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Análisis y Estudios 89



Colección Análisis y Estudios

Serie: Investigación educativa

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C/ Gran de Gràcia, 243-245, 1.ª planta, local 3. 08012 Barcelona

www.grao.com

1.ª edición: enero 2025

ISBN: 978-84-129367-0-4

Diseño: María Tortajada Carenys

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Solving complex environmental and social issues through teaching sustainability to Generations X, Y, and Z

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The research aims to analyze recommended pedagogical strategies adapted to sustainability education in Generations X, Y and Z to contribute to the solution of complex environmental and social problems.

Introduction

With growing recognition that humankind faces an urgent sustainability crisis, education plays a pivotal role in cultivating the mindsets, knowledge, and skills needed to transition

toward more sustainable societies. As interwoven environmental and social crises mount, sustainability education has a pressing interest in younger generations to drive transformational change (Robina-Ramírez y Cotano-Olivera, 2020; Robina-Ramírez et al., 2019, 2020a). However, dominant educational paradigms focused on passive learning and technical specialization prove inadequate for tackling multidimensional sustainability challenges.

Sustainability education is essential for equipping younger generations to solve complex environmental and social issues (Robina-Ramírez et al., 2020a, b). Effectively imparting sustainability competencies requires adapting pedagogies and techniques to resonate across different generational learners. Teaching sustainability competency requires adapting to different generational learners, from Generation X to Millennials, as well known as Generation Y, to Generation Z, who bring diverse perspectives and needs. This research work analyses recommended pedagogical strategies tailored for sustainability education across these major generational cohorts (Estriegana et al., 2021). While foundational sustainability knowledge remains essential across generations, fine-tuning pedagogical strategies to align with cohorts' formative experiences and motivations enhances engagement. Leveraging Gen Xers' self-sufficiency, Millennials' justice orientation and Gen Z's innovative mindset allows education programs to strategically equip different age groups with appropriate skills for collaboratively driving society toward equitable climate adaptation and resilience.

To effectively address the complex issues related to sustainability across different generations, it is essential to organize literature references collected in relation to teaching and experiential learning for generations X, Y, and Z. This organization should be done separately, allowing for a clear understanding of each generation's distinct approaches and experiences. Additionally, it is crucial to organize these references according to experiential learning that fosters the development of new techniques to be

implemented in sustainability practices by these generations.

This model will also serve as a comprehensive framework that illustrates how different generational approaches can be leveraged to address complex environmental and societal issues. By integrating these elements, the flowchart will provide a clear pathway for implementing effective and innovative sustainability solutions, catering to the diverse perspectives and strengths of generations X, Y, and Z.

Literature review

Education for sustainable development requires nurturing competencies like systemic thinking, emotional affinity with nature, future-orientation and social responsibility (Roets y Robina Ramirez, 2024; Rieckmann, 2012). While basic conceptual knowledge remains foundational, generational differences exist regarding learning priorities for activating pro- environmental behaviours across age cohorts (Quiros-Alpera et al., 2024; Otto y Kaiser, 2014).

Sustainability education should thus emphasise resilience tactics like homesteading, renewable energy projects and leveraging online sharing economies as societal structures shift (Iyer y Davy, 2022). Focused technical instruction gives this demographic socially-conscious tools for navigating change.

Understanding complex sustainability issues requires systems thinking to perceive interconnected social, ecological and economic dimensions holistically. However, fragmentation in curriculum design inhibits contextual comprehension. Lateral networking is fostered for their capacities to coordinate inclusive participation, like decentralised community platforms and tokenized incentives models. Combining cultural partnership skills with distributed governance scaffolds cooperative systems enabling just resilience. Experiential teaching techniques for Gen X, Y Z influence the way of solving complex environmental and social issues (Roets y Robina Ramirez, 2024a). Having entered adulthood facing recessions and financial uncertainty, Gen X tends to value self-reliance and pragmatic solutions (Uhl, 2003).

The unprecedented access to information during Millennials' upbringing cultivated strong social justice advocacy (Nilsson, 2019b). This generation thinks critically about how economic policies exacerbate inequality, valuing political reform and activism. Therefore, sustainability curricula must analyse how environmental degradation disproportionately affects underprivileged communities, prompting collective civic participation (McKinnon, 2022).

Meanwhile, Generation Z's immersion in digital networks and passion for youth movements has fostered a culture of innovation and disruption (Pavlova et al., 2022). Teaching should activate this cohort's change-making agency through project-based challenges responding to local ecological threats. Prompt exposure to environmental injustices also spurs this demographic toward compassionate systemic overhaul rather than *status quo* technical solutions (Nilsson, 2019a).

Teaching and experiential learning about sustainability in Generation X

The Generation X cohort, born between the early 1960s and end of the 1970s, came of age amidst the boom of environmentalism, sparked by seminal events like the first Earth Day. Now in their 40s and 50s, Gen X learners bring certain attributes that sustainability educators should take advantage of. Since Gen Xers now occupy leadership roles across sectors, sustainability professional development for this demographic is instrumental.

Firstly, studies emphasise engaging Gen X's inclination for practical skill-building to drive sustainability transitions within their organizations. Per Bachelder (2019), «Mid- career Gen X students are change-averse yet pragmatic. Sustainability curriculum must demonstrate clearly applicable, low-risk opportunities to implement operational improvements» (p. 77). Explicitly linking sustainability concepts to tangible work-flows and cost savings incentives resonates with Gen Xers.

Furthermore, Gen X's lives as parents lead many to prioritise youth education initiatives. As Santos (2020) explains, «Demonstrating how sustainability education prepares children for green economy careers taps working Gen X parents' motivation to secure their families' futures» (p. 412). Framing sustainability competencies as ensuring career readiness and resilience for the next generation activates Gen X support.

Moreover, Gen X's asynchronous digital skills necessitate combined online and in- person teaching formats. According to Willis (2022), «Optimising sustainability instruction for Gen X requires blended delivery integrating self-directed e-learning with hands-on workshops enabling peer exchange» (p. 66). Blended

learning allows self-paced content absorption supplemented by collaborative applied learning.

Defined as “learning by doing,” experiential sustainability education centres active student participation through real-world projects. Per Rodriguez (2019), “experiential approaches organize learning around hands-on application of knowledge to complex problem-solving, enabling impactful skill-development” (p. 55). Learners grapple with driving systems change around genuine sustainability issues, growing strategic and collaborative capacities.

Furthermore, experiential methods promote internalisation of sustainability values through constructivism. As Hartman (2021) indicates, self-directed meaning-making allows students to integrate sustainability concepts into world-views through applied contexts. Learners thus evolve holistic mindsets and critical reflexivity essential for sustainability leadership.

For Gen X learners, typically focused on mid-career skills advancement, experiential sustainability education centred on governance and workplace contexts is recommended. As Willis (2020) advises, applied projects exposing Gen X students to organizational change processes and public policy spheres builds leadership efficacy. Role-play simulations of bargaining sustainability initiatives across corporate or bureaucratic power dynamics helps mid-life learners appreciate real-world complexities.

In addition, systems thinking skill-building enables Gen Xers to trace sustainability challenges upstream to root causes. Per Lean (2022), “Life cycle analyses of economic externalities trains critical perspectives on interconnected socio-environmental problems” (p. 550). De-constructing the tangled web of non-sustainability through supply chain investigations fosters clarity on transformational priorities.

Reflexive critique of dominant paradigms supplements technical skill-sets with philosophical perspectives. As Santos (2020) explains, “contextualization of sustainability solutions within critiques of growthism and consumerism opens imagination to redefining prosperity” (p. 405). Unsettling assumptions on existing economic paradigms that subordinate sustainability kindles Gen X’s creativity. According about what is said hypothesis 1 can be formulated:

- Hypothesis 1: Teaching Sustainability to Gen X influence Experiential teaching Gen X.

Teaching and experiential learning about sustainability in Generation Y

In contrast, Millennials or Gen Y, born between the early 1980s and mid-1990s, came of age with expanding consciousness of anthropogenic climate change. Now entering their peak earning years, Millennials are receptive sustainability education participants.

Firstly, appealing to Millennial social conscience and empathy is beneficial for sustainability messaging. Per Donaldson (2021), “Tapping into caring pro-social motivations through emotional sustainability storytelling heightens Gen Y engagement” (p. 408). Narrative techniques that illustrate the human dimensions and peculiarities of sustainability spark Millennial concern.

Furthermore, Millennials appreciate co-creation of sustainability solutions, demanding two-way dialogue and valuing their contributions, Per McNamara (2019), “Collaborative project-based sustainability learning enabling Gen Y’s creative input and showcasing their contributions builds ownership” (p. 55). Shared authority in collaborative sustainability problem-solving boosts Millennial buy-in.

Moreover, adept digital integration is essential for digitally immersed Gen Y. As Patel (2019) advises, “Fluency with interactive web tools, apps and games tailored for relevant causes energises Millennials’ sustainability learning and activism” (332). Creative employment of technologies aligning with Millennials daily technological habits makes sustainability teaching more instinctive.

Alternatively, experiential sustainability education for civilly-engaged Millennials (Gen Y) benefits from emphasizing grass-roots community leadership capacities. Service learning furnishes purposeful contexts for cultivating change agency. According to Perkins (2021), participating in community-identified sustainability campaigns nurtures Gen Y’s aspirations for values-aligned advocacy and innovation. Needs-based partnerships externalize learning, driving sustainability progress through locally resonant action.

Besides, project-based formats oriented toward start-up solutions activate Millennial change ambitions. As McNamara (2019) indicates, co-developing social enterprises or green technology ventures fulfils Gen Y’s sustainability interests fused with entrepreneurial motivations. Creative liberty to design sustainability ventures from the ground up appeals to daring Millennial mentalities primed to dismantle inefficient conventions.

Framing experiential learning as contemporary skill-building motivates career-minded Millennial priorities. Patel (2021) advocates “positioning experiential sustainability training as professional enhancement distinguished from traditional education constructs” (p. 225). Highlighting competitiveness advantages for

Gen Y participants reconciles sustainability development with personal advancement. According what it has been conveyed hypothesis 2 can be formulated:

- Hypothesis 2: Teaching Sustainability to Gen Y influence Experiential teaching Gen Y.

Teaching and experiential learning about sustainability in Generation Z

Meanwhile, true digital natives of Generation Z, born after 1996, are now coming of university age, necessitating appropriate sustainability education approaches. Several recommendations stand out:

Firstly, framing sustainability as fulfilling Gen Z's heightened civic purpose desires is efficacious. Per Barnes (2021), "Positioning sustainability competencies as empowering positive social change furnishes idealistic Gen Zers meaning and self-efficacy" (p.79). Understanding the societal transformation potential of sustainability inspires eager Gen Z engagement.

Likewise, experiential and solution-oriented learning enables goal-focused Zoomers to apply sustainability. As Rodrigues (2019) states, "Immersive sustainability problem-solving courses deliver purposeful education for action-demanding Gen Z cohorts" (p. 60). Hands-on sustainability projects satisfy Gen Z inclinations to tangibly contribute solutions.

Gen Z visual and digital acuity calls for multimedia sustainability teaching. According to Hartman (2020), "Harnessing social media, messaging apps and info-graphic content resonates with hyper-visual Zoomers, marrying education with their digital lifestyles" (p. 412). Converging text, images, video and shareable media propels Gen Z sustainability learning.

Generation Z students, born after 1996, are spearheading youth climate strikes globally, demanding faster environmental action from governments and education to match ecological crises' urgency (Haynes, 2019). However, traditional curricula often still emphasize passive knowledge acquisition over activism. Targeted experiential pedagogies that align learning with Gen Z's justice-oriented mindset are essential.

This demographic's digital interconnectedness through social media cultivates strong system-critique and governance distrust from exposure to issues like green-washing or lobbying (Kosinski et al., 2021). Experiential programs channelling this scepticism into constructive sustainability problem-solving hence helps students overcome dis-empowerment. For example, designing civic ecology projects or policy reform campaigns grounds abstract learning, allowing Gen Zers to integrate academic skills into social movement contexts (Bowers, 2021).

Furthermore, Gen Z's diversity and inclusion values mean sustainability education should emphasize environmental justice impacts on marginalized groups through activities like field visits to low-income neighbourhoods affected by pollution or indigenous land protection projects (Neutzling et al., 2022). Capitalising on experiential service-learning methodology develops empathy while showcasing pathways for young people to support just transitions.

Gen Zers seek creative self-expression opportunities and paradigm-disrupting innovations from education instead of conformity (Seemiller y Grace, 2019). Sustainability teaching enabling direct trial-and-error tinkering with regenerative technologies like aeroponics or bio-materials invention channels this innate ingenuity into imagining system-change solutions (Geiger et al., 2022). Liberating experiential programs thereby boost agency for resetting unsustainable paradigms

Genuine sustainability skill-building for Gen Z requires immersing students in collaborative real-world contexts of conservation and climate justice activism connected to their personal passions and purpose.

Connecting Gen Z passions like media creation or events production to sustainability outreach leveraging inherent interests. Per Stevens (2020), "Inviting Zoomer creativity by integrating sustainability themes into purposeful art, music and dance fosters enjoyment and meaning" (p. 522). Celebratory expressions of sustainability spread awareness while satisfying Gen Z's cravings for creative stimulus and self-definition.

For passion-driven Gen Z learners, impatience with institutional inertia obliges experiential learning expedited toward direct sustainability action. Advocacy initiatives enable their forceful voices to achieve measurable societal impacts. Per Sposato (2022), guiding Gen Z through designing awareness campaigns targeting documented environmental justice issues provides constructive outlets to activate their expressions against perceived injustice. Campaign facilitation scaffolds galvanize Gen Z agency toward targets warranting scrutiny.

What's more, project-based collaborative formats validate Gen Z's teamwork inclinations cultivated through digital interconnectedness. According to Barnes (2021), Participatory sustainability problem-solving courses teaching methodologies like human-centered design and agile project management skills activate

Gen Z's collaborative community orientation. Dynamic team experiences affirm Gen Z affinity for fluid leadership and resource sharing. Hypothesis 3 can be shown as:

- Hypothesis 3: Teaching Sustainability to Gen Z influence Experiential teaching Gen Z.

Experiential learning develops new techniques to be applied in sustainability for Gen X, Y and Z

Immersive experiential learning techniques allow sustainability competencies to be applied for maximal impact. For Generation X, workshops simulating policy pitching help communicate bureaucratic dynamics. Per Lean (2021), Roleplay-based sustainability training builds mid-career learners' self-assuredness in navigating institutional change processes. Alternatively, innovation sprint methodologies foster Millennial teams co-creating market solutions.

As McNamara (2020) explains, rapid collaborative design sprints focused on commercializing green technologies empowers Gen Y's creative contributions. For passion-fuelled Gen Z, project-based challenges enable grass-roots impact. Slocum (2019) advocates guiding Gen Z cohorts through selecting, planning and executing community sustainability campaigns boosts agency and purpose. Hands-on experiential learning focused on systemic change processes, innovation pathways or civic action furnishes generational cohorts tangible sustainability contribution opportunities suited to their change agent comfort levels.

Among new generations two techniques are quite addressed to teach: the gamification techniques and intergenerational collaborative teaching. Gamified sustainability education techniques providing rewards-based motivation tend to better engage younger generations. Per Dai (2021), Digital game dynamics build in goal-setting, scoring, incentives and interactivity boosts Gen Y and Z sustainability learning productivity over Gen X. However, the most effective gamification approaches avoid oversimplification. As Santos (2022) cautions, "the best sustainability education games manage nuanced simulations of complex systemic dynamics" (p.209). Thus, judicious and contextually relevant uses of gamification mechanisms to drive generational participation should align intrinsic play incentives with real-world sustainability skills development.

While tailored generational techniques are beneficial, cross-generationally collaborative sustainability education models show particular promise. Blending Gen X's critical thinking with Millennial teamwork and Gen Z ingenuity incubates innovation. As Silva (2020) indicates, Intergenerational sustainability problem-solving employs complementary knowledge and capacities across ages. However, facilitating multi-generational collaboration requires overcoming tensions. Randolph (2022) advocates that skilled mediators help translate generational communications styles and bridge divides opening fruitful exchange. Curating mutually respectful spaces for sustainability co-learning across generations enables communal progress unachievable in isolation. According to the section Hypothesis 4, 5, and 6 are the following:

- Hypothesis 4: Experiential teaching Gen X influence experiential teaching techniques for Gen X, Y Z.
- Hypothesis 5: Experiential teaching Gen Y influence experiential teaching techniques for Gen X, Y Z.
- Hypothesis 6: Experiential teaching Gen Z influence experiential teaching techniques for Gen X, Y Z.

Solving complex environmental and social issues

As interwoven environmental and social crises mount, sustainability education plays a pivotal role in cultivating the mindsets, knowledge and skills in younger generations to drive transformational change. However, dominant educational paradigms focused on passive learning and technical specialisation prove inadequate for tackling multidimensional sustainability challenges. This essay analyses emerging educational approaches centred on systems thinking, critical action and participatory leadership tailored to empower Gen Z and Alpha learners for cooperative regeneration.

Understanding complex sustainability issues requires systems thinking to perceive interconnected social, ecological and economic dimensions holistically (Ramírez y Palos-Sánchez, 2018). However, fragmentation in curriculum design inhibits contextual comprehension. As Hartman (2021) explains, entrenched educational silos separating disciplines obstruct grasp of multidimensional causality underlying interconnected sustainability challenges. Transitioning toward integrated sustainability education frameworks focused on relational, contextual, living systems thinking proves critical for complex problem solving.

Firstly, humanities integration into science, technology, engineering and mathematics (STEM) educates complementary perspectives. Barnes (2019) advocates that augmenting STEM with ethics and systems thinking cultivates wisdom and responsibility missing from technically-focused learning. Secondly, place-

based and experiential community learning platforms synthesis and application opportunities. Per Donaldson (2020), “situated learning experiences ground abstract sustainability concepts through localized contexts and lived participation, enabling grass-roots activation” (p.405). Advancing systems-based sustainability education bridges divides across academic fields while dissolving barriers between theory and practice for contextualized understanding.

Also, sustainability education must cultivate critical thinking skills to question assumptions underpinning non-sustainability across inequality, consumerism and exclusionary governance. Santos (2020) states “critical pedagogies exposing socio-political roots of normalised environmental destruction and social marginalisation invites interrogation of dominant paradigms” (p.412). Unsettling learners from passive acceptance of conventional wisdom fosters emancipatory thinking obliging ethical improvement.

Various techniques show promise for spurring critical sustainability awareness. Firstly, scaffolding analysis of mainstream v alternative media representations of sustainability issues highlights selective biases. Besides, reflexive writing and dialogue unpacks internalised consumerist values driving conformity to existing paradigms. Finally, designing imagined ideal futures envisions possibilities beyond defective norms. Equipping younger generations with critical thinking agility for ongoing cooperative regeneration remains imperative amidst converging social and environmental tipping points.

Furthermore, sustainability education must prioritise participatory, distributed leadership skills for driving collaborative change. Sposato (2022) advocates “cultivating facilitative and integrative capacities prepares emerging leaders to guide decentralized collective sustainability action through knitting diversity into cooperative wholes” (p.755). Rather than perpetuating hierarchical competitiveness, teaching methodologies like human-centred design and peer-to-peer coaching builds solidarity within sustainability solution processes.

On top of that, digital platform training fosters lateral networking capacities to coordinate inclusive participation. Per Stevens (2020), “web3 technologies like decentralized community platforms and tokenized incentives models enables cooperative economic structures as alternatives to extractive sharing economies” (p.522). Combining cultural partnership skills with distributed governance and economic templates scaffolds cooperative systems enabling just resilience. According to the section Hypothesis 7 is shown:

- Hypothesis 7: Experiential teaching techniques for Gen X, Y Z influence the way of solving complex environmental and social issues.

Methodology

A thorough review on specialised literature facilitates in-depth research related to different generational features, in order to comprehend and to commit to teaching sustainability according to these characteristics. The highlights of the main literature contributions are gathered through the next results section.

After contextualising the topic in relation to the literature findings, the paradigm is established according to main variables, taking onto account all three generations (X, Y and Z).

Resulting from this paradigm, a model is designed that connects generational variables with the effect of each generation respectively providing solutions to complex environmental and social issues.

The methodology involved conducting a thorough review of specialized literature to explore the distinct characteristics of generations X, Y, and Z in the context of sustainability education. The review process began with a comprehensive search for academic articles, books, and reports that specifically addressed generational differences and sustainability education.

The process of conducting twelve interviews with 22 students and 10 teachers aimed to explore whether seven hypotheses regarding teaching and experiential learning about sustainability were fulfilled. This qualitative study was conducted over two weeks, from July 25 to July 30, 2024. The participants comprised university students from a Business and Finance Degree program and teachers experienced in delivering sustainability-related courses.

The sample included a diverse mix of generational cohorts: 8 students from Gen X (ages 40-45), 10 from Gen Y (ages 28-35), and 4 from Gen Z (ages 20-23). The semi-structured interview format allowed for a blend of open-ended and structured questions, enabling in-depth exploration of participants' experiences and perspectives while ensuring comprehensive coverage of the seven hypotheses.

The interviews were conducted both in person and via video conferencing, depending on participant

availability and preference. Each session lasted approximately 15-20 minutes. Before the interviews, participants were briefed on the study's purpose and assured that their responses would remain confidential. They provided informed consent for recording the interviews, which facilitated accurate transcription and analysis. The interview questions were designed to gauge the effectiveness of teaching methods, the relevance of experiential learning, and the engagement and motivation of different generational cohorts in sustainability education. The students were primarily in their second and third years, offering perspectives from their ongoing educational experiences, while the teachers had between 5 and 15 years of experience, providing insights into pedagogical strategies and curriculum design.

Data collection involved transcribing the recorded interviews and coding the data based on the seven hypotheses. Thematic analysis was then conducted to identify common themes, variations, and insights among the different generational groups and between students and teachers. The teachers ranged in age from 25 to 40, with academic backgrounds in business, economics, environmental studies, and education, contributing to a rich diversity of perspectives on sustainability education. This methodological approach ensured a comprehensive understanding of how sustainability concepts are integrated into business and finance education and their practical implications for students across different generational cohorts.

For the purpose of connecting the previous hypotheses, our flow chart shows as inputs the chosen variables of teaching sustainability to generations X, Y and Z. Through experiential learning and experimental teaching, these variables reach the skill of solving complex environmental and social issues.

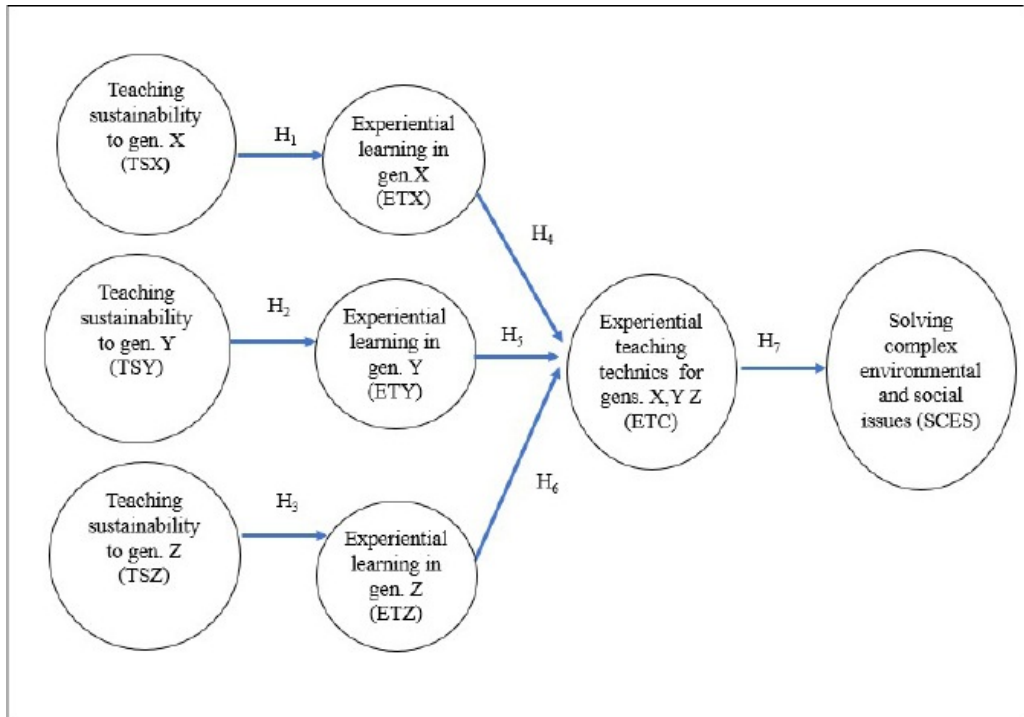


Figure 1. Model designed

Results

Results are connected to the 7 hypotheses regarding the Teaching and experiential learning about sustainability.

According to the Students' Responses, they generally affirmed that the seven hypotheses were relevant and applicable in their learning experiences. Regarding Hypothesis 1, they found that teaching sustainability to Gen X indeed influenced experiential teaching, as older students appreciated practical applications in the curriculum. For Hypothesis 2, students from Gen Y resonated with the idea of emotional storytelling and collaborative projects, noting these methods effectively engaged them in sustainability topics. As for Hypothesis 3, Gen Z students felt their strong civic engagement and desire for meaningful contributions were well addressed through hands-on projects and digital media integration. In discussing Hypothesis 4, students observed that experiential teaching methods tailored for Gen X, such as role-playing, also helped them understand complex sustainability issues. Hypothesis 5 was supported as Gen Y students found value in innovation sprints and creative contributions. For Hypothesis 6, Gen Z students highlighted the effectiveness of gamification and real-world projects in fostering active participation. Lastly, students agreed with Hypothesis 7, noting that experiential learning techniques across all generations helped them better understand and tackle complex environmental and social issues.

Teachers corroborated the relevance of the seven hypotheses, aligning with their observations of generational learning preferences. For Hypothesis 1, they noted that Gen X students, who often have practical life and work experience, responded well to applied learning and pragmatic teaching methods. In Hypothesis 2, teachers found that tapping into the social conscience and collaborative nature of Gen Y made the sustainability curriculum more engaging. Regarding Hypothesis 3, they observed that Gen Z's strong digital skills and civic-mindedness made multimedia and experiential learning particularly effective. Teachers agreed with Hypothesis 4, stating that experiential methods like workshops were beneficial across all generations, particularly for mid-career Gen X. For Hypothesis 5, they noted that Millennials' creativity and desire for involvement led to innovative sustainability solutions. Hypothesis 6 was supported by the teachers' observation that Gen Z's digital nativeness and hands-on engagement in projects made experiential techniques highly effective. Lastly, in Hypothesis 7, teachers emphasized that experiential teaching techniques across generations contributed to a deeper understanding and practical approach to solving complex environmental and social issues, encouraging a holistic and critical perspective among students.

Conclusions

With the sustainability crisis intensifying, education has no generation to lose if positive transformations are to unfold. Sustainability education must evolve to motivate action across age groups. Educators must implement generationally-attuned sustainability teaching, utilising cohorts' orientations from Gen X's pragmatism to Millennial teamwork to Gen Z's digital citizenship. Multi-generational sustainability learning that blends online and in-person formats while enabling collaborative applied impact represents the promise of progress. Getting sustainability education right for varying generational perspectives is imperative for sowing the seeds of change now and preparing society to reap more sustainable futures.

Notable variations exist in effective sustainability education techniques for diverse generational learners. Appealing to lived generational values through relevant framing and life-stage connections enhances resonance. Additionally, experiential learning focused on systemic processes, innovation or activism provides effective applied learning pathways tailored to each cohort's comfort level. Furthermore, strategically employing digital tools suited to each generation's technical proclivities facilitates participation. Three theoretical and practical considerations can be drawn from the study.

Theoretical Conclusions

- **Generational Influence on Learning Styles:** The interviews revealed that each generation—Gen X, Gen Y (Millennials), and Gen Z—has distinct learning preferences shaped by their socio-cultural contexts. Gen X values practical, low-risk applications due to their pragmatic nature, while Millennials engage

deeply with social and collaborative learning experiences that align with their empathy and social consciousness. Gen Z, as digital natives, prefer multimedia and interactive learning environments that align with their technologically integrated lifestyles. These differences suggest that sustainability education must be tailored to the unique characteristics of each generation to maximize engagement and effectiveness.

- The Role of Experiential Learning: Across all generational cohorts, experiential learning emerged as a critical component of effective sustainability education. This approach, which involves "learning by doing" through real-world projects and problem-solving, enables students to develop practical skills and a deeper understanding of complex issues. The emphasis on experiential learning reflects a broader pedagogical shift towards active learning strategies that prioritize student engagement, critical thinking, and the application of theoretical knowledge to real-life situations.
- Critical and Systems Thinking: The integration of critical and systems thinking into sustainability education was consistently highlighted as essential for understanding and addressing complex environmental and social issues. The interviews underscored the importance of educating students to see the interconnectedness of various global challenges and to question established norms and practices. This theoretical framework encourages students to develop a holistic perspective and fosters an ethical and responsible approach to sustainability.

Practical Conclusions

- Customization of Teaching Methods: Educators should tailor their teaching methods to the specific needs and characteristics of different generational cohorts. For Gen X, practical and low-risk applications should be emphasized. Millennials benefit from collaborative and project-based approaches that allow for creative input, while Gen Z thrives in multimedia-rich, interactive environments that incorporate digital tools and social media.
- Integration of Experiential Learning Projects: Practical, hands-on projects should be integrated into the curriculum across all generational cohorts. These projects can include real-world problem-solving, community engagement, and sustainability campaigns. Such experiential learning activities not only enhance understanding but also empower students to take tangible actions towards sustainability, fostering a sense of agency and responsibility.
- Use of Technology and Digital Tools: Leveraging technology and digital tools is crucial, especially for engaging younger generations like Gen Z. Educators should incorporate multimedia content, gamification, and interactive platforms to create dynamic and engaging learning experiences. Additionally, using digital tools for communication and collaboration can enhance the learning experience, making it more accessible and relatable for students accustomed to a digital lifestyle.

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