GreenScape

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1. Extensive Literature Review

1.1. Introduction to Gamification and Sustainability in Education

Combining gamification with sustainability education is a promising way to engage young people, especially outside traditional classrooms. Gamification—using game elements in non-game settings—can make complex topics like climate justice, citizenship, and sustainability more engaging and easier to understand. Research shows it can boost motivation, learning, and action on social and environmental issues.

In the GreenScape project, gamification is not just a way to attract attention but a teaching method used in the virtual escape room (VER). It aims to empower youth to act on climate issues, understand EU policies, and become active citizens. The goal is to turn knowledge into real-world engagement.

Traditional sustainability education often focuses on environmental facts, with less attention to social inclusion or political action. GreenScape takes a different approach, using interactive, scenario-based learning to spark critical thinking and values-based decisions. This aligns with educational theories that promote deep, reflective learning through experience.

The design of the escape room is aimed at building on proven gamification models, such as the Octalysis framework, and includes key themes like climate justice, youth empowerment, and participation. Research from partner countries supports this approach and offers helpful tools and ideas for developing the VER.

1. 2. Country-Specific Literature Analyses

1.2.1. Bulgaria

In Bulgaria, gamification is gaining interest in fields like education, culture, and tourism, though it's not yet widely implemented. A study by Krasteva & Alexova (2023) highlights gamification's strengths—ease of use, user engagement, and digital adaptability—but notes a lack of formal evaluation tools. Their mission-based approach with step-by-step tasks can help structure GreenScape's escape room to keep participants engaged.

Another study (Boyadzhieva, 2016) shows that Bulgarian culture values hierarchy and structure, suggesting that the escape room should offer clear guidance and well-structured choices to support learner autonomy. A 2022 policy report also points to low youth civic engagement and recommends digital tools to encourage participation—aligning well with GreenScape's goals. Lastly, national sustainability campaigns (ETIC, 2023) offer opportunities for synergy through engaging, youth-friendly formats.

1.2.2. Czech Republic

In the Czech Republic, gamified tools like digital escape rooms are already being used in environmental education. Research (Ciencalová, 2022) shows they improve motivation and critical thinking. This supports the use of similar tools in GreenScape.

The Czech curriculum supports cross-subject learning, and environmental education is increasingly seen as a core theme. Cinčera (2017) emphasizes hands-on methods like simulations, which GreenScape's VER directly applies. EU-level guidance also reinforces the importance of youth engagement in sustainability, strengthening the case for combining education, action, and policy themes in the game.

1.2.3. Finland

Finland has a well-developed approach to gamified learning, especially in sustainability education. A case study (Friedrichsen & Lehtonen, 2023) with student teachers showed that escape rooms encouraged reflection, teamwork, and emotional engagement—key goals for GreenScape.

Finnish research (Jeronen et al., 2009) also highlights how nature-based, emotional learning deepens ecological understanding. Finland's curriculum emphasizes modern skills like systems thinking and collaboration, which can be developed through the escape room format. Tahvanainen et al. (2021) showed how escape rooms can be adapted to teach these skills through both digital and physical tasks.

1.2.4. Greece

Gamification in Greece is growing, mainly through NGO and EU-backed projects. A review by Dichev & Dicheva (2017) found that using levels, feedback, and team challenges makes gamified learning effective—elements that fit well with GreenScape's design.

Inclusive education research (Panagiotis, 2024) calls for more adaptable teaching methods. Escape rooms can support this by offering flexible, inclusive experiences. Climate justice scenarios can also reflect real-world processes, such as youth participation in global climate talks (Knowles, 2024), to promote civic engagement through gameplay.

1.2.5. Spain

Spain has broadly adopted gamification across educational sectors. A recent review (Rahmi et al., 2025) found frequent use of points and leaderboards but warned that these can reduce internal motivation if overused. For GreenScape, this means balancing game rewards with meaningful content.

Other studies (Huang, 2024; Gupta, 2022) stress the importance of simple design, adaptable goals, and strategies for long-term behavior change. These ideas support GreenScape's plan to create a flexible, engaging, and impactful escape room focused on real-world sustainability action.

1.3 Educational Theories Supporting Gamified Learning

The design of the GreenScape virtual escape room (VER) is deeply rooted in educational theories that emphasize active participation, reflection, and collaboration. Central to this approach is constructivism, as developed by Piaget and Vygotsky, which views learning as a process of building knowledge through hands-on exploration and problem-solving. In this

spirit, GreenScape's VER engages learners directly in scenarios that require critical thinking and independent inquiry.

Experiential learning, as outlined by Kolb, is also key to the project's educational foundation. This theory emphasizes learning through direct experience followed by reflection and conceptualization. The puzzles and tasks within the escape room provide meaningful experiences that encourage participants to apply their knowledge and reflect on the outcomes, reinforcing deeper understanding.

GreenScape also draws on Self-Determination Theory by Deci and Ryan, which identifies autonomy, competence, and relatedness as essential to motivation. The escape room supports these needs by giving players choices (autonomy), offering feedback that builds a sense of achievement through progressively challenging tasks (competence), and promoting collaboration through team-based challenges and shared problem-solving (relatedness). Additionally, Transformative Learning Theory, developed by Mezirow, guides the project's goal of fostering shifts in perspective. This is particularly relevant to climate justice education, where learners are encouraged to question assumptions and engage in values-driven reflection.

Taken together, these theories support the idea that gamified learning is not just engaging—it is a powerful pedagogical method that empowers learners to tackle complex social and environmental issues through immersive, meaningful experiences.

1.4 Frameworks for Youth Engagement and EU Youth Goal #10

GreenScape's mission aligns closely with EU Youth Goal #10: A Sustainable Green Europe, which calls for urgent and inclusive climate action led by young people. This goal is backed by major policy frameworks such as the European Green Deal and the EU Youth Strategy (2019–2027), both of which emphasize youth agency in achieving sustainable development.

In the realm of education, youth engagement frameworks increasingly promote participatory design, digital inclusion, and civic responsibility. For example, UNESCO's Education for Sustainable Development (ESD) framework and the Council of Europe's Competences for Democratic Culture both advocate for embedding sustainability into education through real-world problem-solving, critical thinking, and active citizenship.

Gamification offers a practical way to bring these frameworks to life. Through role-based challenges, narrative-driven gameplay, and scenario-based decision-making, tools like the GreenScape VER can simulate civic participation and environmental activism. Examples from across Europe—such as sustainability apps, citizen science platforms, and policy simulation games—demonstrate how digital tools can empower youth to connect learning with meaningful action. In this way, gamification becomes a bridge between education and engagement, helping young people experience themselves as agents of change in the face of climate challenges.

1.5 Insights and Comparative Reflections Across Countries

A comparative analysis of the national case studies revealed both shared opportunities and context-specific challenges in implementing gamified sustainability education. Across all five countries, there is strong interest from educators and youth organizations in using gamification to make sustainability learning more engaging. Particularly encouraging is the positive response from young people when they are involved in co-designing the learning experience, which enhances relevance and ownership.

However, the readiness to implement such approaches varies. Countries like Finland and Spain benefit from supportive infrastructure, teacher training, and curricular flexibility, enabling the wider use of gamified tools in education. In contrast, Bulgaria and Greece face more significant structural barriers, such as rigid curricula and limited educator capacity. The Czech Republic occupies a middle position, with promising localized innovations but a lack of national coordination to scale these efforts.

These insights have direct implications for the design of the GreenScape VER. In contexts where learners are more accustomed to structured learning environments, the escape room should offer clear guidance and scaffolding. Wherever possible, the content should integrate culturally relevant sustainability themes to ensure local resonance. While extrinsic motivators like points or levels can help attract attention, they must be balanced with intrinsic goals—such as personal values, empathy, and social responsibility—to sustain meaningful engagement. Accessibility and inclusion should be built into the design from the start, ensuring that all participants can fully engage with the experience.

Overall, gamified sustainability education offers a promising path forward. It allows for flexibility across diverse educational systems while staying grounded in sound pedagogy and aligned with broader policy goals. The GreenScape virtual escape room is designed not just as an educational tool, but as a platform for mobilizing youth across Europe to learn, reflect, and act on the climate crisis.

2. Identification of Key Theoretical Pillars and Best Practices in Gamified Sustainability Education

2.1 Core Theories: Constructivism, Experiential Learning, and Self-Determination Theory

GreenScape virtual escape room draws from a strong theoretical foundation rooted in learner-centered and motivation-enhancing educational theories. Central among these is Constructivism, particularly as shaped by Piaget and Vygotsky, which posits that learners actively construct knowledge through interaction with their environment. Within the GreenScape escape room, participants navigate real-world sustainability dilemmas and construct personal understandings of ecological interdependence, climate justice, and civic engagement.

Experiential Learning Theory (Kolb, 1984) underpins the design of the escape room's tasks and puzzles. Learners cycle through phases of concrete experience, reflective

observation, abstract conceptualization, and active experimentation. This iterative process is enacted in scenario-based challenges that simulate EU-level decision-making or require team-based environmental planning. Such experiences not only anchor theoretical knowledge but also foster critical thinking, empathy, and systems awareness.

Self-Determination Theory (Deci & Ryan, 2000) further informs the motivational architecture of GreenScape. The escape room is structured to satisfy three psychological needs: autonomy (choice in actions), competence (feedback and achievable challenge), and relatedness (collaborative problem-solving). Players are not merely passive recipients of information but co-agents in shaping solutions, which enhances intrinsic motivation and sustained engagement.

These educational theories are augmented by Transformative Learning Theory (Mezirow, 2000), which emphasizes perspective shifts through critical reflection. The narrative and role-play elements embedded in GreenScape invite learners to reconsider assumptions, particularly around equity and justice in sustainability, thus cultivating empowered, critically aware citizens.

2.2. Gamification Models: Octalysis, Bartle's Taxonomy, and Gameful Learning

Gamification in GreenScape is not decorative but functional. It is designed using validated models that align with pedagogical intentions. The Octalysis Framework (Chou, 2015) serves as a strategic guide, ensuring a balance of extrinsic and intrinsic motivators. Core drives such as meaning, accomplishment, empowerment, and social influence are deliberately mapped to game mechanics as narratives, feedback loops, mission clarity, and team task within the escape room.

Complementing Octalysis, Bartle's Taxonomy of Player Types (1996) informs the design of roles and missions that appeal to diverse learner motivations. Explorers (curiosity-driven), achievers (goal-oriented), socializers (team-oriented), and killers (competitive strategists) each find entry points into the escape experience, which supports inclusive engagement and differentiated learning.

Gameful Learning (Landers, 2014) provides the overarching pedagogical lens, emphasizing that gamification should enhance—not distract from—learning. In GreenScape, this means integrating content mastery with game design, so that every challenge or puzzle has clear alignment with learning outcomes, particularly around civic agency and sustainability competencies. Reflection is embedded through structured debriefing, reinforcing metacognition and transfer.

GreenScape's virtual escape room design synthesizes European best practices in gamified education, as revealed through case studies in Bulgaria, Czech Republic, Finland, Greece, and Spain. These practices affirm key principles:

- **1st Principle: Narrative Engagement**

Case studies, such as Spain's Escape Room ODS, demonstrate the power of urgent, value-laden storytelling to prompt critical reflection and emotional engagement.

- **2nd Principle: Collaborative Design**

Finnish and Czech examples highlight co-creation and participatory learning environments that empower students as decision-makers.

- **3rd Principle: Accessible Tools**

Greek projects show how low-barrier digital platforms (Kahoot, Genial.ly) can facilitate wide adoption, especially in under-resourced contexts.

- **4th Principle: Civic Relevance**

Across contexts, effective gamification is tied to real-world issues, particularly environmental and civic dilemmas that mirror learners' societal roles.

The Octalysis Framework, developed by Yu-kai Chou, organizes game design elements around eight core motivational drivers: meaning, accomplishment, empowerment, ownership, social influence, scarcity, unpredictability, and avoidance. These are further categorized into intrinsic and extrinsic motivators, as well as right- and left-brain-oriented dynamics. The GreenScape escape room applies this framework strategically by integrating elements such as narrative identity (Core Drive 1: Meaning), progressive challenge levels (Core Drive 2: Accomplishment), and peer collaboration (Core Drive 5: Social Influence). The inclusion of uncertainty (Core Drive 7) in scenario-based dilemmas also sustains engagement through suspense and emergent outcomes. Research in educational psychology supports this approach: by targeting multiple motivational pathways, games can promote both short-term engagement and long-term learning retention (Hamari, Koivisto, & Sarsa, 2014).

Bartle's Taxonomy offers a typological classification of player motivations in multiplayer environments. Originally developed in the context of MUDs (Multi-User Dungeons), it identifies four dominant player types as Achievers, Explorers, Socializers, and Killers, each driven by different in-game goals. GreenScape's gamified design consciously accommodates these motivational profiles: Achievers are engaged through task complexity and accomplishment systems; Explorers find meaning in uncovering hidden knowledge or alternative pathways; Socializers thrive in cooperative tasks and decision-making processes; and even competitive players (Killers) are engaged through time-based missions or scoring mechanisms that stimulate urgency without undermining collaboration. Modern extensions of Bartle's model, such as Yee's Motivational Components for MMO players (Yee, 2006), further affirm that diverse motivational profiles must be considered to ensure inclusivity and sustained participation in educational game design.

The framework of Gameful Learning, as theorized by Landers (2014), positions gamification not as a surface-level set of tricks, but as a deep pedagogical intervention. Gameful learning theory emphasizes that game elements must be aligned with learning outcomes and embedded within valid instructional frameworks. In this view, mechanics such as feedback, goals, narrative, and rules are only meaningful if they scaffold metacognition, self-regulation, and mastery-oriented behaviors. GreenScape follows this model by ensuring that every game mechanic, whether a puzzle, role-play, or cooperative challenges, as contributes to the development of civic, ecological, and reflective competencies. The feedback loop within the game is designed to emulate real-life policy deliberation, allowing players to experience consequences, reassess their strategy, and refine their approach, thus mimicking the iterative nature of civic engagement and policy learning.

Empirical studies in game-based learning (Deterding et al., 2011; Sailer et al., 2017) highlight the importance of coherence between game mechanics and cognitive outcomes. When gamification is grounded in learner psychology and contextualized within meaningful narratives as in GreenScape, since it can enhance intrinsic motivation, promote persistence, and deepen conceptual understanding, especially in complex domains like sustainability and civic education.

In synthesizing these models, GreenScape creates a multidimensional learning environment where game mechanics are not ancillary but essential to the educational mission. The escape room becomes both a pedagogical structure and a motivational engine, translating theoretical principles into transformative practice.

2.3. Mapping Best Practices in Gamified Education

To shape a solid and inclusive educational model, GreenScape is drawing on leading examples of gamified learning from across Europe. These case studies illustrate how interactive, narrative-driven experiences can enhance student engagement, critical thinking, and collaboration—especially in relation to sustainability and civic participation. The examples span diverse educational settings, from digital escape rooms and heritage-based quests to simulations and university-led innovation labs. What unites them is a commitment to pedagogy, relevance, and inclusivity. Each practice helped shape GreenScape's VER design, offering not only inspiration but clear validation for its immersive, value-driven approach.

2.3.1. Bulgaria

In Bulgaria, gamification has been especially prominent in the fields of cultural heritage and tourism, with valuable lessons for civic and sustainability education. Two notable projects—*Belogradchik Highlights: A High Wizard's Legacy* and *Roman Plovdiv – Urban Game*—stood out as exemplary models. The Belogradchik game uses a mobile app to lead players through historical sites via a story-driven mission. It successfully fosters intrinsic motivation by combining exploration, problem-solving, and real-time feedback. However, it also highlights the need to avoid overly rigid game mechanics that can limit creativity.

GreenScape will adapt this model by emphasizing role-based narratives and collaborative challenges grounded in real-world issues like climate policy. Meanwhile, the Roman Plovdiv project, which guides users through ancient city landmarks using digital tools and gamified prompts, provided a strong example of inclusivity and accessibility. With multilingual support and content tailored for a wide audience, it showed how to create educational experiences that are socially engaging and adaptable to different learners. These insights have directly shaped GreenScape's design strategy, leading to the development of adaptable pacing, cooperative gameplay, and socially responsive narratives that reflect and support the diverse backgrounds and learning needs of participants.

2.3.2. Czech Republic

The Czech Republic offers a broad spectrum of gamified education practices across secondary, higher, and vocational education. One notable initiative is the digital escape room developed by Masaryk University, which turns abstract subjects like coding and logic into

interactive, puzzle-based experiences. For example, students worked through a sequence of challenges involving data encoding, binary codes, and logical AND/OR operations—each embedded into visual puzzles and interactive slides created using Genial.ly and Google Slides. These tools enabled the design of hidden clues, animated transitions, and clickable elements to simulate the feel of an actual escape room, fostering both engagement and collaboration. The use of accessible platforms affirmed the value of low-barrier tools that support wide implementation across diverse school settings.

Additionally, national efforts recognized by DZS (Erasmus+ Czech National Agency) showcased how gamification can foster sustainability education and international collaboration through real-world simulations. These projects reinforced the importance of social meaning, role diversity, and flexible, multi-path learning structures—all of which GreenScape adopted.

Another standout was a healthcare escape room created at the University of Pardubice, used in paramedic training. It demonstrated how gamification can simulate high-stakes decision-making and teamwork under pressure, while also highlighting the power of structured reflection. This approach informs GreenScape's integration of tiered challenges and debriefing tools to support metacognition and civic insight.

2.3.3. Finland

Finland, a global leader in innovative education, offers compelling examples of gamification that integrate 21st-century skills, sustainability, and inquiry-based learning. Aalto University's use of role-based sustainability games framed students as "eco-champions," tasked with solving real-world environmental problems. These experiences embedded assessment and reflection within gameplay, reinforcing GreenScape's design of embedded learning checkpoints and team-based quests.

The Sm4rt LOC project at the University of Eastern Finland created a physical and digital escape room environment supporting STEM and transversal skills. With flexible, VR-enhanced spaces and interactive challenges, it became both a learning lab and a model for scalable innovation. This influences GreenScape's vision for adaptable, multidisciplinary civic learning environments that blend observation, co-creation, and technical flexibility.

2.3.4. Greece

Greece's application of gamification has proven particularly effective in boosting engagement in language learning and vocational education. In response to low student motivation, Greek educators turned to storytelling, team challenges, and multi-level tasks to create more engaging, student-centered environments. These efforts informed GreenScape's use of real-world roleplay in climate scenarios—students might act as journalists or urban planners to solve community issues.

Greek schools also successfully used tools like Kahoot and Google Classroom to ensure accessibility despite limited resources. GreenScape mirrored this approach by designing with low-barrier digital tools and differentiated tasks to accommodate learners with varying abilities and digital access. The integration of civic content into escape room formats further supports GreenScape's goal of combining sustainability education with practical, inclusive learning.

2.3.5. Spain

Spain's *Escape Room ODS*, developed by the Government of Cantabria, offered a direct model for connecting gamification to civic and environmental responsibility. The game placed students in urgent, collaborative roles where they had to solve sustainability-related missions under time constraints. This format directly inspires GreenScape's use of time-bound challenges that simulate climate emergencies.

Post-game reflection was also a key feature in the Spanish model. GreenScape incorporates structured debriefing in every module to help learners analyze decisions, connect game events to real-world issues, and reflect on civic action. Furthermore, Spain's hybrid use of low-tech tools—such as QR codes, printed kits, and digital platforms like Genial.ly—demonstrated how gamified experiences can remain highly accessible while retaining educational depth. This approach directly informs GreenScape's commitment to scalable, inclusive design adaptable to diverse learning environments and infrastructure levels across Europe.

2. 4. Comparative Analysis and Lessons Learned

The case studies from Bulgaria, the Czech Republic, Finland, Greece, and Spain reveal a common set of success factors and challenges in gamified sustainability education. Despite national differences, all effective practices shared a strong emphasis on immersive storytelling and role-based learning. When students took on meaningful identities—activists, scientists, or decision-makers—they engaged more deeply and retained knowledge longer. GreenScape builds on this by weaving civic dilemmas and climate challenges into its game narratives, giving learners a sense of purpose and agency.

Collaboration also emerged as a foundational element. Team-based learning was central to success in nearly every case, from Finland's VR classrooms to Greece's digital quests. GreenScape will use this insight to structure its modules around cooperation, democratic decision-making, and shared responsibility.

Real-world relevance was another consistent strength. Games that connected directly to contemporary sustainability challenges—such as policy debates or environmental crises—proved most effective in fostering systems thinking. Inspired by these models, GreenScape designed its content to reflect the complexity and urgency of real ecological issues.

Inclusivity and accessibility were also vital. Greece and Spain demonstrated how modular, tech-light solutions can reach learners in under-resourced schools, while Bulgaria's multilingual games ensured broad participation. These examples shaped GreenScape's commitment to universal design, including scaffolded difficulty, multilingual support, and flexible pacing.

Finally, structured reflection significantly enhanced learning outcomes. Spanish and Czech models showed that post-game debriefing turns gameplay into lasting civic insight. GreenScape adopted this by embedding guided reflection and feedback loops throughout its modules.

Across all cases, institutional support and scalability played a crucial role. Countries with strong curricular alignment and long-term investment—like Finland—were better able to integrate gamification into education systems. GreenScape aspires to achieve similar impact by offering open-access resources and adaptable frameworks for implementation across Europe.

In sum, the comparative analysis confirms that gamified learning can be a powerful tool for civic and sustainability education—when it is grounded in meaningful narratives, collaborative tasks, inclusive design, and real-world relevance. The GreenScape model brings these best practices together into a unified learning experience that not only informs, but empowers youth to become active participants in shaping a more sustainable future.

3. Integration of Youth Goal #10 Objectives in Gamified Learning

3.1. Overview of Understanding Youth Goal #10: Sustainable Green Europe

Youth Goal #10, titled "A Sustainable Green Europe," envisions a continent where sustainability is not just a policy priority but a lived, shared, and practiced value—especially among younger generations. It urges European societies to support youth participation in shaping a green future, emphasizing the importance of informed civic engagement and transformative education.

At the heart of this goal lies a critical shift: sustainability is reframed from a top-down mandate into a collective responsibility where youth are not passive recipients of policy but active co-authors of change. GreenScape responds directly to this challenge by embedding Youth Goal #10 within a gamified educational model that empowers young people to explore, interrogate, and enact the very processes that drive ecological transformation at the European level.

Rather than treating sustainability as a set of abstract targets, GreenScape translates its principles into experiences narrative-based, emotionally resonant, and socially meaningful. Through interactive gameplay, learners face simulated yet realistic dilemmas such as energy transition, climate migration, and eco-social trade-offs. They are invited to adopt civic roles such as local leaders, EU parliamentarians, or youth activists, thus anchoring learning in both institutional contexts and personal identity formation.

3.2. Methodological Approaches to Embedding Sustainability, Climate Action, Civic Participation, Environmental Justice, and Green Skills into Gamification

To meaningfully embed the principles of Youth Goal #10, GreenScape employs a carefully curated methodological framework grounded in contemporary educational science, political

theory, and digital pedagogy. This approach merges experiential learning, transformative education, and deliberative democratic theory to create a multi-sensory learning environment.

Each gameplay element functions on multiple levels:

1. Cognitively, it presents complex systems (e.g., carbon economies, biodiversity loss, EU governance).
2. Emotionally, it involves learners in human-centered stories, invoking compassion and moral reasoning.
3. Socially, it requires dialogue, collective decision-making, and negotiation under pressure.
4. Politically, it familiarizes players with real institutional frameworks, mechanisms of participation, and civic rights.

Tasks are designed to mirror the kind of dilemmas faced in real-world sustainability transitions. For example, players may be asked to mediate conflicts between ecological protection and economic growth, or to develop an inclusive urban sustainability plan that reflects the needs of both indigenous communities and renewable energy stakeholders. These challenges simulate real-life tensions and allow for the practice of applied systems thinking, empathy-based decision-making, and ethical compromise.

The methodology is scaffolded in three tiers:

-Engagement through narrative immersion – Players are immersed in scenarios with emotional and political depth, inspired by real EU policy debates and grassroots activism.

-Empowerment through co-design and reflection – Learners help shape outcomes and are given structured reflection points to analyze decisions, emotions, and social dynamics.

-Extension through policy and action pathways – Gameplay is tied back to real EU strategies, local movements, and civic tools, ensuring learners leave with both knowledge and a sense of personal agency.

This methodological structure aligns with the EU's competence frameworks (such as LifeComp and GreenComp), while also pushing beyond them to prioritize the whole learner to head, heart, and hand.

3.3. From Policy to Practice: Aligning Educational Goals with EU Priorities

GreenScape operates as a pedagogical bridge between abstract policy frameworks and lived educational experiences. It brings the European Green Deal, the EU Youth Strategy 2019–2027, the Climate Pact, and Youth Goal #10 into tangible form by embedding them in the design, content, and process of the escape room.

What does this mean in practice? Learners do not simply read about the EU's sustainability priorities, they live them. For instance, one challenge might involve managing a participatory budgeting process in a fictional EU city. Players must weigh environmental

restoration projects against housing needs, while navigating institutional constraints and public dissent. The game presents primary EU documents, funding tools, and stakeholder voices, requiring learners to synthesize knowledge, manage competing interests, and craft solutions within realistic boundaries.

This shift from policy awareness to policy simulation creates a profound pedagogical opportunity. It not only boosts institutional literacy, helping learners understand how EU bodies operate, but also builds political imagination. Players begin to envision themselves within governance systems, as future voters, activists, or policy architects, thus fostering a sense of ownership and efficacy.

Moreover, the integration of authentic EU materials into gameplay reinforces the legitimacy and relevance of the educational content. It also satisfies the Erasmus+ mandate to make youth work and non-formal education more connected to the institutional landscape of European policy. By translating policy into challenge-based, emotionally grounded, and reflective learning, GreenScape becomes a model of applied European citizenship education.

3.4. Addressing Environmental Justice, Civic Participation, and Green Skills

At the ethical core of GreenScape lie three interdependent pillars: environmental justice, civic participation, and green skills. These elements are not siloed topics but are embedded throughout the design, functioning as both content and methodology.

Environmental Justice in GreenScape is not abstract, but it is experiential. Players encounter challenges that highlight the disproportionate burdens of climate change, often borne by marginalized groups. A mission might require allocating adaptation funds between coastal and inland communities, forcing players to confront inequalities in risk exposure and voice. By incorporating perspectives from underrepresented groups, GreenScape invites learners to engage in justice-centered thinking, moving beyond technocratic or individualistic conceptions of sustainability.

Civic Participation is operationalized through gameplay structure. Teams make collective decisions, debate ethical dilemmas, and simulate participatory processes such as town halls or EU committee sessions. This design not only models democratic engagement but also trains the skills it requires, as listening, empathy, evidence-based reasoning, and collaborative problem-solving. Through structured debriefs, players reflect on their roles, evaluate outcomes, and connect game dynamics to real political processes and opportunities for engagement in their communities.

Green Skills, as articulated by the European Green Deal and frameworks such as ESCO and GreenComp, are cultivated holistically. Players practice in:

I.   Systems Thinking, tracing cause-effect relationships across environmental, social, and economic domains.
II. Strategic Foresight, projecting future scenarios based on present actions.

III.   Digital Fluency, using tech-based tools to analyze, communicate, and simulate ecological problems.
IV.   Creativity and Innovation, designing sustainable solutions under constraints.
V.   Ethical Reasoning, navigating value conflicts and collective trade-offs.

Rather than teaching these competencies in isolation, GreenScape fosters them through performance. Learning is situated in action, where risks are felt, feedback is immediate, and insight emerges through doing.

In synthesizing these three dimensions, GreenScape embodies a comprehensive vision of sustainability education, since one that is cognitive, affective, and participatory. It reframes young people not as future leaders, but as current citizens, with the knowledge, empathy, and courage to shape the transitions their world urgently needs.

4. Development of the Overall Design of the Virtual Escape Room: Structure, Narrative, and Educational Approach

This section outlines the core components of the GreenScape Virtual Escape Room, focusing on how its design supports educational impact, engagement, and inclusivity. Drawing on principles from transformative and experiential learning, the escape room is structured as an immersive learning journey where participants explore climate policy, EU decision-making, and civic responsibility through interactive storytelling and collaborative challenges. The following subsections detail the experience's structure and flow, narrative design, puzzle development, accessibility considerations, facilitator roles, and the integration of digital tools—all working together to create a meaningful and adaptable educational resource for youth.

4.1 Structure and Flow of the Virtual Escape Room Experience

The structure of the GreenScape Virtual Escape Room is intentionally designed to serve as both a linear and adaptive educational journey. It follows a **three-phase progression—Awareness, Dilemma, and Transformation**—each phase reflecting the theoretical underpinnings of **transformative learning** (Mezirow, 1997) and **experiential learning cycles** (Kolb, 1984). This modular framework ensures that learners not only acquire knowledge but also emotionally engage with content and apply it in context-rich, decision-based scenarios. The sequential flow enables a gradual transition from passive learning to active civic participation, making the experience both cognitively enriching and personally meaningful.

The virtual escape room is structured to take approximately **45 to 60 minutes** in total, with each phase occupying a specific role in the overall learning journey. The game could be played by **players gathered in person**, using **a single device**. This option is considered both **cost-effective** and likely the most practical. Alternatively, players located anywhere within the EU can join and play individually from their own devices in separate, individual sessions. Both options are fully supported.

The **Awareness Phase** introduces the conceptual groundwork—familiarizing participants with key themes such as EU climate strategies, Youth Goal #10, and basic institutional knowledge. The puzzles in this phase are low in difficulty but high in context.

Next, the **Dilemma Phase** transitions the experience into more dynamic and complex terrain. Here, players are introduced to realistic, ethically charged scenarios that require collaboration, negotiation, and critical thinking. By simulating stakeholder roles (e.g., youth activist, policy advisor, business lobbyist), learners are placed in situations where no single "correct" answer exists, mirroring the complexity of real-world policy-making. This phase is structured to stimulate debate and systems-level thinking, as teams navigate the tension between competing values such as economic growth and environmental justice.

The final stage, the **Transformation Phase**, invites learners to synthesize their knowledge and propose actionable solutions. This could include formulating climate policy recommendations, simulating a vote within a virtual EU chamber, or crafting a strategic communication plan for citizen engagement. Unlike traditional escape rooms, the GreenScape model adopts an **open-ended outcome design**, where multiple "successful" resolutions are possible. This flexible structure not only accommodates different learning styles and perspectives but also reflects the pluralistic nature of democratic processes.

Each phase of the GreenScape Virtual Escape Room includes a **short, built-in transition segment** designed to consolidate learning and support reflection. These transitions take the form of **interactive prompts**, such as multiple-choice reflection questions, short journal-style text boxes ("What was the most difficult decision you made and why?"), or quick sentiment check-ins using emoji sliders or color-coded scales. In group-facilitated settings, these moments can be extended into brief live discussions, led by a facilitator using prepared guiding questions.

These transitions typically last **2–5 minutes** and are placed strategically after each phase to prevent cognitive overload, encourage metacognitive processing, and give participants space to emotionally process the experience. For example, after completing the dilemma phase, learners may be asked to choose which stakeholder group they most empathized with and briefly explain why. This allows them to connect personally with the scenario, even if their decisions were driven by strategy rather than values.

These practical reflection points are not add-ons—they are core to the pacing and impact of the experience. By embedding them between phases, the game avoids becoming overly fast-paced or purely gamified, and instead reinforces the deeper learning goals of civic awareness, ethical reasoning, and systems thinking. This design choice also provides facilitators with natural checkpoints to monitor engagement and support learners who may need clarification or encouragement before progressing to the next stage.

4.2 Narrative Design: Storytelling with Impact

The narrative design of the GreenScape Virtual Escape Room is central to its educational effectiveness. Rather than functioning as a decorative layer, the storyline serves as the primary vehicle for **delivering complex content in a way that is accessible,**

immersive, and emotionally resonant. Learners are placed in the midst of a **high-stakes, time-sensitive climate emergency**, where their decisions shape the **outcome of a fictional—but realistic—EU policy scenario**. Through interactive storytelling, participants are not passive recipients of information, but active contributors in **shaping a collective response to a continental sustainability crisis**. For the GreenScape Virtual Escape Room, the ideal group size is **4 to 6 players per team**.

At the beginning of the experience, participants are invited to take part in an **emergency session of the European Parliament**. A breaking news clip or animated briefing sets the stage: unprecedented floods, energy instability, and mounting youth protests have prompted the EU to propose a fast-tracked climate directive. However, the **policy is incomplete and politically fragile**, under pressure from competing economic, social, and environmental interests. It is up to the players to **investigate, negotiate, and co-create a viable solution before the legislative deadline expires.**

To bring this scenario to life, each participant assumes one of several **role-based identities**, inspired by the **real ecosystem of EU climate decision-making**. These roles include:

- **MEP (Member of the European Parliament)** with a Green Agenda – a legislator championing bold climate reforms;
- **Industry Lobbyist** – representing businesses concerned about regulatory burdens and economic impacts;
- **Youth Climate Activist** – advocating for urgent, equity-centered action on behalf of young people;
- **Local Mayor** – balancing municipal-level challenges with EU-wide sustainability goals.

Roles are either assigned or chosen depending on the group setup and facilitation needs. Each role is introduced through a brief character card or video, outlining that character's objectives, priorities, and constraints. These roles remain **consistent throughout the escape room**, allowing participants to deeply inhabit their perspective, engage empathetically with other viewpoints, and experience the tension between individual values and systemic decision-making. The diversity of roles ensures a plurality of perspectives in each group, simulating the complexity of real democratic negotiations.

The use of role-based narrative structures draws from applied theatre and simulation pedagogy, particularly the principles of dramatic inquiry and participatory storytelling. According to Boal's Theatre of the Oppressed and Heathcote's Mantle of the Expert model, learners engage more deeply when they are positioned not as observers but as decision-makers within a dramatic frame. GreenScape's character-driven design follows this tradition, transforming the escape room into a safe space for rehearsing civic responsibility. When participants step into roles, they begin to explore unfamiliar values, confront dilemmas from multiple angles, and navigate conflicting identities. This imaginative immersion cultivates not only empathy but also a nuanced appreciation of governance as a space of compromise, pressure, and collective responsibility.

The narrative unfolds in **three episodic chapters**, aligned with the GreenScape project's pedagogical phases:

- In the **Awareness Phase**, participants explore the background of the crisis through simulated interviews, media fragments, and institutional briefings. This phase introduces key terminology, contextual framing, and the urgency behind the pending legislation.

- In the **Dilemma Phase**, participants move into active role-play, where they debate policy options, navigate stakeholder conflicts, and attempt to reach consensus. Branching decision points allow their choices to influence the course of the story, reinforcing the idea that policy-making is iterative and influenced by trade-offs.

- In the **Transformation Phase**, players synthesize their positions into a proposed directive, simulate a parliamentary vote, and receive a virtual public response based on their decisions. This phase concludes with a guided debrief where participants reflect on the process, the outcome, and their role as civic actors.

Throughout the game, the narrative integrates **branching paths and feedback loops** that reflect real-world complexity. For example, agreeing to a subsidy compromise may earn short-term support from one group but trigger long-term political consequences from others. These story forks are grounded in realism, not gamified fantasy, ensuring participants remain engaged in decision-making that mirrors actual policy dynamics.

To enhance emotional engagement, the narrative can include **testimonials, ethical dilemmas, and personal stories**. Players might encounter a climate-displaced family, a community opposing green infrastructure, or a youth petition demanding systemic reform. These narrative cues move the experience beyond institutional abstraction, reinforcing that behind every policy decision are human lives and lived consequences.

From a cognitive science perspective, narrative scaffolding enhances both retention and transfer of knowledge. Research shows that emotionally charged stories activate brain regions associated with both memory (hippocampus) and moral reasoning (prefrontal cortex), making them powerful vehicles for integrating abstract concepts into lived understanding (Green & Brock, 2000; Immordino-Yang & Damasio, 2007). In GreenScape, every narrative component is intentionally crafted to blend affective engagement with epistemic complexity. Rather than providing didactic content, the storyline functions as an epistemological engine, one that supports identity development, values clarification, and metacognitive insight. This not only strengthens participants' understanding of policy systems but also helps them internalize the emotional and ethical stakes of environmental governance.

Importantly, the escape room avoids simplistic outcomes of "success" or "failure." Instead, participants receive **multiple reflective endings**, shaped by the values, inclusivity, and feasibility of their proposed solutions. These may include public support, criticism from key groups, or future projections of impact—offering an authentic learning experience rooted in civic realism.

4.3. Puzzle Design Aligned with Learning Outcomes

In the GreenScape Virtual Escape Room, puzzles are not included simply for entertainment; they serve as deliberate **instructional tools that align with defined learning outcomes across cognitive, emotional, and behavioral domains.** Each puzzle is embedded within the narrative and corresponds directly to one of the three educational phases—**Awareness, Dilemma, and Transformation**—ensuring that gameplay and pedagogy are mutually reinforcing. This structure is grounded in Bloom's Taxonomy[1] and experiential learning theory, allowing participants to move from understanding basic concepts to applying them in realistic decision-making contexts.

4. 3. 1. Awareness Phase: Building Foundational Knowledge

In the first phase, puzzle design emphasizes **information acquisition and comprehension**. The goal is to familiarize participants with key concepts related to EU institutions, sustainability terminology, and the broader context of Youth Goal #10. These puzzles are designed to be engaging but not overly challenging, allowing participants to build confidence while absorbing critical background knowledge.

Example puzzles in this phase include:

- **EU Matchmaker**: A fun drag-and-drop game where players connect EU institutions—like the Parliament or Commission—to what they do for the climate.
- **Media Literacy Check**: Players look at made-up news headlines and try to spot fake news or bias about climate issues.
- **Glossary Hunt**: In a virtual room, players click on objects to discover short videos or definitions that explain important climate and EU terms.

These activities are designed to support **recognition, recall, and conceptual framing**, ensuring a shared foundation before progressing into more complex problem-solving.

4. 3. 2. Dilemma Phase: Encouraging Critical Thinking and Collaboration

In the second phase, puzzle complexity increases. Players must now **analyze scenarios, interpret conflicting interests, and engage in role-based decision-making**. These puzzles simulate real-life policy debates, ethical trade-offs, and group negotiation—mirroring the stakeholder tensions within EU legislative processes.

Example puzzles in this phase include:

- **Stakeholder Alignment**: Players use a virtual map to position different stakeholders (e.g., NGOs, industry, youth organizations) along axes of influence and interest, then assess where consensus is possible.
- **Role-Driven Dilemma Choices**: Within their assigned roles, participants must vote on climate proposals, such as implementing a carbon tax or banning certain fuels. Their decisions trigger branching consequences that influence the storyline and future challenges.

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[1] **Bloom's Taxonomy**, developed by Benjamin Bloom (1956), is a framework for categorizing educational goals into six hierarchical levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. A revised version (Anderson & Krathwohl, 2001) updated these to: remember, understand, apply, analyze, evaluate, and create.

- **Pressure Points**: A timed challenge where players must prioritize between competing demands—economic recovery, environmental protection, and social equity—within a limited "policy budget."

These puzzles are often collaborative, requiring **group consensus or structured disagreement**, which supports the development of **critical thinking, empathy, and civic negotiation skills**.

4. 3. 3. Transformation Phase: Applying and Synthesizing Knowledge

In the final phase, puzzles emphasize **creative synthesis and applied problem-solving**. Participants take what they have learned and use it to develop policy solutions, justify their decisions, and communicate outcomes. These tasks are intentionally open-ended, allowing for multiple valid solutions and encouraging innovation.

Example puzzles in this phase include:

- **Policy Pitch Pad:** teams choose 2–3 policy cards from a list (e.g., green subsidies, plastic bans) and explain their selections in a brief written or recorded pitch. This supports clear communication and strategic thinking.
- **Policy Reaction Cards**: After selecting policy options, players receive fictional stakeholder feedback—such as praise from environmental groups or criticism from industry representatives—and reflect on how their choices affect different groups.
- **Voting Simulation**: A group decision is made via majority vote, with real-time visual feedback showing simulated reactions from fictional citizens, media, and partner countries.

These high-level puzzles target **application, evaluation, and creative thinking**, and reinforce participants' sense of **civic agency** by showing the tangible outcomes of their choices.

This alignment between puzzles and learning outcomes is rooted in the principle of constructive alignment (Biggs, 1996), which emphasizes that learning activities must directly support the intended educational objectives. By integrating puzzles as formative learning events rather than isolated tasks, GreenScape ensures that each challenge is pedagogically purposeful. This structure also leverages the cognitive load theory (Sweller, 1988), balancing novelty and difficulty to optimize working memory without overwhelming learners. Early puzzles introduce terminology and schema; later puzzles challenge learners to manipulate, evaluate, and apply those schemas under complex conditions. In doing so, the experience scaffolds cognitive development in a progression that is both neurologically efficient and emotionally engaging.

Furthermore, the puzzle architecture is designed to promote deeper learning through what the OECD describes as "21st-century competencies", including critical thinking, collaboration, and adaptability. Each phase moves beyond rote memorization toward higher-order skills, such as synthesis, perspective-taking, and strategic foresight. Importantly, the puzzles are intentionally situated within socio-political contexts, allowing learners to perceive civic learning not as abstract theory but as a skillset for ethical and democratic engagement. The dynamic interplay between narrative consequences and puzzle choices serves to build

self-efficacy and a sense of civic identity as two key predictors of long-term participatory behavior in democratic societies.

Together, these puzzles transform theoretical knowledge into lived experience, simulating the complexity of real-world climate policy-making in a way that is both accessible and deeply impactful. Participants don't just learn *about* civic processes—they practice engaging with them, making the learning active, relevant, and lasting.

4.4. Inclusivity and Accessibility Principles

Inclusivity and accessibility are fundamental principles in the design of the GreenScape Virtual Escape Room. The experience is built to ensure that **all participants—regardless of background, language, ability, or learning style—can fully engage** with the content, collaborate effectively, and benefit from the educational goals. This aligns with the broader objectives of the GreenScape project to promote participation, representation, and equity in civic education.

From a **language and cultural inclusion** perspective, the escape room will be available in **multiple languages**, starting with English and the official languages of partner countries. The content will be culturally neutral but adaptable, allowing local facilitators to tailor certain elements (e.g., examples, news headlines, character names) to reflect regional contexts without losing core learning outcomes.

Key information will be conveyed through clear iconography, simple language, and concise instructions. Where possible, alternative formats such as **audio narration**, **subtitles**, and **text transcripts** will be provided.

Interactive puzzles will avoid overreliance on fine motor skills or fast response times, ensuring that players using different devices or assistive technologies can participate equally.

Finally, character roles and narratives within the escape room will also reflect a **diversity of voices and identities**, helping participants see themselves represented and encouraging empathy across social groups. Avatars and scenario content will be inclusive in terms of **gender, age, ethnicity, ability, and geography**, avoiding stereotypes and promoting multiple perspectives on sustainability and civic action.

4.5. Role of Facilitators and Learner Interaction

Just like in a traditional escape room, the GreenScape Virtual Escape Room benefits from the presence of a **facilitator who guides the experience from beginning to end**. While the game is designed to be largely self-directed and intuitive, the facilitator plays a crucial role in supporting learning, managing the flow, and encouraging meaningful interaction among participants. Their presence ensures the experience remains focused, inclusive, and pedagogically effective.

At the start, the facilitator provides a **briefing**, introducing the story scenario (a European climate emergency), explaining how the game works, and assigning or confirming

roles within each team. They may also help form balanced groups and answer initial questions to ensure everyone feels ready and confident to begin.

Throughout the game, the facilitator acts as a **quiet observer and support figure**. They monitor progress, keep track of time, and offer assistance if a group becomes stuck or needs clarification. Their interventions are light-touch and non-intrusive—guiding with questions rather than giving answers. For example, if a team struggles during the dilemma phase, the facilitator might ask, "How might your character respond to this policy?" or "What would happen if you delayed the vote?"

Facilitators also manage **transitions between the game's phases**, providing short moments for reflection and discussion. These pauses are built into the experience and serve as checkpoints where participants can share their thoughts, consider alternative views, and relate their in-game decisions to real-world civic issues. Facilitators can use simple prompts like:

- "What was the biggest challenge your group faced in reaching agreement?"
- "Did your role's goals change as the story progressed?"
- "How would your proposed policy affect people in your own community?"

At the end of the game, the facilitator leads a **debrief session**. This is an essential part of the learning process, where players reflect on their roles, the decisions they made, and the outcomes they achieved. The goal is to help participants connect their experience to broader themes of sustainability, democracy, and civic responsibility.

The facilitator role can be taken on by an educational professional (e.g., a teacher or youth worker) or by one of the participants, depending on the context. To support this flexibility and ensure a consistent experience, a dedicated facilitator user guide (A3.3) will be developed. This guide will provide clear, practical instructions on how to approach the game, what kinds of questions to ask, how to manage transitions, and how to lead an effective debrief. In both online and in-person formats, the facilitator may also handle technical or logistical tasks—such as launching breakout rooms, sharing links, managing time, or adapting the activity to fit different settings and group sizes.

Ultimately, the facilitator ensures that the escape room functions as more than just a game. Their presence brings structure, emotional support, and educational depth to the experience—helping participants not only solve puzzles, but **learn, collaborate, and reflect as active citizens**.

4.6. Integration of Digital Tools and Technology

The successful delivery of the GreenScape Virtual Escape Room relies on the thoughtful integration of **accessible, flexible, and user-friendly digital tools**. The technology is not just a delivery mechanism—it is essential for creating an interactive, immersive environment where storytelling, collaboration, and learning outcomes converge. All tools are selected based on their **compatibility with various devices, ease of use, and suitability for youth-focused, non-formal learning settings.**

To develop the core escape room experience, the project will use a **web-based platform** such as Unity. This tool allows for the creation of visually engaging, non-linear content without the need for advanced programming. They support interactive elements such as clickable objects, branching story paths, embedded videos, drag-and-drop activities, and quiz-style reflections—features that are essential for implementing the puzzle designs outlined in earlier sections.

For **collaborative gameplay and group interaction**, platforms like **Zoom**, or **Google Meet** will be used in live sessions. These tools allow participants to brainstorm, map stakeholder interests, co-create, and engage in team-based decision-making in real time. For asynchronous use, players can interact via embedded comment fields or simplified input forms, allowing individual participation at their own pace.

As mentioned in the previous section, accessibility and inclusivity are central to the technology plan. The selected tools must support:

- **Screen reader compatibility and keyboard navigation**
- **Multilingual interface options**
- **Closed captions and text alternatives for audio/video content**
- **Mobile device access**, ensuring that the experience is not limited to desktop users

To support facilitators and educators, the escape room will include a **comprehensive digital user guide (A3.3)** with clear instructions on how to navigate the virtual escape room.

To enhance engagement and motivation, the experience will feature **gamification elements** such as progress indicators, team achievements, and responsive feedback—designed to support learning without creating unnecessary competition.

Finally, to support evaluation and impact tracking, the system may include optional **analytics features** (where privacy regulations allow), enabling the collection of anonymized data on puzzle completion rates, decision trends, and user engagement. This data can inform improvements and support reporting on project outcomes.

4.7 Greenscape Educational Modules: Purpose, Structure, and Role in the VER

To enhance meaningful engagement with the GreenScape Virtual Escape Room (VER), a series of six educational modules has been developed. These modules are designed to provide users with essential theoretical foundations, procedural tools, and critical-thinking skills necessary to navigate both the VER and its real-world sustainability themes.

4. 7. 1. Overview of Modules

Each module focuses on a specific thematic area, ranging from institutional knowledge and media literacy to civic participation and policy development:

1. Module 1 – Understanding EU Climate Institutions
2. Module 2 – Key Policies and Milestones of the European Green Deal

3. Module 3 – Civic Simulation and Stakeholder Roles
4. Module 4 – Tools for Youth Civic Action
5. Module 5 – Ethics and Disinformation in Climate Communication
6. Module 6 – The Policy Pitch Pad: Co-Designing Climate Solutions

4. 7. 2. Function, Educational Role, and Integration with the VER

The modules serve two primary functions:

- Before gameplay: They provide essential background knowledge, helping users understand key concepts related to EU climate policy, civic engagement, media literacy, and ethical decision-making.
- During and after gameplay: They function as reference tools and debriefing supports, allowing for deeper reflection and extended learning beyond the game environment.

Though not embedded within the VER interface, the modules are closely aligned with its three gameplay phases—Awareness, Dilemma, and Transformation—and scaffold learning progressively: from system understanding to values negotiation and civic action design.

- Phase 1: Awareness

This phase introduces users to key EU structures, sustainability policies, and climate communication.

- Module 1 familiarizes learners with the roles of EU institutions.
- Module 2 outlines major milestones of the European Green Deal.
- Module 5 begins to address the issue of disinformation.

These modules build essential context and lower barriers to more advanced learning.

- Phase 2: Dilemma

Players adopt stakeholder perspectives and engage with complex climate policy dilemmas.

- Module 3 enables role-based simulations and voting mechanics.
- Module 5 deepens engagement with ethical challenges and misinformation.
- Module 4 introduces democratic tools for youth civic action.

This phase blends civic reasoning with emotional and ethical inquiry.

- Phase 3: Transformation

Learners synthesize insights and co-design actionable policy proposals.

- Module 6 offers the "Policy Pitch Pad" as a structured tool for policy development.
- Module 3's voting mechanics lend realism to deliberation.
- Module 4 reinforces real-world pathways for civic engagement.

This stage consolidates the skills, values, and insights developed throughout the VER journey.

4. 7. 3. Access and Usability

To ensure seamless user access and integration:

- An introductory section within the VER will clearly reference the modules and recommend reviewing them in advance.
- A direct link to the "Virtual Escape Room" section of the website—where both the modules and the game are hosted—will be embedded within the VER interface. This centralized location enables easy navigation between resources.

4. 7. 4. Structure and Format

Each module is presented as a standalone yet cohesive learning unit (up to 15 pages), consisting of two components:

1. Theoretical Core: Provides key ideas, background knowledge, and conceptual frameworks.
2. Additional Resources: Includes short activities and reflection tasks designed to reinforce and personalize learning.

The modules are designed for flexible use—individually or as a complete set—and are suitable for both formal and informal educational contexts, including classrooms, youth centers, and online learning environments.

4. 8. Conclusion

In sum, the GreenScape Virtual Escape Room combines structure, storytelling, and technology to create a meaningful learning experience for young people. It offers participants the opportunity to explore sustainability and civic engagement in a hands-on, collaborative way, grounded in real-world EU contexts. Designed to be accessible and flexible, the escape room can be adapted to different learning environments, making it a valuable tool for fostering active participation and critical thinking among youth.