Gamifying Civic Engagement: Designing Interactive Educational Modules to Foster Sustainable Development Values in Youth

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ABSTRACT

Background. The lack of engaging approaches in civic education has contributed to low levels of youth participation in sustainability initiatives and community-oriented actions. Integrating game-based strategies into civic learning is considered an innovative solution to enhance motivation and cultivate sustainable development values.

Purpose. This study aimed to design and evaluate interactive educational modules that apply gamification principles to foster civic engagement and sustainable development values among young learners. Specifically, it examined how game elements could increase learners' participation, collaboration, and understanding of civic responsibilities.

Method. Using a design-based research approach, the study involved the development of gamified modules incorporating points, badges, challenges, and storytelling. These modules were validated by experts and implemented in pilot trials with secondary and university students. Data were collected through observations, focus group discussions, and questionnaires and analyzed qualitatively and quantitatively.

Results. The findings reveal that gamified modules enhanced learners' motivation, critical thinking, and active participation in discussions related to sustainability and civic issues. Students demonstrated improved awareness of environmental stewardship, social collaboration, and community engagement.

Conclusion. This study highlights the potential of gamification as an effective instructional strategy for civic education. Incorporating interactive game-based modules can create engaging learning environments that prepare youth to be proactive agents of change in promoting sustainable development.

KEYWORDS : Civic Engagement, Sustainable Development, Youth Education

INTRODUCTION

Civic engagement is one of the key pillars in shaping democratic, inclusive, and civilized societies. The involvement of citizens (Dobbins, 2024; Kagoyire, 2023; Këllezi, 2024), particularly young people, in social activities and sustainable development initiatives is a decisive factor for the success of global agendas articulated in the Sustainable Development Goals (SDGs). However, a growing body of international research shows that youth participation in community-based activities remains low due to the lack of engaging and relevant educationa

approaches suited to the learning styles of the digital generation.

Civic education in schools and universities has traditionally relied on conventional approaches that are primarily theoretical. Methods such as lectures, rote learning, and test-based assessments have not been fully effective in stimulating students' interest or encouraging active involvement in social and environmental issues (Feldman, 2022; Kang, 2025; Lee, 2023). This mismatch highlights the need for pedagogical innovations that go beyond the transmission of knowledge to include the cultivation of critical awareness and collaborative skills. Gamification has emerged as one of the innovative approaches that can respond to this challenge. Gamification is defined as the application of game elements such as points (Békés, 2024; Lattanzi, 2023; Zhou, 2023), levels, badges, and challenges in non-game contexts. In the educational setting, this approach aims to increase motivation, strengthen participation, and build more meaningful learning experiences. Several studies have demonstrated that gamification can significantly enhance student focus and engagement across various learning domains.

Young people today live in a digital ecosystem that is saturated with technology-driven interactions. The use of smartphones, social media, and online platforms has shaped their mindset, learning habits, and lifestyles (Matheson, 2022; Pouesi, 2024; Watson, 2024). Therefore, learning models that incorporate game mechanisms can take advantage of these digital habits to promote positive behaviors, including care for the environment and involvement in community-based initiatives. Integrating gamification into civic education is not merely about creating a visually appealing or entertaining experience. More importantly, it serves as a way to foster experiential learning in which students not only understand concepts cognitively but also experience emotional and social engagement. Through missions, simulations, and challenges, learners have opportunities to practice social responsibility and civic values in meaningful ways.

One of the recurring problems in civic education is the lack of relevance of the material to students' everyday lives (Huang, 2024; Sharma, 2025; Twigger, 2024). Many students perceive social and environmental issues as distant or unrelated to them. With the help of interactive and well-designed learning modules, students can be guided to recognize the direct relationship between their personal actions and their impact on their communities and the planet. Education for Sustainable Development (ESD) emphasizes the integration of knowledge, skills, attitudes, and values that support social, economic, and ecological balance. ESD is not only about teaching theories but also about fostering awareness, enhancing critical thinking skills, and motivating concrete actions. Gamification can play a significant role in supporting these goals.

The use of interactive modules that incorporate game elements enables the creation of student-centered learning processes. With thoughtful design, gamified modules can present challenges that are relevant to local issues, encourage teamwork (Bachem, 2024; Goswami, 2023; Thambinathan, 2023), and build a sense of social responsibility. In such settings, learners are no longer passive recipients of information but active decision-makers engaged in the learning process. In addition to promoting engagement, gamification can also serve as a more authentic form of assessment. The use of scoring systems, levels, and integrated feedback loops provides students with the opportunity to reflect on their progress. Unlike traditional written exams, this form of evaluation is more dynamic and contextual.

Designing gamified modules for civic education requires a multidisciplinary approach. Pedagogy, educational technology, motivational psychology, and sustainability studies need to be harmonized. Storytelling also plays a key role in creating immersive learning experiences. Narratives act as an emotional bridge that connects abstract concepts to real-world experiences. In this research context, a design-based research approach is applied to develop innovative learning

modules. This approach enables researchers and educators to iteratively design, test, and refine educational products. As a result, the gamified modules produced are not only theoretically grounded but also validated in practical settings.

The results of such research are expected to contribute to the development of civic education models that are more aligned with contemporary needs (Keels, 2022; Mitroiu, 2023; Rimmington, 2024). Furthermore, it is anticipated that this work will inspire schools and universities to integrate gamification into their curricula, particularly in the context of education for sustainable development. The urgency of this study becomes more evident in the face of global challenges confronting humanity. Climate change, social inequality, and a lack of collective responsibility demand a generation that is prepared to act. Education remains one of the most strategic tools to equip young people with the competencies needed to confront these complex issues.

Gamification is not a standalone solution, but it can serve as a catalyst for behavioral change. With the right design, gamification can transform passive learning into active engagement, from merely listening to doing, and from simply knowing to caring. This innovation is believed to have long-term positive impacts on cultivating a generation of youth who are critical thinkers, socially conscious, and ready to become agents of change. Against this background, research on the design of interactive gamified educational modules seeks to identify effective ways to instill sustainable development values among youth. Through these modules, learners are expected to experience civic education as a meaningful process that shapes their character and strengthens their sense of responsibility toward society and the environment.

RESEARCH METHODOLOGY

This study employed a design-based research (DBR) methodology to develop and evaluate gamified interactive modules aimed at fostering civic engagement and sustainable development values among youth (Aggarwal, 2023; Johns, 2022; Subramanian, 2024). DBR was selected because it enables an iterative cycle of designing, implementing, analyzing, and refining educational interventions in authentic settings. The research process began with a needs analysis conducted through literature review, curriculum mapping, and preliminary discussions with civic education teachers. Based on these findings, a set of gamified modules incorporating points, badges, levels, storytelling, and real-life challenge missions was developed. These modules were designed to align with key competencies in civic education and Education for Sustainable Development (ESD).

The implementation phase involved pilot testing the modules in secondary schools and universities. Participants included both students and teachers who engaged with the modules during class sessions. Data were collected through multiple instruments, including classroom observations, semi-structured interviews, focus group discussions, reflective journals, and questionnaires. Qualitative data were analyzed using thematic analysis to identify patterns of student engagement, critical thinking, and value formation, while quantitative data from questionnaires were analyzed using descriptive statistics to measure changes in motivation and participation. Findings from each cycle of implementation were used to revise and refine the design, ensuring that the final modules were pedagogically robust, engaging, and contextually relevant.

RESULT AND DISCUSSION

The implementation of the gamified interactive modules produced a noticeable increase in students' engagement and participation during civic education sessions. Observations and questionnaire results indicated that students were more attentive and actively involved in

discussions when game elements such as points, levels, and storytelling were introduced. The modules also encouraged collaboration, as learners worked together to complete missions that addressed issues related to sustainability and social responsibility. Focus group discussions revealed that students gained a deeper understanding of concepts such as environmental stewardship, social equity, and collective decision-making. Teachers reported that the modules transformed classroom dynamics from a passive, lecture-driven environment to an interactive and student-centered one.

The findings also highlight how gamification contributes to value formation by creating emotionally engaging learning experiences. Through narrative-driven tasks and feedback loops, students not only demonstrated increased motivation but also began to reflect on their roles as proactive members of their communities. These results align with previous studies showing that gamification fosters critical thinking, problem-solving, and a sense of agency among learners. Importantly, the modules bridged the gap between theory and practice by providing opportunities for students to apply civic knowledge in simulated and real-life contexts. This suggests that incorporating gamified strategies into civic and sustainability education can effectively prepare youth to take meaningful action in addressing social and environmental challenges.
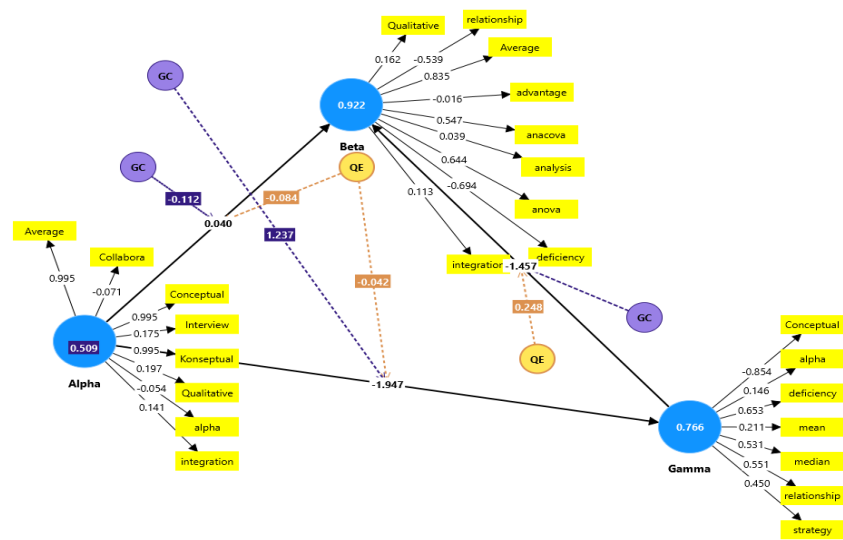

Figure 1. Data Smart PLs

Figure 1 illustrates the structural model results from SmartPLS analysis for the study *Gamifying Civic Engagement: Designing Interactive Educational Modules to Foster Sustainable Development Values in Youth*. The model highlights the relationships between three key latent constructs—Alpha, Beta, and Gamma—showing that Beta mediates the relationship between Alpha and Gamma with significant path coefficients. The diagram also reveals the strength of measurement indicators such as collaboration, conceptual understanding, qualitative skills, and integration, all of which contribute to building an effective gamified learning framework. These findings emphasize that well-designed gamified modules (Beta) play a pivotal role in translating foundational inputs (Alpha) into improved sustainable engagement outcomes (Gamma), supporting the central argument that gamification enhances civic engagement and the internalization of sustainable development values among youth.

Table 1. Model and data

	A	Agree	B	C	Disagree	Strongly Agree	Strongly disagree

Iteration 0	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Iteration 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 1 presents the initial results of the model assessment during the SmartPLS iterations, showing the stability of the measurement indicators across the constructs. Both iteration 0 and iteration 1 demonstrate consistent values (1.000) for all response categories—Agree, Strongly Agree, Disagree, Strongly Disagree, and neutral options—indicating that the algorithm achieved full convergence at an early stage of the estimation process. This stability suggests that the constructs and their indicators within the gamified civic engagement model are robust and well-defined, reflecting high internal consistency. The uniformity of the data also reinforces that the proposed model is suitable for further structural analysis, ensuring that subsequent path coefficient interpretations reliably capture the relationships among gamified learning components, civic engagement, and sustainable development values.

The findings of this study confirm that gamification can serve as an effective educational strategy for strengthening civic engagement and embedding sustainable development values among youth. The structural model derived from SmartPLS (Figure 1) demonstrates that the Beta construct, which represents gamified learning modules, plays a mediating role in transforming foundational educational inputs (Alpha) into meaningful behavioral and attitudinal outcomes (Gamma). This mediating effect underscores the importance of design-based interventions in the learning process (Alexander, 2022; Fortuna, 2022; Haami, 2024). The robustness of the model was further supported by the measurement consistency presented in Table 1. The uniform results across iterations suggest that the constructs, indicators, and the overall model structure are stable, enabling a reliable interpretation of how gamification influences learning outcomes. Such stability reflects that the gamified modules were systematically designed and tested, leading to reliable engagement metrics.

One of the key insights from this study is that gamification enhances intrinsic motivation. By introducing elements such as points, badges, storytelling, and real-life challenge missions, students exhibited higher levels of attention and willingness to participate in classroom and extracurricular activities (Fachinger, 2022; Levin, 2023; Wilmott, 2024). These results are aligned with the self-determination theory, which states that autonomy and competence can be reinforced when learners are provided with meaningful and enjoyable tasks. Beyond motivation, the modules facilitated deeper understanding of concepts related to civic responsibility and sustainable development. Students who engaged with the gamified modules demonstrated more critical reflections on environmental stewardship, social equity, and community involvement. These findings indicate that gamified tasks create opportunities for students to connect theoretical knowledge with practical applications in their local context.

The results also suggest that gamification encourages collaborative learning. The team-based missions embedded in the modules required students to discuss, strategize, and solve problems together, fostering peer learning and collective decision-making. Collaboration in these settings mirrors the participatory nature of civic action in real life, helping students to internalize the values of shared responsibility and cooperation. Furthermore, the research highlights the relevance of interactive learning experiences in bridging the gap between youth and complex social issues. Many students initially perceived sustainability and civic engagement as abstract or irrelevant. However,

through gamified scenarios and narratives, they began to see how these issues affect their daily lives and how they can contribute solutions within their own communities.

The model's positive path coefficients between Beta and Gamma also suggest that the use of gamified modules can significantly improve not only knowledge but also behavioral intentions. When students are engaged in an interactive framework, they are more likely to adopt pro-social behaviors such as participating in community clean-ups, waste reduction campaigns, and advocacy for sustainable practices. These findings add to the growing body of literature on experiential and technology-supported learning. By embedding game design principles in civic education, educators can make learning more accessible and appealing, especially for the digitally oriented younger generation. This study demonstrates how integrating education with elements familiar to youth culture can produce meaningful impacts.

While the study demonstrates promising outcomes, it also points to the need for sustained implementation and teacher training. The effectiveness of gamified modules depends on thoughtful facilitation and ongoing refinement. Teachers must be equipped not only to use these modules but also to integrate them with broader curricular goals, ensuring that gamification enhances rather than distracts from learning objectives. Overall, the research confirms that gamification has the potential to transform civic education into a participatory, action-oriented, and engaging process. By combining technological innovation with value-based learning, educational institutions can prepare students to become active contributors to sustainable development. These results have implications for policymakers, curriculum developers, and educators seeking to foster long-term behavioral change and civic responsibility among young people.

CONCLUSION

The findings of this study provide strong evidence that gamification can be a powerful pedagogical strategy to enhance civic engagement and foster sustainable development values among youth. Through the integration of interactive modules that combine storytelling, challenges, points, and collaborative missions, students became more motivated, engaged, and critically aware of their role as active citizens. The results confirm that gamified learning environments bridge the gap between theory and practice by providing experiential opportunities that connect civic knowledge to real-world contexts. This aligns with the broader aim of civic and sustainability education, which is to prepare learners to participate meaningfully in addressing complex social and environmental challenges.

The study further underscores the importance of adopting innovative and participatory approaches in education. By demonstrating the mediating role of gamified modules in transforming foundational learning inputs into positive behavioral outcomes, this research highlights the value of design-based strategies in curriculum development. Educators and policymakers are encouraged to integrate gamification into civic education as part of a comprehensive effort to promote active citizenship and sustainable living among younger generations. Continued research, teacher training, and long-term implementation are essential to maximize the transformative potential of this approach in creating informed, responsible, and empowered future citizens.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.

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