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Navigating the Duality of Generative Artificial Intelligence in Higher Education: A Phenomenological Inquiry into Environmental Education Faculty Experiences

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Abstract

The emergence of Generative Artificial Intelligence (GenAI) has redefined the landscape of higher education, producing both enthusiasm and ethical uncertainty. This study explored how university faculty within the field of Environmental Education perceive, interpret, and integrate GenAI technologies in their pedagogical and institutional contexts. Employing an interpretative phenomenological analysis (IPA), semi-structured interviews were conducted with ten lecturers from Iranian universities. Data were coded and visualized using Quirkos software. Trustworthiness was ensured through data triangulation, member checking, and peer debriefing. Three meta-themes emerged: (1) GenAI as an agent of epistemic transformation challenging traditional notions of authentic learning and expertise; (2) Institutional and ethical insufficiencies in policy and capacity building; and (3) Collaborative curriculum reconstruction toward AI literacy and sustainability. Faculty recognized the pedagogical benefits of GenAI for efficiency and accessibility but expressed concerns about integrity, evaluation standards, and the lack of institutional guidance. The study advocates the development of AI ethics frameworks, continuous faculty training, and integration of critical AI literacy into environmental curricula. Findings offer evidence-based directions for universities to shift from technological adoption to transformative pedagogy. This research bridges the growing dialogue on GenAI with environmental education a field often absent from AI policy debates demonstrating that ethical, reflective, and context-sensitive AI implementation is essential for sustainable higher education.

Introduction

1. Background and Context

The rapid emergence of Generative Artificial Intelligence (GenAI) has dramatically reshaped higher education worldwide. Over a few years, tools such as ChatGPT, DALL-E 2, and Claude have begun transforming academic practice by automating text generation, promoting adaptive learning, and supplying instant feedback (Stenalt & Mathiasen, 2024; Bond, M., et al., 2024; Tlili, A., et al., 2024). Universities have invested heavily in AI-driven infrastructures to enhance instructional design, assessment, and research productivity. Yet, while these tools are often celebrated as catalysts for innovation, they also evoke deep concern regarding academic integrity, authenticity of student work, and ethical accountability (Gouia-Zarrad & Gunn, 2024). The debate has therefore shifted from whether to adopt GenAI to how responsibly it can be integrated into higher education systems.

2. Generative AI in Higher Education: Opportunities and Dilemmas

Existing studies highlight two contrasting narratives. On one hand, GenAI supports personalized learning, enhances accessibility, and reduces educators' workloads by generating quizzes, scaffolds, and feedback (Tan X et al., 2025). On the other hand, scholars warn that blind reliance on AI-produced content can foster intellectual dependency, misinformation, and erosion of students' critical-thinking abilities (Zhai et al., 2024). These tensions urge educational communities to reconsider pedagogy as a

shared human–machine enterprise in which teachers' judgement and ethical mediation remain indispensable.

3. Research Gap in Environmental Education

Despite the expanding body of empirical work on AI in medicine, STEM, and business education, Environmental Education (EE) has received little empirical attention. EE entails nurturing ecological literacy, sustainability values, and systems thinking domains that rely profoundly on authenticity, reflection, and field-based inquiry. Consequently, integrating GenAI into this field raises distinct ethical and pedagogical challenges: Can algorithmic tools support the cultivation of environmental consciousness without diluting experiential learning? To date, few qualitative studies have explored how university lecturers in EE perceive and navigate these dilemmas, particularly in non-Western contexts such as Tehran, Iran.

4. Purpose of the Study

To address this gap, the present study adopts an Interpretative Phenomenological Analysis (IPA) design to uncover the lived experiences, perceptions, and attitudes of university lecturers in Environmental Education postgraduate programs in Tehran regarding the integration of GenAI into teaching and learning. It seeks to illuminate both the perceived benefits and the ethical, pedagogical, and institutional challenges of employing AI tools in their classrooms.

5. Significance of the Study

Understanding lecturers' lived experiences is essential for bridging technological enthusiasm with educational ethics. The study contributes to three domains: Pedagogical practice: offering grounded insights into how environmental educators negotiate AI-mediated teaching; Policy formulation: informing universities about necessary ethical frameworks, digital-literacy training, and professional-development needs; and Scholarly discourse: extending the IJETHE conversation on human–AI co-agency and "teaching-sensitive technologies" (Stenalt & Mathiasen, 2024). Ultimately, this phenomenological exploration aims to support a balanced paradigm where Generative AI serves as both a catalyst for innovation and a test of educational integrity within higher education.

Methods

3.1 Research Design and Approach

This research employed a **qualitative interpretative phenomenological analysis (IPA)** design to explore how university lecturers in **Environmental Education postgraduate programs in Tehran** perceive and experience the integration of **Generative Artificial Intelligence (GenAI)**, particularly tools such as

ChatGPT, in their teaching and learning practices. IPA allows in-depth engagement with participants lived experiences to capture how they make sense of a rapidly changing educational phenomenon (Creswell & Poth, 2017). The design was deemed appropriate because the investigation sought to understand the meanings and interpretations that lecturers attribute to GenAI as both an educational opportunity and an ethical challenge within the natural university setting.

3.2 Research Questions

The study was guided by five research questions:

1. How do lecturers in Environmental Education programs at Tehran universities perceive and evaluate the use of Generative AI in academic and classroom contexts?
2. What benefits do lecturers associate with the use of Generative AI for teaching and learning?
3. What concerns or challenges do lecturers identify regarding its classroom use?
4. How do lecturers assess the institutional preparedness, support, and leadership guidance for adopting Generative AI?
5. How do lecturers evaluate the potential effects of Generative AI on students' performance and learning experience?

3.3 Participants and Sampling Strategy

A **purposeful criterion-based sampling** strategy (Creswell & Poth, 2017; Creswell & Creswell, 2018) was used to select information-rich participants who could meaningfully address the research phenomenon. Eligible participants were lecturers currently teaching graduate-level courses in Environmental Education in at least one Tehran-based university. Initial contact lists were drawn from departmental websites; invitations and a short **pre-screening online survey** were distributed to potential participants. The survey examined their level of familiarity with GenAI tools, recent experience using such tools in teaching, and willingness to participate in the study. Those who rated themselves as *very familiar* or *somewhat familiar* with GenAI and confirmed practical exposure to its educational use were invited for interview.

Following ethical approval from the **Institutional Review Board (IRB)** of Payam-e Noor University (South Tehran Branch), 8–12 participants were purposefully recruited from three major public universities and one private institution. This range conforms to IPA's recommendation of small, homogeneous samples to enable depth of interpretation.

3.4 Ethical Considerations and Participant Recruitment

All prospective participants received an **email invitation** describing the study purpose, potential benefits, voluntary nature of participation, and confidentiality protocols. Informed-consent forms were attached and returned electronically before scheduling interviews. Participants retained the right to withdraw at any stage. To ensure anonymity, pseudonyms replaced real names, and all identifiable institutional data were removed from transcripts and reports. Audio files were encrypted and stored on password-protected drives accessible only to the researcher; transcripts were retained securely for two years.

3.5 Data Collection Procedures

Data were collected through **semi-structured one-to-one interviews**, either virtually via Google Meet and Skype or face-to-face sessions on campus, each lasting approximately 60 minutes. The interview protocol contained 15 open-ended core questions aligned with the five research questions (Table 3 – 1). Follow-up prompts allowed elaboration on experiences with GenAI in teaching, perceived opportunities, challenges, institutional support, and student impact. Interviews were audio-recorded with participants' permission and transcribed verbatim in Microsoft Word. Each participant had the opportunity to verify the accuracy of their transcript (*member-checking*).

3.6 Data Analysis Procedure

An iterative, multi-stage process of analysis following Creswell & Poth (2017) and Saldaña (2012) was conducted using **Quirkos software** for qualitative coding and visualization:

1. 1. **Initial Immersion and Data Preparation** – All transcripts were anonymized, formatted, and imported into Quirkos as individual *sources*. Each file was tagged with brief demographic metadata (institution type, gender, years of teaching).
2. 2. **Open Coding** – The researcher read each transcript several times, assigning short descriptive or action-oriented labels to significant segments of text reflecting thoughts, feelings, or experiences regarding GenAI.
3. 3. **Memo Writing** – Analytical notes were written concurrently to document emerging reflections and early connections among codes.
4. 4. **Axial Coding** – Related codes were grouped under broader conceptual clusters illustrating relationships (e.g., "pedagogical benefits," "ethical concerns, and" "institutional support").
5. 5. **Selective Coding and Theme Development** – Overarching themes representing the essence of participants' lived experiences were synthesized. Constant comparison and re-reading prevented premature closure until theoretical saturation was achieved that is, no new concepts emerged from additional interviews.
6. 6. **Validation and Trustworthiness** – Credibility was established through methodological triangulation (multiple data sources), member-checks, and external audit by another qualitative researcher who independently reviewed coding consistency. Reflexive journaling documented the researcher's biases and emotional responses to maintain transparency.

3.7 Data Management in Quirkos

Quirkos' visual interface facilitated color-coded thematic mapping. Each major theme was represented as a "bubble," within which coded quotes accumulated dynamically, enabling frequency checks and cross-participant comparisons. Narrative summaries exported from Quirkos then informed the Results and Discussion sections.

3.8 Analytical Rigor

While Quirkos streamlined organization, interpretation remained the responsibility of the researcher. Analytical rigor was sustained by deep immersion, critical reflection, and continuous linkage between empirical codes and theoretical underpinnings of Environmental Education and ethical AI use. The process embodies the hermeneutic cycle central to IPA—moving repeatedly between parts (participant statements) and the whole (the phenomenon of AI-mediated teaching).

3.9 Summary

This methodological framework captured nuanced understandings of how academic staff in Environmental Education encounter, interpret, and respond to the integration of GenAI in Iranian higher education. The multi-stage IPA procedure ensured credibility and depth in identifying recurrent themes, which will be reported in the next section on Findings and Discussion.

Discussion

This section presents the phenomenological findings on how lecturers in graduate-level Environmental Education (EE) programs in Tehran perceive and navigate the integration of Generative Artificial Intelligence (GenAI). In examining the perspectives of Environmental Education (EE) lecturers, this study captures a clear duality: GenAI is perceived both as a powerful pedagogical enabler and as a source of serious risk. These findings echo and extend broader debates in the literature.

4.1 Dual Nature: Innovation vs Authenticity Crisis

Lecturers in this study expressed that GenAI offers **increased efficiency, ideation, and personalized learning**, but also poses a risk of eroding academic authenticity. These concerns align with the findings of Yusuf, Pervin, and Román-González (2024), who documented tensions in higher education between GenAI as a tool for innovation and its threat to integrity across multicultural contexts. (SpringerOpen) the global findings of Stenalt & Mathiasen (2024) and Zhai (2024), who similarly observed that faculty oscillate between enthusiasm for GenAI's pedagogical affordances and concerns regarding eroded student agency. The outputs in Alabool, H. M. (2023) and Halaweh (2023) research, even shows scholars stressed that educational AI initiatives oscillate between empowerment and dependency.

However, our data add unique value by showing how these tensions play out specifically within EE: lecturers worry that AI-generated content may undercut *field-based inquiry*, *emotional connection to nature*, and *deep reflection*. Unlike more generalized studies, the phenomenological texture of our findings highlights how environmental educators negotiate meaning in a discipline rooted in place and ethical awareness.

"GenAI can spark creativity if guided properly, but without ethical awareness it may lead to intellectual laziness." (Professor C)

4.2 Pedagogical Opportunities: Creativity, Scaffolding, and Prompt Literacy

Participants noted that GenAI supports **creative curriculum design**, instantaneous scenario generation (e.g., simulated ecosystems), and scaffolding reflective writing. These affordances resonate with the broader evidence synthesized in a recent systematic review: Yufeng Qian (2025) in the *TechTrends* review reports that GenAI in higher education is increasingly being used to foster *prompt literacy*, *autonomous learning*, and *creative exploration*. (SpringerLink) These affordances align with Su & Yang (2023), who demonstrated that generative tools can enhance inquiry-based learning when paired with instructor oversight. Importantly, instructors perceived GenAI as a **supplementary co-teacher** assisting with environmental data visualization, rather than replacing their pedagogical judgment.

Yet, EE lecturers in our study emphasized that such benefits emerge only when AI use is carefully mediated: they recommended structured debriefing, scaffolded prompts, and guided critique of AI outputs. This insight refines the broader literature by providing concrete pedagogical strategies grounded in environmental contexts.

"Instead of spending hours preparing examples of sustainable city models, I can ask the AI to generate contextual scenarios." (Professor E)

4.3 Risks to Critical Thinking, Cognitive Laziness, and Integrity

A recurring theme in lecturers' narratives was a fear that AI use may encourage *cognitive laziness and Outsourcing*: students might rely on AI to generate content without deeply engaging with underlying ecological concepts. These concerns are supported by recent systematic work: Bittle and El-Gayar (2025) conducted a comprehensive review on GenAI and academic integrity, noting that overreliance on AI can undermine critical thinking and foster shortcut behaviors. (MDPI) These reflections correspond with the global discourse urging universities to design frameworks for **responsible AI pedagogies** (Ngan 2023; Hargreaves 2023). Participants argued that unless ethics accompanies technical skill-building, GenAI may deepen students' dependency rather than autonomy.

Furthermore, some lecturers pointed to a *policy vacuum* in their institution: a lack of explicit guidelines around AI use, assessment, and authorship. This gap amplifies the risk of misuse and intellectual dishonesty, particularly in the absence of proactive governance.

"We need institutional codes of conduct; otherwise using GenAI will look like academic short-cuts." (Professor H)

4.4 Institutional Governance, Policy, and Leadership

Lecturers identified leadership and institutional policy as critical factors for shaping GenAI adoption. Without clear policies, they feared AI would be used inconsistently or irresponsibly. This mirrors the findings of Yusuf et al. (2024), who call for robust regulatory frameworks in multicultural higher education contexts to ensure equity, integrity, and transparency. (SpringerOpen)

In response, participants in our study perceived a **structural gap** between managerial enthusiasm and practical support. Although leaders encouraged innovation, **institutional capacities, training resources, and policy guidelines** were limited. The dominant theme, *"Guided Transformation,"* encapsulates a call for **strategic leadership and faculty development-oriented governance**. They strongly recommended participatory governance models involving faculty, students, and administrators, as well as ongoing capacity building in AI ethics and policy design.

"Leaders must enable a shift from classroom-based to problem-solving approaches, not merely buy software." (Professor B)

These statements illustrate that technological integration requires **transformational leadership** (Bush & Middlewood, 2019). Effective leadership should mediate top-down policy and bottom-up creativity to sustain innovation in Environmental Education.

4.5 Postgraduate Research and Ethical Implications

Regarding to "*influence on students: engagement gains vs critical-thinking risks*" lecturers acknowledged that **GenAI expands access to information and stimulates research curiosity**, yet they observed **reduced original writing skills and surface learning** among some students. Two sub-themes emerged:

1. **Enhanced Engagement and Motivation**: Students appreciated instant feedback and interactive simulations.
2. **Risk of Cognitive Outsourcing**: Excessive reliance on GenAI limited their critical reflection.

"Students become efficient but not necessarily wiser; the system gives answers before they ask why." (Professor J)

The literature echoes this paradox (Qi X, et al., 2025), suggesting that AI's educational value depends on **AI literacy and reflective instruction**. Enabling students to *interrogate* GenAI outputs nurtures authentic learning.

Some lecturers also expressed concern about postgraduate students' use of GenAI in research tasks: literature reviews, hypothesis generation, and writing assistance. These concerns align with a recent systematic review by Francis, Nigel. J., Vicent Mabirizi et. al. (2025) in *Discover Artificial Intelligence*, which highlights how GenAI is reshaping postgraduate research productivity, creativity, and ethical risk. (SpringerLink) Our contribution is to provide grounded, contextually rich data on how supervisors perceive and negotiate these changes: they call for explicit training around AI in research, transparent documentation of AI-assisted idea generation, and ethical guidelines within supervisory relationships.

4.6 Toward Balanced AI Use: Synthesis of Findings

Together, these findings underscore that GenAI is not simply a technological tool in EE, but a **sociotechnical phenomenon, a Sociopedagogical Turning Point**. Its value depends heavily on how educators and institutions mediate its integration — through governance, ethics, pedagogy, and capacity

building. The participants' reflections suggest that without intentional design, the risks (authenticity crisis, cognitive laziness, policy vacuum) may outweigh the benefits. Yet, when harnessed carefully, GenAI offers profound opportunities: increased efficiency, personalized learning, innovative ideation, and a redefinition of environmental skills. Aligning with recent IJETHE scholarship (e.g., Bond et al., 2024), the study emphasizes that sustainable AI integration in higher education requires intentional leadership, robust ethics, and continuous faculty development to ensure that technological adoption supports—not supplants—authentic learning.

Conclusion and Implications

5.1 Summary of Findings

This phenomenological study situates the voices of EE lecturers at a critical intersection of **technological potential** and **ethical caution**. Their lived experiences reflect both the promise of GenAI (e.g., prompt-based creativity, efficiency) and profound concerns about undermining core values of environmental education, such as authenticity, critical thinking, and reflective practice. Through these dimensions, GenAI emerges less as a technological tool and more as a **socio-pedagogical turning point** compelling a shift in academic ethos, responsibility, and design of learning experiences.

5.2 Theoretical and Pedagogical Implications

Theoretically, our findings reinforce the idea that GenAI must be understood not as a neutral instrument but as a *mediator of meaning and knowledge*. Environmental educators must reshape pedagogical frameworks to incorporate GenAI in ways that preserve epistemic authenticity.

Pedagogically, we recommend embedding **AI literacy** into EE curricula — not only in how to write prompts, but in how to critically evaluate AI-generated content, deconstruct its assumptions, and reflect on its ecological implications.

Speciically the results underscore the need to:

- Embed **AI literacy** and **critical environmental data ethics** across curricula.
- Encourage **inquiry-based learning scenarios** in which students evaluate, critique, and remodel GenAI outputs.
- Promote **teacher as designer** rather than transmitter of knowledge empowering lecturers to orchestrate learning through continuous co-adaptation with intelligent systems.
- Cultivate **reflective assessment methods** that reward reasoning and originality over algorithmic precision.

5.3 Strategic Policy and Institutional Recommendations

At the governance level, universities require a **comprehensive AI integration policy architecture** aligned with international principles (e.g., UNESCO 2024 Ethical AI in Education Framework). The interviews revealed an urgent call for leadership to move from technological enthusiasm to structured regulation. Therefore, based on lecturers' reflections and the broader literature, we propose:

1. **Institutional AI Governance**: Establish collaborative policy bodies (faculty, administrators, students) to develop guidelines for AI use — focusing not only on academic integrity but also on educational values.
2. **Professional Development**: Implement sustained training in AI ethics, prompt design, and critical evaluation to empower faculty as designers and mediators.
3. **Assessment Redesign**: Reframe assessment to reward *process, reflection, and reasoning*, rather than only polished outputs — e.g., scaffolded tasks, staged submissions, oral defenses.
4. **Postgraduate Guidelines**: Create supervisory frameworks that explicitly address AI use in research writing, hypothesis generation, and data synthesis.
5. **Infrastructure and Data Protection Policies**: Adopt secure platforms, protect data privacy, and encourage open-source collaborations.

Collectively, these actions transform AI adoption from scattered experimentation into strategic pedagogical innovation anchored in accountability and inclusivity.

5.4 Final Reflective Synthesis: *Is AI a Hazardous Coexistence or an Intelligent Synergy?*

This study shows that **the weight of each pan depends on our choice**:

- **Risks**: authenticity crisis, cognitive laziness, policy vacuum, undermining critical thinking
- **Opportunities**: increased efficiency, personalized learning, innovative ideation, redefining skills

AI is **neither a savior nor a demon of obsolescence**. Rather, it is a powerful instrument whose effectiveness hinges on redefining our educational paradigm, empowering faculty, and fostering information literacy among students. Moving from a *hazardous coexistence* to an *intelligent synergy* requires **transformational leadership**, **collaborative governance**, and **conscious pedagogical action**.

5.5 Limitations and Future Research Directions

As a qualitative phenomenological study conducted with a limited sample (10 lecturers), findings are interpretively rich but not statistically generalizable. Future research should examine:

- Comparative studies across disciplines to observe how cultural and epistemic contexts shape AI adoption.
- Mixed-methods designs combining large-scale survey data with IPA to triangulate perceptions and learning outcomes.

- Longitudinal tracking of faculty development initiatives to measure sustained change in practice and attitude.
- Design-based research (DBR) interventions testing AI-enhanced curriculum models for environmental ethics education.

In line with IJETHE's preference for actionable outcomes, further inquiries may focus on the reciprocal relationship between **GenAI literacy and sustainable education governance**, thereby contributing to equitable AI ecosystems in global higher education.

5.5 Closing Statement

Ultimately, this study enriches the evolving dialogue on Generative AI in higher education by merging the lens of Environmental Education with digital ethics. It suggests that academic communities when equipped with reflective leadership and a shared ethical vision can harness GenAI not merely as a pedagogical tool but as a **transformative medium for critical ecological consciousness**.

Declarations

Author Contribution

Author Contributions StatementH.N. conceived the study, conducted the literature review, designed the research framework, collected and analyzed the data, interpreted the findings, and wrote the original manuscript draft. S.M.S. supervised the research project, provided conceptual and methodological guidance, contributed to the interpretation of results, and critically reviewed and revised the manuscript for important intellectual content. M.R. contributed to the research design, assisted in methodological refinement and data interpretation, and reviewed and edited the manuscript. All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Tables

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