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Original article

Qualitative validation of an elective course related to environmental education in higher education

Validación cualitativa de un curso electivo relacionado con la educación ambiental en la educación superior

Validação qualitativa de uma disciplina eletiva relacionada à educação ambiental no ensino superior

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ABSTRACT

The research was grounded in strengthening university environmental education, coherently aligned with sustainability science, critical and transformative environmental education, university social responsibility, and the Sustainable Development Goals, addressing the gap between institutional commitments and tangible territorial impacts. The objective of this study was to prospectively validate the design of an elective course on Environmental Education within Humanistic Formation at César Vallejo University through qualitative expert judgment. A descriptive study employing an instrumental case design was conducted. Theoretical foundation and structural design utilized documentary and content analysis, complemented by synthesis, deduction-induction, and comparative education methods. Validation drew on an intentional panel of nine experts via a Likert-scale questionnaire featuring 27 indicators across four dimensions (theoretical coherence, contextual relevance, organizational feasibility, and SMART evaluation criteria), open-ended questions, thematic

analysis, and triangulation against an internal coherence matrix. Results revealed means exceeding 4.3 on a 1-5 scale, consensus levels from 86 % to 89 %, an overall consensus of 87.7 %, and 92 % internal coherence across foundations, objectives, contents, methodologies, and evaluation criteria. Critical analysis enabled SMART indicator reformulation, shifting focus from academic outputs to measurable community impacts, thereby establishing the course as a pertinent, feasible, and transferable model to bolster university social responsibility under the 2030 Agenda at César Vallejo University—scalable to other campuses and adaptable to comparable educational settings.

Keywords: environmental education; higher education; sustainable education; qualitative validation.

RESUMEN

La investigación se fundamentó en el fortalecimiento de la formación ambiental universitaria, coherentemente, con la ciencia de la sostenibilidad, la educación ambiental crítica y transformadora, la responsabilidad social universitaria y los Objetivos de Desarrollo Sostenible, ante la brecha entre los compromisos institucionales y los impactos reales territoriales. El objetivo fue validar cualitativamente, de manera prospectiva, el diseño de un Curso Electivo de Educación Ambiental en Formación Humanística en la Universidad César Vallejo. Se desarrolló un estudio descriptivo y un diseño de caso instrumental. Para la fundamentación teórica y el diseño se aplicó el análisis documental, de contenido, complementado con análisis, síntesis, deducción–inducción y educación comparada. Para la validación se utilizó un panel intencional de nueve expertos, un cuestionario tipo Likert con 27 indicadores en cuatro dimensiones, preguntas abiertas, análisis temático y triangulación con una matriz de coherencia interna. Los resultados evidenciaron medias superiores a 4,3 en una escala de 1 a 5, con niveles de consenso entre 86 % y 89 %, un consenso global de 87,7 % y una coherencia interna del 92 % entre fundamentos, objetivos, contenidos, metodologías y criterios de evaluación. El análisis crítico permitió reformular los indicadores SMART para pasar del énfasis en productos académicos a la medición de impactos comunitarios concretos, lo que consolidó el curso como propuesta pertinente, viable y transferible para fortalecer la responsabilidad social universitaria en el marco de la Agenda 2030 en la Universidad César Vallejo, escalable a otros campus y ajustable en contextos educativos similares.

Palabras clave: educación ambiental; educación superior; educación sostenible; validación cualitativa.

RESUMO

Esta pesquisa teve como objetivo o fortalecimento da educação ambiental universitária, alinhada de forma coerente com a ciência da sustentabilidade, a educação ambiental crítica e transformadora, a responsabilidade social universitária e os Objetivos de Desenvolvimento Sustentável, considerando a lacuna entre os compromissos institucionais e os impactos territoriais reais. O objetivo foi validar qualitativamente, de forma prospectiva, o desenho de uma disciplina eletiva em Educação Ambiental no âmbito do curso de Ciências Humanas da Universidade César Vallejo. Foram desenvolvidos um estudo descritivo e um estudo de caso instrumental. A análise documental e de conteúdo, complementada por análise, síntese, dedução-indução e educação comparada, foram aplicadas para o referencial teórico e o desenho da disciplina. A validação envolveu um painel intencional de nove especialistas, um questionário do tipo Likert com 27 indicadores distribuídos em quatro dimensões, questões abertas, análise temática e triangulação com uma matriz de consistência interna. Os resultados mostraram pontuações médias acima de 4,3 em uma escala de 1 a 5, com níveis de consenso entre 86 % e 89 %, um consenso geral de 87,7 % e 92 % de consistência interna entre os fundamentos, objetivos, conteúdo, metodologias e critérios de avaliação. A análise crítica permitiu a reformulação dos indicadores SMART, deslocando a ênfase dos resultados acadêmicos para a mensuração de impactos concretos na comunidade. Isso consolidou o curso como uma proposta relevante, viável e transferível para o fortalecimento da responsabilidade social universitária no âmbito da Agenda 2030 na Universidade César Vallejo. É escalável para outros campi e adaptável a contextos educacionais similares.

Palavras-chave: educação ambiental; ensino superior; educação sustentável; validação qualitativa.

INTRODUCTION

The III Regional Conference on Higher Education in Latin America and the Caribbean (CRES), Brazil 2024, recognizes in the CRES+5 Declaration (2024) that training professionals capable of facing the visible political, economic and social deterioration the region is suffering, which significantly affects

higher education, is a transcendental challenge. It also emphasizes alignment with the Sustainable Development Goals (SDGs) and underlines the importance of the actions that States must take to transform education systems and, in particular, to increase the strategic role of higher education in the sustainable development of the region (CRES+5, 2024).

This is a global concern, as shown by the research of de la Rosa and Miró (2024), who explore the subjective and social dimensions of sustainability and humanistic values in Spanish universities. Martínez et al. (2025) evaluate sustainability education among Mexican university students to determine the institution's levels of action regarding education for sustainability. In another line of research, Plata-Izquierdo and Ruiz-Bernardo (2025) examine the impact of teacher education on the development of sustainability awareness among student teachers and in-service teachers in Spain, while Traversa-Tejero and González (2022) carry out bibliographic and case studies on the training of teachers responsible for teaching environmental topics in Uruguay.

In Peru, various studies show the importance of environmental education and sustainability in higher education. Among them, Chávez-Ortiz (2023) stands out for examining the relationship between environmental education and sustainability education among students of Public Higher Technological Institutes in the Amazon region. Claros and Escurra (2021) address university students' perception of their professional training in environmental matters, apart from their professional training, in relation to the self-assessment of their pro-environmental attitudes. The relationship between university social responsibility (USR) and environmental education has also been analyzed by Li et al. (2025) and Velasquez and Estrada (2023), among others.

Going beyond their typical roles in teaching and research is a challenge for universities seeking to become active agents of social transformation. As Núñez et al. (2025) state, "a significant gap still persists between institutional theory and actual practice in the territories" (pp. 4-5). The multicausal nature of the phenomenon, the particular features of socio-environmental contexts and the importance of the sustainability of our common home justify research on this topic.

César Vallejo University in Peru, hereinafter UCV, expresses its commitment to USR by promoting "actions that lead to the ethical and effective management of the impact generated by the University on society through the exercise of its functions: academic, research, social outreach and management" (Universidad César Vallejo, 2025, p. 41), for the benefit of the community, for social

transformation, the promotion of well-being and sustainable development, in harmony with the 2030 Agenda of the United Nations (Naciones Unidas, 2015).

Despite this commitment, there are no validated curricular designs that link environmental education with measurable community impacts in humanistic university education. Therefore, the objective of this article is to prospectively validate an Elective Course on Environmental Education within Humanistic Education at César Vallejo University, for which three specific research tasks were set:

1. Identification of the theoretical foundations of the Elective Course on Environmental Education within Humanistic Education at the UCV.
2. Design of the Elective Course on Environmental Education within Humanistic Education at the UCV.
3. Qualitative validation of the Elective Course on Environmental Education within Humanistic Education at the UCV.

MATERIALS AND METHODS

A qualitative study with a descriptive scope was carried out using an instrumental case design, focused on the prospective validation of the design of an Elective Course on Environmental Education within Humanistic Education at César Vallejo University (UCV), which comprised two phases:

1. Theoretical foundation and curriculum design through document and content analysis.
2. Qualitative validation of the course through expert judgment.

Validation was carried out with a purposive panel of nine (9) experts, university teachers and academic managers with experience in environmental education, USR and curriculum management.

The inclusion criteria were:

- at least five years of experience in higher education
- participation in projects related to sustainability or USR
- extensive knowledge of the institutional context of the UCV

Two main instruments were used:

1. Document analysis matrix, used to examine the internal coherence of the curriculum design (foundations, objectives, content, methodologies and evaluation).
2. Structured Likert-type questionnaire (1–5) for experts, consisting of 27 indicators distributed across four dimensions:
    - theoretical coherence
    - contextual relevance
    - organizational feasibility
    - evaluation with a SMART approach

The instrument included open-ended questions to gather qualitative observations and suggestions for improvement.

Data analysis combined descriptive quantitative procedures and qualitative analysis:

- Calculation of the percentage of consensus (≥85 % of ratings of 4–5 as the validation criterion).
- Calculation of means by dimension.
- Thematic categorization of open-ended responses.
- Triangulation between expert judgment and document analysis using an internal coherence matrix.

Qualitative rigor criteria were applied: credibility (triangulation), transferability (contextual description), dependability (record of the process) and confirmability (grounding in textual evidence).

Ethical considerations

Informed consent was obtained from the participants through a digital form. Anonymity and confidentiality of responses were guaranteed.

Validation was carried out before the course was implemented, for exclusively academic and curriculum improvement purposes.

RESULTS

On Phase 1

The first phase made it possible to define four central foundations of the Elective Course on Environmental Education within Humanistic Education:

- Sustainability Science
- Critical and Transformative Environmental Education
- University Social Responsibility
- The 2030 Agenda–SDGs

Document analysis showed that these pillars are present in all the topics and activities of the course, which shaped an integrated scientific, pedagogical, institutional and political-global framework oriented toward community action.

On this basis, a 16-week (64-hour) semester course was structured, organized into four sequential blocks: conceptual foundations, participatory socio-environmental diagnosis, design and implementation of a community project, and evaluation-systematization of impacts. The proposal combined project-based learning (PBL), participatory action research (PAR) and service-learning (SL) methodologies, integrating classroom work, field activities, community intervention and impact evaluation. The thematic organization, shown in table 1, presents a theoretical-practical progression in which each block culminates in assessable products (concept maps, diagnostic reports, community projects and systematizations) aligned with SMART criteria.

Table 1. Structure of the elective course

Topic	Weeks	Hours	Methodological approach	Assessable product	Key SMART criteria
1. Conceptual foundations	1-3	12	Critical analysis (cases)	Theoretical concept map	85 % integrate 5 key concepts (sustainability, SDGs, USR).
2. Socio-environmental diagnosis	4-7	16	PAR, SWOT/PESTEL (field)	Diagnostic report (8 pp.)	100 % submission and 80 % field trip
3. Community project	8-13	24	SL/PAR, Gantt	Portfolio of executed project	100 % project formulated and 85 % implemented
4. Evaluation and impact	14-16	12	Systematization of the SDGs	Final report (10 pp.) + presentation	100 % SDG impact indicators and 80 % public presentation

Topic 1. Conceptual foundations and critical framework (Weeks 1–3, 12 hours)

Objective: to analyze the theoretical foundations of sustainability, critical environmental education, the SDGs and USR.

Content: the concept of sustainability from a systemic and interdisciplinary approach, the role of the university in community socio-environmental transformation and the ethical principles underpinning community environmental education.

Activities: guided readings, preparation of concept maps and analysis of cases set in the environment of the UCV and nearby communities.

Assessable product: a short text or a systemic diagram that synthesizes the main conceptual frameworks covered.

Assessment objective: To verify understanding of the foundations of sustainability, critical environmental education, the SDGs and USR.

SMART criteria:

1. ≥85 % of the students prepare a concept map or systemic diagram that integrates at least five (5) key concepts (sustainability, SDGs, USR, critical environmental education, environmental ethics, among others), with a rubric score of ≥70/100.

2. ≥80 % of the students correctly identify at least four (4) SDGs relevant to the local context in an applied test or written activity.

3. 100 % of the students take part in at least one case analysis activity, verifiable through the participation record.

Topic 2. Participatory socio-environmental diagnosis (Weeks 4–7, 16 hours)

Objective: to analyze a real socio-environmental problem in the campus environment or nearby community.

Content: participatory diagnostic techniques such as the analysis of strengths, weaknesses, opportunities and threats (SWOT), stakeholder mapping, the analysis of political, economic, social, technological, ecological and legal factors (PESTEL), the problem tree, field observation and semi-structured interviews.

Activities: teamwork, classroom sessions and field trips.

Assessable product: a short socio-environmental diagnostic report identifying the priority problem, causes, actors involved and possible lines of intervention.

Assessment objective: To verify the ability to analyze a real socio-environmental problem using participatory techniques.

SMART criteria:

1. 100 % of the teams submit a socio-environmental diagnostic report that includes a prioritized problem, SWOT analysis, stakeholder mapping, problem tree and PESTEL analysis, with a minimum length of 8 pages and a rubric score of ≥75/100.
2. ≥80 % of the students take part in at least one field trip, verifiable through the attendance list and photographic record.
3. ≥75 % of the teams identify at least 10 relevant actors with roles described in the stakeholder matrix.

Topic 3. Design and implementation of the community project (Weeks 8–13, 24 hours)

Objective: to implement a basic socio-environmental intervention using PAR and SL approaches.

Content: project formulation, definition of objectives, activities and indicators, and preparation of a participatory Gantt-type schedule.

Activities: execution of a pilot project coordinated with community actors, systematic recording of evidence and continuous reflection on the process.

Assessable product: the executed project and a portfolio of documentary evidence of the planning, implementation and preliminary results obtained.

Assessment objective: To assess the ability to carry out a basic socio-environmental intervention with a participatory approach.

SMART criteria:

1. 100 % of the teams present a formulated project that includes objectives, activities, indicators and a Gantt-type schedule, with a score of ≥80/100 on the project rubric.
2. ≥85 % of the students take part in at least one field implementation activity, verifiable through minutes, photographs or activity records.
3. ≥80 % of the teams submit a portfolio of evidence documenting the planning, execution and preliminary results of the project.

Topic 4. Evaluation, systematization of experiences and impact measurement (Weeks 14–16, 12 hours)

Objectives: (a) to evaluate the results of the intervention, (b) to systematize the experiences and (c) to communicate the lessons learned.

Activities: impact indicators linked to the SDGs, basic pre and post-test measurements and critical reflection on the achievements, limitations and possibilities for continuing the project.

Final assessable product: a report on the systematization of experiences and impact evaluation, with a public presentation of the results addressed to both the university community and the participating community actors.

Assessment objectives:

- To evaluate the ability to measure the results of project implementation
- To reflect critically on the results obtained
- To communicate the lessons learned

SMART criteria:

1. 100 % of the teams present a final systematization and evaluation report with a minimum length of 10 pages, including at least two (2) impact indicators linked to the SDGs.
2. ≥80 % of the students take part in the public presentation of the results, verifiable through minutes or an audiovisual record.
3. ≥75 % of the final reports obtain a rubric score of ≥75/100 (criteria: quality of analysis, methodological coherence, critical reflection and feasibility of continuing the project).

On Phase 2. Qualitative validation of the Elective Course on Environmental Education within Humanistic Education at the UCV

Nine experts with experience in environmental education, USR and curriculum design took part in the qualitative validation. The Likert-type questionnaire, structured in four dimensions (theoretical coherence, contextual relevance, organizational feasibility and evaluation with a SMART approach), yielded overall means above 4.3 on a scale of 1 to 5 and consensus levels between 86 % and 89 %

in the categories "Agree" and "Strongly agree". Overall consensus reached 87.7 %, exceeding the pre-established threshold of 85 %, so the four dimensions were considered validated.

Table 2 summarizes these results and also includes the main recommendations for improvement: rewording two ambiguously formulated objectives (theoretical coherence dimension), adding further examples from the Peruvian and UCV context (contextual relevance), redistributing the workload in weeks 8–13 (organizational feasibility) and simplifying three assessment rubrics (SMART dimension). Taken together, the suggested adjustments were classified as minor modifications that do not affect the overall structure of the course but help refine its relevance and clarity.

Table 2. Results of expert judgment (n=9)

Dimension assessed	Items (n)	Likert mean (1-5)	% consensus (4-5)	Status	Main adjustments
Theoretical coherence	8	4,6	89 %	Validated	Reword 2 objectives
Contextual relevance	7	4,5	87 %	Validated	Include more local examples
Organizational feasibility	6	4,3	86 %	Validated	Balance the workload in weeks 8-13
SMART evaluation	6	4,5	89 %	Validated	Simplify 3 rubrics
TOTAL	27	4.5	87.7 %	VALIDATED	7 minor adjustments

The experts' consensus was reflected in statements such as: "Perfect logical progression from the foundations to the evaluation of the SDGs" (E3, Coherence, 5/5); "The weekly workload in weeks 10-12 exceeds 8 actual hours; adjust" (E7, Feasibility, suggestion incorporated).

Internal coherence analysis and critical reformulation

The internal coherence matrix confirmed 92 % overall alignment between foundations, objectives, content, methodologies (PAR/SL) and evaluation, with full coverage (100 %) of the four theoretical

pillars in all topics and a logical theory-intervention-impact progression rated at 95 %. Among the strengths highlighted were 100 % feasible SMART criteria (80 % measurable) and pedagogical coherence (91 % PAR/SL). Two (2) minor discrepancies were detected (1 vague indicator for field trips; 1 missing UCV USR example), which coincided with the experts' suggestions and were incorporated into the final version.

However, the post-validation critical analysis carried out by the author detected a methodological limitation: 80 % of the SMART indicators measured academic products (submissions, participation, rubrics) rather than concrete community impacts (behavioral changes, territorial partnerships, measurable SDGs). This asymmetry contradicted the transformative foundations of the course (critical EE, territorial USR). To overcome it, the 12 indicators were reformulated, prioritizing quantifiable results in the community/territory (Table 3).

Table 3. Reformulation of indicators by topic

#	Topic	ORIGINAL indicator (activity/product)	IMPROVED indicator (community result/impact)
1	Topic 1	≥85 % of the students prepare a concept map or systemic diagram that integrates…	≥80 % of the students identify ≥3 local socio-environmental problems through participatory mapping with the community, using pre-post surveys.
2	Topic 1	≥80 % of the students correctly identify…	≥75 % of the students link local SDGs to community diagnoses, with agreement from ≥70 % of community actors evidenced in a focus group.
3	Topic 1	100 % of the students take part in at least one activity…	≥85 % of the students apply concepts in the initial community forum, generating ≥2 collective proposals.
4	Topic 2	100 % of the teams submit a socio-environmental diagnostic report that includes…	100 % of the teams submit a report that prioritizes two (2) problems with community validation (≥60 % agreement in the community workshop, linked to SDGs 11/13).

5	Topic 2	≥80 % of the students take part in at least one field trip, verifiable…	≥80 % of the students take part in at least one field trip that generates data: ≥20 % improvement in environmental perception among 50 residents (pre-post).
6	Topic 2	≥75 % of the teams identify at least 10 relevant actors with roles described…	Actionable matrix: ≥5 formalized partnerships with actors for a project (verifiable in a three (3) month follow-up).
7	Topic 3	100 % of the teams present a formulated project that includes…	100 % of the teams present a pilot project that achieves ≥15 % behavioral change in the community, e.g., recycling in 30 households (pre-post measurement).
8	Topic 3	≥85 % of the students take part in at least one activity of…	≥70 % of community participants report practical usefulness in a post-intervention satisfaction survey.
9	Topic 3	≥80 % of the teams submit a portfolio of evidence documenting…	≥80 % of the teams submit a portfolio of evidence that includes ≥2 SDG impact indicators (e.g., kg of waste reduced, SDG 12).
10	Topic 4	100 % of the teams present a final report on…	100 % of the teams present a final report that measures sustained impact: ≥20 % improvement in environmental practice three (3) months after follow-up.
11	Topic 4	≥80 % of the students take part in the public presentation of the results…	≥80 % of the students take part in the public presentation of the results, which generates ≥3 commitments to continuity between the community and the university, verifiable through signed minutes.
12	Topic 4	≥75 % of the final reports obtain a score…	≥60 % of the projects are scalable, with annual impact projections (with SDGs linked to the community budget).

DISCUSSION

The validation confirms the relevance of articulating Sustainability Science, Critical Environmental Education, USR and the SDGs-2030 Agenda as pillars of transformative environmental education in university contexts such as the UCV. This framework responds to global demands for interdisciplinary approaches that link the natural sciences, the social sciences and the humanities (Vilches & Gil-Pérez, 2015), overcoming fragmented views by integrating theory with territorial action (Li et al., 2025), a position confirmed by de la Rosa and Miró (2024), who stress the need for university students to learn about concrete sustainable practices and understand the principles guiding sustainable development.

With respect to previous studies, the design makes progress on the gap identified by Núñez et al. (2025) between institutional commitments and actual practice: while Peruvian and Mexican studies measure individual perceptions (Chávez-Ortiz, 2023; Martínez et al., 2025), this course prioritizes measurable community impacts from the curriculum design stage.

The reformulation of SMART indicators is the main methodological contribution: it shifts the focus from academic products (submissions and rubrics) to quantifiable territorial transformations (waste reduction, formalized partnerships, behavioral changes, with reference to SDGs 11-13). This makes USR tangible beyond declarations, in line with Fausti et al. (2024), who call for indicators "with facts on the ground" to make university commitments transparent.

In the face of documented limitations, namely the lack of tools to evaluate socio-environmental changes (Díaz Patiño, 2025; Núñez et al., 2025), the proposal offers a replicable model: 16 feasible weeks, scalable to other UCV campuses and adaptable to similar contexts. The theory-diagnosis-intervention-impact progression (95 % coherence) strengthens the university-community link, responding to CRES+5 (2024) on the strategic role of sustainable higher education.

As a prospective study, the validation is limited to the pre-implementation design; the reformulated SMART community impacts require empirical testing, with follow-ups of three to six months. The sample (9 UCV experts) suggests caution in extrapolation, although triangulation (judgment and matrix with 92 % internal coherence) ensures credibility.

As for practical implications, the course legitimizes USR through quantifiable evidence, both for institutional reports and for sound curriculum design in this area; methodologically, it validates the

use of expert judgment and the coherence matrix for environmental curriculum designs. Future research on this topic should pursue one of the following lines: a) implementing/applying the curriculum design in multiple classrooms, b) measuring longitudinal impacts with pre-post designs, c) comparing/transferring the methodology and results to other humanistic programs.

In summary, this research prospectively validates an Elective Course on Critical Environmental Education within Humanistic Education that bridges the theory-practice gap in university USR through a coherent design (92 %) and measurable, context-adaptable territorial SMART indicators. Its scope lies in its scalability to other UCV campuses and similar contexts. Its limitations are its prospective nature and the limited expert sample. Its significance lies in its contribution to the strategic role of higher education in the SDGs-2030 Agenda (CRES+5, 2024), offering a transferable model for turning institutional commitments into concrete socio-environmental impacts.

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Conflict of interest

The author declares no conflicts of interest.

Author contribution

The author participated in the design and writing of the article, and in the search for and analysis of the information contained in the bibliography consulted.

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