordinated policy interventions across European, national, and institutional levels to advance climate education and open recognition systems. Each level presents distinct challenges and opportunities that must be addressed through carefully crafted policy frameworks.

At the European level, the European Union must establish comprehensive frameworks that balance standardization with national adaptability. This requires developing quality assurance mechanisms for open badge systems that set minimum standards while allowing flexibility for national and regional adaptation (Council of the European Union, 2022b). These mechanisms should ensure alignment with existing European qualification frameworks (European Commission, 2018) while supporting accessibility through multilingual resources and platforms. The EU must also provide funding for digital infrastructure, particularly in underserved regions,

and establish standardized protocols for badge portability across member states. Integration with broader EU initiatives is crucial, including alignment with European Green Deal educational objectives (European Commission, 2019) and coordination with the Digital Education Action Plan implementation to support cross-border recognition of climate-related credentials.

National-level policy development should focus on the systemic integration of climate education and recognition within existing educational frameworks. Curriculum development requires thoughtful integration of climate competencies into national frameworks, with consideration given to increasing mandatory climate education hours (UNESCO, 2022). Additionally, assessment frameworks must evolve to recognize both formal and informal learning pathways. Teacher preparation represents another crucial area for national policy intervention, as highlighted by Redman et al. (2018). Countries should establish systematic professional development programs and create support networks for teaching staff, providing necessary resources for eco-pedagogical activities. Recognition systems at the national level must create clear pathways for validating informal learning and establish mechanisms for incorporating open badges into national qualification systems, with quality assurance processes aligned with EU standards (European Commission: Joint Research Centre, 2025).

At the institutional level, educational organizations require policy support for implementing comprehensive approaches to climate education and recognition (Breiting et al., 2005; Higgs & McMillan, 2006; Mathar, 2015; Leal-Filho et al., 2021). Organizational strategy should embrace whole-institution approaches to climate education while establishing partnerships with environmental organizations (UNESCO, 2021). Institutions must develop clear policies for recognizing external learning and integrating sustainability across academic programs. Infrastructure development demands significant attention, with investments needed in digital platforms for badge issuance and verification, alongside technical support systems for users. Quality assurance at the institutional level requires robust assessment criteria and verification processes for badge issuance, supported by careful documentation of learning outcomes.

These policy recommendations align with key EU frameworks, including the European Skills Agenda's emphasis on transversal skills recognition (European Commission, 2020b), the Digital Education Action Plan's promotion of innovative learning tools (European Commission, 2021b), and the European Green Deal's focus on environmental sustainability education (European Commission, 2019). Successful implementation requires careful attention to several critical factors. Policymakers must maintain a delicate balance between standardization and contextual flexibility while ensuring equitable access to recognition systems. Support for technological

infrastructure development must be coupled with building credibility through robust quality assurance, such as the European Blockchain Service Infrastructure (EBSI). Furthermore, policies should foster collaboration between educational institutions and industry to enhance the value and recognition of climate-related credentials.

Implementation should follow an evidence-based approach while remaining adaptable to emerging needs and technological developments in digital credentialing. The findings from this study suggest that effective policy frameworks must address both the technical aspects of open badge systems and the broader educational and social contexts in which they operate (Bianchi et al., 2022). As climate education evolves and digital recognition systems mature, policies must remain responsive to changing needs while maintaining high standards for quality and accessibility.

4.5. Limitations and future research directions

This study has several limitations that future research should address. The sample's skew toward higher education students may limit generalizability to other educational contexts. Additionally, the rapid evolution of digital credentialing systems means that attitudes toward open badges may shift as these tools become more widespread. Future research should explore:

- 1) Longitudinal impacts of open recognition systems on learning outcomes
- 2) Comparative effectiveness of different badge implementation strategies
- 3) Intersection of climate competencies with other key EU competency frameworks
- 4) Role of emerging technologies, like blockchain, in credential verification to enhance security and trust

Our findings underscore the complex interplay between environmental attitudes, educational preferences, and recognition systems in supporting climate competency development. Success will require carefully coordinated efforts across policy domains and stakeholder groups, with particular attention to maintaining a balance between standardization and contextual flexibility.

5. Conclusion

The OpenPass4Climate research reveals critical insights for developing effective climate education and open recognition systems in European higher education. The study across four countries demonstrates that while students show strong climate awareness, there remains a significant gap between knowledge and action. This gap presents both a challenge and an

opportunity for the development of open badge systems.

The findings suggest three key areas requiring immediate attention for the successful implementation of the OpenPass4Climate initiative:

First, educational systems must bridge formal and informal learning pathways. Our research demonstrates that students value both structured academic approaches and experiential learning opportunities, suggesting that open badge systems should recognize and validate both forms of learning.

Second, badge system design must prioritize credibility and usability. The focus group findings emphasize that successful implementation requires clear institutional backing, robust quality assurance mechanisms, and user-friendly interfaces. These elements are essential for ensuring that badges hold value for both academic progression and professional development.

Third, implementation strategies must account for national and cultural contexts while maintaining European-wide standards. The significant variations in climate attitudes and educational preferences across countries indicate the need for flexible frameworks that can adapt to local contexts while ensuring consistent quality and recognition.

Looking ahead, the OpenPass4Climate initiative must work within existing European educational frameworks while pushing boundaries to create innovative recognition systems. The focus should be on developing badges that not only acknowledge learning but actively encourage engagement with climate issues through practical action.

The path forward requires a coordinated effort from educational institutions, policymakers, and stakeholders to create meaningful change in climate education. Success will depend on maintaining the delicate balance between standardization and flexibility, ensuring that open badges serve as effective tools for recognizing and promoting climate competency development across Europe.

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6. ANNEXES

ANNEX I: SURVEY QUESTIONNAIRE

Introduction

Thank you for taking the time to participate in this online survey on climate change. The survey aims to collect information on the nature of students' general views and commitments towards climate change, and their view on receiving training on climate-related topics, either formal or informal, and the recognition of these flexible learning pathways using an open badges system.

Your participation in this survey is entirely voluntary. Your responses will be kept confidential, and your personal information will be kept anonymous. Only the researchers involved in this project will have access to the data collected, and the results will be reported in aggregate form. By taking the survey, you are indicating that you have read and understood this statement and that you consent to participate. If you do not wish to participate, you may decline by closing the survey window.

Information on data protection: As established in the current data protection regulations, you are informed that the [University of Valladolid] will process the personal data provided, in the case of choosing this option, to manage your participation in this research project. If you do not provide your e-mail address, the present data protection clauses do not apply as you are not identifiable. The legitimacy of this treatment is based on your consent and the fulfillment, by the University, of missions carried out in the public interest and the obligations legally assigned to it. Your data will not be disclosed to third parties. We inform you that you can exercise your rights of access, rectification, and deletion, among others, through the e-mail address [delegado.proteccion.datos@uva.es] or the postal address: [Secretaría General de la Universidad de Valladolid. Plaza del Colegio de Santa Cruz, 8. 47002 Valladolid]. Additional and detailed information on data protection can be consulted at [https://uvaes-my.sharepoint.com/:b:/g/personal/pmr_uva_es/EZ9bbrmUdRZlvXOkZI92fwlBLikvDRSmkiHAPQWd2mpdiw?e=qyzCHz] and on the web [www.uva.es/protecciondedato].

Demographic questions

Before we begin, please provide us with some basic information about yourself:

What is your age? [Single choice]

- Under 18
- 18-24
- 25-44
- 45-64
- Above 65

How do you identify in terms of gender? [Single choice]

- Male
- Female
- Non-binary
- Prefer not to say
- Other: [Text field]

What is your current level of education? [Single choice]

- Middle School / Junior High (11-14 y.o.)
- High School (14-18 y.o.)
- Bachelor's degree student
- Master's degree student
- Ph.D. student
- Lifelong learner/Other

In which country do you study? [Single choice]

- France
- Italy
- Spain
- Portugal
- Other: [Text field]

Climate change views

1. On a scale of 1-5, how concerned are you about climate change? (1: Very unconcerned, 5: Very concerned) [Likert scale]
2. On a scale of 1-5, how much do you think human activities contribute to climate change? (1: Not at all, 5: A great deal) [Likert scale]
3. On a scale of 1-5, how much do you think individuals can make a difference in addressing climate change? (1: Not at all, 5: A great deal) [Likert scale]
4. On a scale of 1-5, how much do you think governments can make a difference in addressing climate change? (1: Not at all, 5: A great deal) [Likert scale]

Environmental values and identity

5. On a scale of 1-5, how important is it to you to protect the environment? (1: Not at all important, 5: Extremely important) [Likert scale]
6. On a scale of 1-5, how much do you think the environment should be prioritized over economic growth? (1: Not at all, 5: Completely) [Likert scale]
7. On a scale of 1-5, how much do you think your actions align with your environmental values? (i.e., how often do you engage in pro-environmental behaviors, such as recycling, saving energy, or using public transportation?) (1: Not at all, 5: Completely) [Likert scale]

Personal responsibility and emotional responses

8. On a scale of 1-5, how much do you agree or disagree with the following statement: "I feel personally responsible for reducing the negative effects of climate change."? (1: Strongly disagree, 5: Strongly agree) [Likert scale]
9. On a scale of 1-5, how hopeful do you feel about the future of the environment? (1: Not hopeful at all, 5: Extremely hopeful) [Likert scale]

Social norms

10. On a scale of 1-5, how much do you think people in your social circle care about the environment and climate change? (1: Not at all, 5: A great deal) [Likert scale]
11. On a scale of 1-5, how much do you think people in positions of responsibility (national government, regional government) in your country care and take action to protect the environment and climate change? (1: Not at all, 5: A great deal) [Likert scale]

Eco-pedagogical activities

An eco-pedagogical activity is an educational activity that aims to promote environmental awareness and sustainability, educating planetary citizens to adopt life-long caring and appreciation for nature.

12. On a 1-5 scale, what do you consider to be your degree of training on climate change received from formal education (e.g., courses or workshops at your educational institution)? (1: None at all, 5: Extensive) [Likert scale]
13. On a 1-5 scale, what do you consider to be your degree of training on climate change received from informal education (documentaries, podcasts, social media, games, etc.)? (1: None at all, 5: Extensive) [Likert scale]
14. On a scale of 1-5, how frequently have you participated in eco-pedagogical activities in the past year? (1: Never, 5: Very frequently) [Likert scale]

Learning interests and training preferences

15. On a scale of 1-5, how interested are you in learning about climate-related topics? (1: Not at all interested, 5: Extremely interested) [Likert scale]
16. On a scale of 1-5, how much do you think formal education should include climate-related topics? (1: Not at all, 5: Absolutely) [Likert scale]
17. On a scale of 1-5, how much do you think informal learning can be effective in teaching about climate-related topics? (1: Not effective at all, 5: Very effective) [Likert scale]

Open badges system/awareness

Open badges are digital credentials that represent skills or achievements earned by an individual and can be shared on digital platforms. They help showcase skills and knowledge acquired outside of traditional educational institutions.

18. On a scale of 1-5, how much do you value recognition for completing climate-related learning activities? (1: Not at all, 5: Extremely) [Likert scale]

19. On a scale of 1-5, how much do you think open badges can motivate you to learn about climate-related topics? (1: Not at all, 5: Extremely) [Likert scale]
20. On a scale of 1-5, to what extent do you think that open badges related to climate-related training can increase your employability and career opportunities? (1: Not at all, 5: Significantly) [Likert scale]

Follow-up

21. Would you be willing to participate in a follow-up study of this survey, discussing your view on key climate commitments to consider? [Yes/No]
22. Please indicate your email address (permanent one) [Text field]

Conclusion

Thank you for completing this survey. Your responses will help us understand the perceptions and attitudes of students towards climate change, and their willingness to receive training on climate-related topics. Your participation is greatly appreciated.

Appendix 2 - Mapping of Eco-Pedagogical Activities on Project Website

ANNEX II: SURVEY RESULTS

Climate attitudes and values among survey participants

Table S1. Mean Likert scale scores (range: 1–5) for survey items assessing climate change views, environmental values and identity, personal responsibility and emotional responses, and social norms constructs.

Gender	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Female	4.11	4.50	3.83	4.45	4.53	3.94	3.66	3.29	2.58	2.93	2.33
Male	3.77	4.24	3.44	4.22	4.37	3.68	3.58	3.03	2.71	2.81	2.40
Total	3.98	4.40	3.68	4.36	4.47	3.84	3.63	3.19	2.63	2.88	2.36

Education Level	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
High School	3.77	4.32	3.57	4.24	4.44	3.78	3.70	3.13	2.72	2.71	2.45
Bachelor's degree	4.00	4.41	3.72	4.41	4.49	3.85	3.67	3.24	2.52	2.86	2.27
Master's degree	4.15	4.49	3.82	4.49	4.45	3.90	3.49	3.15	2.60	3.10	2.28
Total	3.96	4.40	3.69	4.37	4.46	3.84	3.63	3.18	2.61	2.88	2.34

Country	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
France	4.11	4.50	3.79	4.37	4.42	3.91	3.48	3.02	2.50	3.08	2.18
Italy	3.76	4.31	3.57	4.22	4.44	3.78	3.71	3.13	2.72	2.69	2.46
Portugal	4.48	4.80	3.98	4.63	4.75	3.85	3.65	3.52	3.04	3.13	2.56
Spain	3.91	4.29	3.62	4.45	4.44	3.83	3.66	3.26	2.48	2.82	2.33
Total	3.97	4.40	3.68	4.36	4.46	3.84	3.62	3.17	2.62	2.88	2.35

Table S2. Kruskal-Wallis test results (mean of ranks) and multiple pairwise comparisons using the Conover-Iman procedure for survey items assessing climate change views, environmental values and identity, personal responsibility and emotional responses, and social norms constructs.

Gender	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Female	337.8 a	332.5 a	337.4 a	329.8 a	330.5 a	331.4 a	319.8 a	333.0 a	308.7 a	324.9 a	314.0 a
Male	281.2 b	285.4 b	275.6 b	289.3 b	294.8 b	286.6 b	309.6 a	291.8 b	331.9 a	300.2 a	321.5 a
p-value	<0.000 1	0.000	<0.000 1	0.003	0.007	0.002	0.466	0.004	0.107	0.084	0.597

Education Level	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
High School	265.5 a	284.3 a	281.8 a	278.5 a	295.5 a	290.9 a	317.4 b	296.5 a	325.8 b	272.9 a	324.8 a
Bachelor's degree	317.0 b	309.3 a	312.1 a	311.6 ab	300.7 a	306.1 a	316.6 b	318.2 a	286.1 a	299.9 a	292.3 a
Master's degree	334.1 b	320.1 a	319.6 a	324.3 b	312.4 a	315.8 a	269.2 a	293.2 a	298.1 ab	346.5 b	291.2 a
p-value	<0.000 1	0.063	0.057	0.010	0.529	0.330	0.004	0.255	0.039	<0.000 1	0.062

Country	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
France	334.2 b	327.6 b	323.4 ab	310.1 ab	295.3 a	288.3 a	272.9 a	281.3 a	284.1 ab	343.2 b	272.8 a
Italy	260.0 a	282.6 a	280.3 a	275.5 a	299.6 ab	322.5 a	317.7 b	358.1 b	324.8 bc	269.5 a	325.5 b
Portugal	405.6 c	389.6 b	360.2 b	347.2 b	362.9 b	310.8 a	319.6 b	296.5 ab	378.2 c	353.5 b	342.3 b
Spain	296.9 ab	280.3 a	295.6 ab	319.0 b	300.5 ab	300.4 a	313.5 ab	320.2 ab	277.1 a	290.1 a	297.8 ab
p-value	<0.000 1	<0.000 1	0.007	0.006	0.052	0.237	0.027	0.016	0.000	<0.000 1	0.005

p-values shown in bold indicate statistical significance.

Educational engagement and perspectives on climate learning and its recognition

Table S3. Mean Likert scale scores (range: 1–5) for survey items assessing eco-pedagogical activities, learning interest/flexible learning pathways/training preferences, and open badges system/awareness constructs.

Gender	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Female	3.27	3.46	2.29	3.90	4.19	4.20	3.60	3.34	3.09
Male	3.09	3.53	2.20	3.65	3.97	3.91	3.42	3.09	2.95
Total	3.20	3.49	2.26	3.81	4.11	4.09	3.53	3.25	3.04

Education Level	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
High School	3.15	3.50	2.16	3.59	3.99	3.99	3.38	3.28	2.98
Bachelor's degree	3.04	3.39	2.06	3.80	4.05	4.11	3.56	3.27	3.08
Master's degree	3.47	3.61	2.52	4.07	4.32	4.18	3.64	3.17	3.02
Total	3.20	3.49	2.23	3.80	4.10	4.09	3.52	3.24	3.03

Country	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
France	3.51	3.66	2.55	4.00	4.26	4.16	3.59	3.06	2.95
Italy	3.16	3.52	2.19	3.60	4.00	4.00	3.40	3.29	2.99
Portugal	3.44	3.56	2.83	4.31	4.44	4.23	3.92	3.54	3.46
Spain	2.87	3.25	1.79	3.68	3.98	4.07	3.45	3.26	3.01
Total	3.20	3.49	2.24	3.80	4.10	4.09	3.51	3.23	3.02

Table S4. Kruskal-Wallis test results (mean of ranks) and multiple pairwise comparisons using the Conover-Iman procedure for survey items assessing eco-pedagogical activities, learning interest/flexible learning pathways/training preferences, and open badges system/awareness constructs.

Gender	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Female	324.8 a	309.5 a	323.9 a	331.9 a	327.9 a	332.4 a	326.6 a	332.7 a	325.6 a
Male	295.9 b	323.9 a	306.0 a	289.4 b	293.5 b	288.1 b	300.7 a	290.5 a	300.6 a
p-value	0.047	0.314	0.219	0.003	0.015	0.002	0.073	0.004	0.085

Education Level	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
High School	293.1 a	303.6 a	294.3 a	261.6 a	278.8 a	283.6 a	278.6 a	308.5 a	294.4 a
Bachelor's degree	279.6 a	289.0 a	277.8 a	312.0 b	298.6 a	311.4 a	313.8 ab	309.7 a	314.8 a
Master's degree	347.4 b	322.1 a	348.2 b	345.0 b	340.7 b	318.2 a	321.4 b	289.3 a	300.3 a
p-value	0.000	0.145	0.000	<0.0001	0.001	0.083	0.023	0.426	0.423

Country	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
France	356.3 c	334.1 b	355.1 c	343.1 b	334.5 b	319.6 a	317.1 ab	278.7 a	296.4 a
Italy	295.4 b	305.7 ab	296.3 b	261.7 a	279.0 a	285.7 a	280.6 a	311.1 a	294.2 a
Portugal	339.8 bc	324.7 ab	387.0 c	397.2 b	364.6 b	322.6 a	378.8 b	349.7 a	383.2 b
Spain	248.5 a	263.1 a	235.7 a	287.9 a	284.6 a	303.3 a	296.7 a	307.3 a	300.4 a
p-value	<0.0001	0.001	<0.0001	<0.0001	0.000	0.188	0.002	0.046	0.009

p-values shown in bold indicate

ANNEX III: ONE-TO-ONE INTERVIEW QUESTIONNAIRE

Background information

- Can you tell me what is your name?
- What are you studying?

Section I: Climate change views

1. What do you think are the most pressing environmental issues facing the world today?
2. What actions do you think individuals can take to address climate change? / In your opinion, what is the most effective way for individuals to make a difference on this issue?
3. How can we encourage more people to take action on climate change? How can we encourage more people to adopt sustainable lifestyles and behaviors?

Section II: Eco-pedagogical activities

4. Have you received any formal or informal training on climate-related topics? If so, could you describe your experience?
5. What types of eco-pedagogical activities have you participated in before?
6. How do you think eco-pedagogical activities can be used to promote sustainable behavior change?

Section III: Learning interests and training preferences

7. What types of climate-related topics are you most interested in learning about?
8. How do you prefer to learn about climate-related topics: online courses, workshops, experiential learning (i.e., learning by doing), action-oriented (i.e., focused on practical solutions and strategies), etc.?
9. Do you believe flexible learning pathways (e.g., self-paced courses) are effective for learning about climate-related topics? Why or why not?

Section IV: Open badges system/awareness

10. Have you ever earned an open badge related to environmental issues? If so, what was your experience like? / Have you ever used open badges as a way to showcase your skills or knowledge related to sustainability or environmental protection? If so, how did it work out for you?
11. How effective do you think open badges are in recognizing and validating skills related to sustainability and environmental protection?
12. Do you believe that open badges could be used as a tool for motivating people to take action on climate change? Why or why not?

ANNEX IV: NATIONAL FOCUS GROUP QUESTIONNAIRE

Section I: Climate change views

1. What are your thoughts on the current state of climate change and its impact on the environment? *[The instructor should encourage the students to agree on 5-10 most relevant issues]*
2. How do you think climate change is affecting current generations? And how will affect future generations? How do you think climate change is affecting and will affect your local community? *[The instructor should encourage the students to reach an agreement on at least the 5 most relevant impacts and then prioritize them]*
3. Do you believe that there is still time to mitigate the effects of climate change? Why or why not? *[The instructor should encourage the students to provide at least 5 reasons to support their opinion]*

Section II: Personal responsibility and emotional responses + Social norms

4. Have you ever changed your behavior or lifestyle in response to concerns about climate change? If so, how? Have you promoted/caused changes in others' behavior? *[The instructor should encourage the students to provide 2-3 actions per student]*
5. What role does personal responsibility play in addressing climate change compared to collective action by governments and institutions? *[The instructor should ask the students to summarize their view in 4-5 main points]*
6. What actions do you think governments should take to address climate change? What steps should governments take to incentivize individuals, businesses, and organizations to reduce their carbon footprint? *[The instructor should encourage the students to provide a list of at least 3 actions (one for individuals, one for businesses, and one for organizations). When translating this question, please take into consideration that 'businesses' refers to companies, whether they are private, public, or a combination of both. On the other hand, 'organization' is used as a broader term to encompass non-profit organizations, non-governmental organizations (NGOs), and other similar entities].*

Section III: Learning interests and training preferences

7. What role do you think education (e.g., eco-pedagogical activities) and awareness-raising campaigns can play in addressing climate change? *[The instructor should gather at least 3-5 points]*
8. How can we ensure that future generations are equipped to address the challenges of climate change? What are the key competencies to be acquired? How can they be acquired? *[The instructor should ensure that they define priorities and that those key competencies are ranked in terms of importance. By 'key competencies', we are referring to a set of essential (soft) skills, knowledge, and attitudes that individuals need to possess (e.g., environmental awareness, understanding of complex, critical thinking and problem-solving, knowledge of sustainable practices, collaboration and communication, empathy*

and ethical responsibility, etc.). The students should share their perspectives on how to acquire the top three competencies. This can be done through online courses, workshops, experiential learning (learning by doing), action-oriented approaches (focused on practical solutions and strategies), and more. It would be beneficial if students discuss specific examples that can further enhance the learning experience]

9. How can we measure the impact of eco-pedagogical activities on students' attitudes and behaviors towards the environment? How can we measure the degree of acquisition of the key competencies? *[It is essential that the students provide at least 5 “means of verification” of the impact of the eco-pedagogical activities; the second question may be skipped, as it may be difficult for them to answer it]*
10. How can we ensure that eco-pedagogical activities are accessible to all students, regardless of their background or socioeconomic status? *[The students need to propose at least 5 ideas]*

Section IV: Open badges system/awareness

11. What role do you think open badges can play in promoting lifelong learning about environmental issues? *[The instructor should explain what open badges are, and students should propose at least 3 ideas; as an example, you may use [About Open Badges - Open Badge Factory](#) or [Open badges: new opportunities to recognize and validate achievements digitally – UNESCO IITE](#)]*
12. How can we ensure that open badges are credible and trustworthy indicators of skills and knowledge related to sustainability? *[The instructor should provide examples of skills related to sustainability (e.g. <https://www.innerdevelopmentgoals.org/framework>), and the students should provide at least 3 approaches]*