

Megagames as a Methodology to Foster Learning in Higher Education

Sonia Palha, Anders Bouwer, Erwin Crasbeek and Daan van Smaalen

Faculty of Education, Amsterdam University of Applied Sciences, The Netherlands

s.abrantes.garcez.palha@hva.nl

a.j.bouwer@hva.nl

e.m.van.crasbeek2@hva.nl

d.van.smaalen@hva.nl

Abstract: Megagames are large-scale collaborative games with elements of role-playing and board games. Players need to solve wicked problems together and explore multiple solutions. When applied to higher education, megagames create opportunities for learners to work in multidisciplinary teams solving ill-structured problems, and in this way prepare learners to deal with complex social processes and different actor's interests. Despite the promising potential of megagames, there is limited research on the use of megagames in education. The project 'Megagames as a Methodology to Enhance Global Awareness' (MEGA) involved a multidisciplinary team of teachers, researchers and game designers and its aim was to investigate the potential of megagames as methodology for higher education to address global problems, which cannot be simply solved from a fragmented disciplinary approach. In this paper we present and discuss insights gathered during the MEGA project. The guiding research question was: How can megagames be used in higher education to create immersive learning experiences that foster learning about global issues? We addressed the research question through phenomenological research because we wanted to capture the players' experience. Phenomenological research emphasizes the importance of direct experience for understanding the essence of a phenomenon. Within this methodology we developed and piloted a megagame centered on AI and Ethics, a relevant global issue for our university's students and faculty and investigated players' experience. The game event took about 4 hours, and it was open to students, faculty staff and other professionals. Thirty people participated in the game. We investigated participants' learning and personal experience and how they envisioned the implementation of megagames in education through open questionnaires and semi-structured interviews. In this paper we focus on the results from the twenty-eight participants who answered the questionnaire. The data was analyzed qualitatively. Results reveal dimensions in the participants' megagame experience that are valuable for preparing students to deal with complex situations and global problems. In particular, experiences that were connected with moral values and social skills, which are increasingly needed to prepare students for a democratic society. The megagame approach can help meet this need by offering immersive learning experiences.

Keywords: Megagames, Game-Based learning, Artificial intelligence, Higher education, Wicked problems, Serious games

1. Introduction

1.1 Megagames in Education

Megagames are large-scale collaborative games with elements of role-playing and board games. The number of players can vary from several to hundreds of people who are organized into teams and taking specific roles (Ludert et al., 2023). Players need to solve wicked problems together and explore multiple solutions. The megagame format creates a context where players come together in a process and explore solutions, thus making different perspectives visible. Megagames share some features of board games such as rules, rounds, and objectives which provide a framework for the player to act (Moreno & Melgoza, 2024). However, while board games have clear rules and goals, the megagame format has few rules with freedom for the players to define their own goals (Ludert et al 2023; Uhrqvist et al, 2021). Also, while board games involve typically a few players around a single table, a megagame involves several teams of players competing and/or collaborating with each other.

1.2 Research on Educational Megagames

Research on educational megagames has shown that megagames increase students awareness of social global issues, such as sustainability (Ludert et al, 2023; Uhrqvist et al, 2021), can be designed for increasing students' motivation for learning (Ludert et al., 2023), and are a method for gathering empirical data about different groups' knowledge and perspectives about social global issues. One example of a megagame for education is the Climate Change megagame conducted in 2020 at Linköping University. This game aims to encourage discussion about Climate change and what strategies to follow. Players are engaged in real-life experiences and role-play; they must negotiate the use of limited resources while considering different needs and interests. Findings from this study (Uhrqvist et al, 2021) showed that the megagame raised the awareness of the participants for climate adaptation and mitigation.

Research on megagames can also provide valuable guidelines and insights for designing and adapting them for educational purposes (Ludert et al., 2023). A review of the literature identifies several dimensions of the megagame format that make it interesting for education. One such dimension is *immersion*. Game elements contributing to this include narrative, secrecy, role-playing, high levels of interaction, and a context that resonates with participants (Uhrqvist et al., 2021; Moreno & Melgoza, 2024).

Another key dimension is *collaboration*. The large number of participants requires strategic thinking and alliance-building, as it is not feasible to communicate with everyone (Uhrqvist et al., 2021). Additionally, the presence of *multiple perspectives and stakeholders* enables participants to adopt multidisciplinary and holistic approaches to address complex, “wicked” problems—challenges that cannot be effectively solved through fragmented, discipline-specific strategies (Ludert et al., 2023; Uhrqvist et al., 2021; Kossoff & Irwin, 2021).

Megagames also support *experiential learning* by allowing players to actively engage with events and experiment with different perspectives, solutions, and outcomes that are often absent in traditional educational settings. Finally, because megagames involve participants adopting specific roles and foster empathy by encouraging them to view problems from other stakeholders' perspectives, they create a *safe environment* for discussing real-world issues. This setting helps facilitate the exchange of conflicting views and opinions in a constructive manner—conversations that might otherwise provoke defensiveness, argumentation, or entrenchment (Fleming et al., 2020).

However, research on educational megagames remains limited and existing studies on the use of megagames provide little insight into how learning unfolds during the megagame experience or how educators can effectively integrate this format into their practice. Our research addresses these gaps by focusing on the investigation, design, and implementation of educational megagames within higher education contexts.

In this paper we present a megagame developed in a project and results from the pilot of the game, which involved thirty people playing. Our guiding research question was: How can megagames be used in higher education to create immersive learning experiences that foster learning about global issues?

2. Context of the Research

2.1 MEGA Project

The MEGA (Megagames as a Methodology to Enhance Global Awareness) project explores the use of megagames in higher education to address social issues. By participating in a megagame, students and faculty engage with global challenges, gaining insight into the motivations of different stakeholders and reflecting on their own agency. The project focuses on a megagame about AI and Ethics—a timely and relevant topic—and investigates how participants learn through this format.

2.2 The Megagame Age of Intelligence

"Age of Intelligence" simulates a near-future world where nations and corporations negotiate AI technologies while confronting global crises and ethical challenges. Designed for 25-50 players, the game emphasizes the complex interplay between technological advancement, ethical considerations, and societal impact.

Players were assigned to one of four faction types with distinct missions: **Nations** (2-3 people in each team, the main mission was improving trust with citizens), **Corporations** (2-3 people in each team, with the mission of developing and selling AI technology for profit), **Press** (2 people reporting news to maintain audience trust), and **Activists** (1 person promoting ethical AI use). Each player received at the start of the game a sheet folded in half and sealed to hide the exact details of achieving his/her character and faction goals. The activities created tensions between and within factions, compelling players to negotiate ethical dilemmas while pursuing conflicting objectives. **Control players** (one per team Nation or Corporation) facilitated gameplay, adjudicated actions, and ensured narrative coherence, with a **Master Control player** overseeing the game while individual Controls supported specific factions.

The setup included tables for nations, corporations, a research forum, and a world council. Each **faction table** featured a map with a "trust track" that visually represented the faction's standing with their constituents (citizens for nations, shareholders for corporations). An example is provided in Figure 1. These spaces facilitated nations managing their resources and internal policies, and corporations developing AI technologies and applications; **the research table** provided access to AI knowledge for a resource cost, by presenting an overview of possible AI applications for various application domains, the core technologies required to develop them, their potential benefits, costs, and associated ethical issues; and the **world council** handled global crises affecting

multiple factions. Movement between spaces was regulated to simulate real-world communication constraints, with press and activist players having greater mobility to fulfill their watchdog roles.

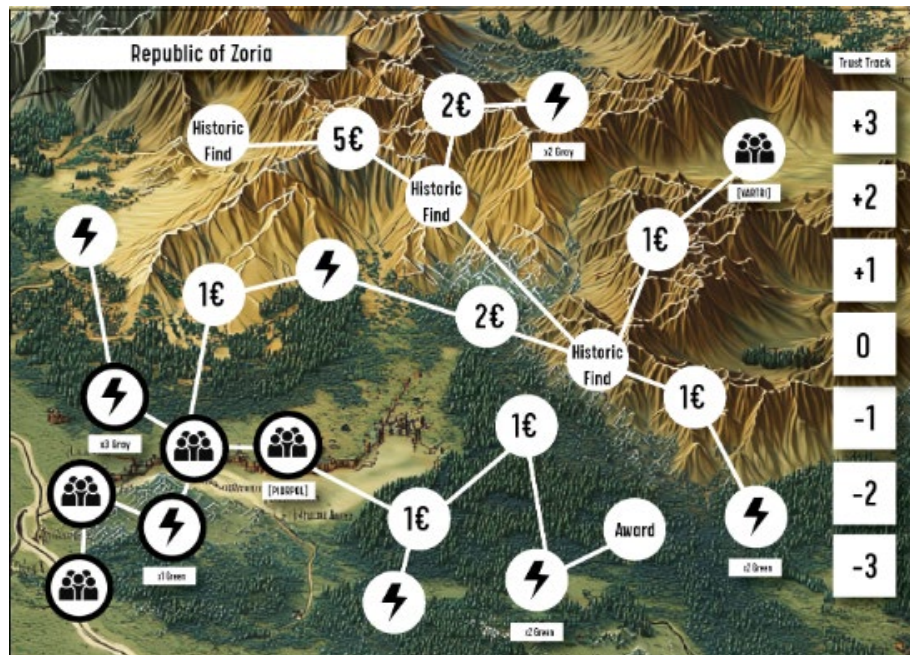


Figure 1: Map of Republic of Zoria

Resources in the game included both tangible assets (money, people, energy) and abstract concepts (data, advantages, complications), all represented by physical cards that players collected, traded, and spent during gameplay. Examples of these cards are presented in Figure 2. This resource economy was designed to encourage negotiation and create interdependence between factions, as players physically exchanged these cards when making deals or investing in technologies.

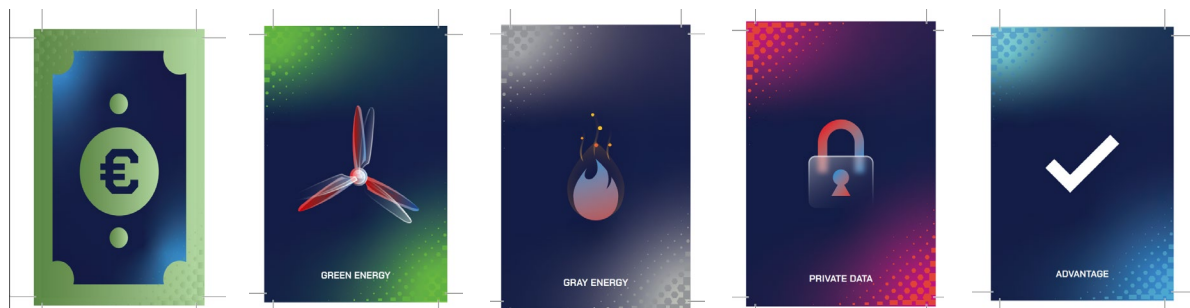


Figure 2: Resource cards

The game ran for nine rounds, from 1 to 5 pm, with mandatory faction meetings on alternate rounds. Control players served as both facilitators and arbiters who evaluated the quality and plausibility of player actions. Rather than rigid rules, the game relied on Control players' judgment to assess players' narratives, role alignment, and resource allocation when resolving actions. Action resolution followed a structured process where players described their intended actions to Control players, who evaluated the quality of their plans and resource allocation before determining outcomes through dice rolls. This mechanism rewarded thoughtful planning and role-appropriate behavior while maintaining an element of uncertainty. Although factions had goals to strive for, there were no explicit winning conditions to be achieved, and the end of the game was determined by the Master Control player.

Learning outcomes were of two types: (1) application of 21st century skills such as negotiation, critical thinking and collaboration for solving global issues in practice; and (2) learning about AI and ethics, in particular awareness of ethical principles, risk categories, and mitigation strategies. The descriptions of ethical issues and risks were informed by the European Commission's seven ethical principles for trustworthy AI (European

Commission HLEGAI, 2019) and the EU AI Act's risk categories (European Commission, 2024), stimulating players to engage with these frameworks within the context of their roles and objectives.

To illustrate how the different game elements combine, consider a nation faction facing rising healthcare costs due to an aging population. One or more business factions negotiate with this nation about AI healthcare applications and, using the AI research table, arrive at a solution: *AI-powered remote health monitoring*. Developing this requires two core technologies: Internet of Things (IoT) for data collection and Machine Learning for health pattern analysis. The company already possesses one core technology, and invests money and other resources (data and energy) to develop the second and build the AI application. This offers potential benefits to the nation—early health issue detection and reduced costs through preventive care—but also raises two ethical concerns: (1) Privacy and Data Governance, involving consent and potential data breaches, and (2) Technical Robustness and Safety, where data collection errors could endanger patients. The business faction must explain how they plan to address these concerns to a control player, who evaluates the plan and determines outcomes using dice to reflect uncertainty. At some point, the master game controller announces that the next round will include a check on the use of personal data, triggering additional costs. This prompts factions to either switch to anonymized data or develop AI applications that support data anonymization.

3. Method

3.1 Participants

To investigate the way megagames enact learning we applied phenomenological research because this method is suitable to capture peoples' experience. Phenomenological research emphasizes the importance of direct experience for understanding the essence of a phenomenon, in this case, the megagame. The pilot of the megagame was open to students, faculty staff, and other professionals and took approximately four hours. Participants' learning and personal experience and how they envisioned the implementation of megagames in education were investigated using open questionnaires. Of the thirty people who participated in the game, twenty-eight participants answered the questionnaire.

3.2 Questionnaire

The questionnaire contained 22 questions, addressing participants' background (age, function, workplace, motivation to play the game), participants' satisfaction and overall learning experience, what they liked and disliked, when they were engaged and disengaged, participants' perceived learning about AI and Ethics and how participants envisaged application of megagames in their work or school practice.

3.3 Data Analyses

Following a phenomenological approach, the qualitative data was analyzed per participant (horizontalization) and across participants. The whole dataset was coded and from the codes, categories and overarching themes were created. Through the processes of horizontalization, comparison and reduction, the themes were tested against the original data. These themes describe players' experience with the megagame and provide answers to the first part of the research question (how people learned). Perceived learning about AI and Ethics was measured with multiple-choice questions that asked to what extent participants learned specific content. Quantitative analyses of participants' answers provided answers to the second part of the research question (what they have learned about the global issue in question).

In qualitative data analysis, some methodologists question the relevance of intercoder agreement, given the interpretative nature of the process (Saldaña, 2015). In this study, we employed extensive team discussions and achieving consensus as a primary agreement strategy. During the initial phase of analysis, two researchers independently coded a portion of the data to establish inter-coder reliability. Any discrepancies were addressed through discussion and resolved by consensus. After this step, the first author completed the full dataset coding, while the third author acted as a critical reviewer, thoroughly auditing the coding process to ensure consistency and transparency (Saldaña, 2015).

4. Results

4.1 Characterizing Players' Learning Experience With the Megagame

4.1.1 Immersive

The theme Immersive entails players' feelings of joy, pleasure or displeasure in their megagame experience. Playing the megagame felt very immersive for some players. For instance: "I had a blast! The experience was very immersive" (P10); "Special! I've never done anything like this before, so it was educational and entertaining" (P26). "I was continuously motivated and engaged" (P06).

Other players experienced fun, enjoyed the role-playing and the story unfolding (*fun or interesting*) and one player was slightly disappointed (*disappointed*), feeling that it took too long to step into the game.

4.1.2 Learnful

Learnful refers to the educational potential of the megagame. It includes aspects related to learning activities, learned knowledge or skills enacted during the gameplay. People recognized its educational value and relevance for learning about AI and ethics (*relevant and educational*). For instance, one player noticed that it was "easy to see the relevance" (P20). Playing the game gets people "thinking about AI" (P18) and provokes thinking about positive and negative consequences of its use (*fostered critical thinking*): "Coming up with positive negative consequences regarding the actions or innovations of the players" (P18).

Players were exposed in a fun way to complex learning which involves multiple and diverse perspectives, different points of views, and shifting priorities / urgencies (*multiple perspectives*): "It was a fun way to learn about different perspectives" (P06). This experience was complex and nonlinear, sometimes described as "chaotic because of many perspectives and shifting priorities / urgencies. But in a good way" (P27). It was also connected with reality as players experienced the complexity of the world. They found the resources largely corresponded with reality and the role play realistic (*connection with reality*): "[I liked] how the resources largely corresponded with reality" (P18); "the role play was realistic" (P14).

Players felt most engaged when doing research, creating proposals or designing products ("when we did some research and ended up with a great proposal", P07); when negotiating and making deals with other teams. For instance, player P12 stated: "When dealing with the press and negotiating with companies, I had to really break things down to what benefitted my country most and enter the character. In thinking about how something would affect millions of people"; when persuading others or discussing about tradeoffs ("Making the argument for a plan before control. Then all of the things you discussed and discovered need to make sense and be convincing.", P27) (*engaging discussions, negotiation, design*).

4.1.3 Collaborating, communicating and connecting with others

Collaborating, communicating and connecting with others referred to the social interaction enacted during the gameplay and ways that it supported and motivated players through the gameplay. Interaction and collaboration with others was the most engaging factor of the megagame experience. During the game people met new people ("I got to know new people", P16) and collaborated intensively with other players within the team and across the teams (*interaction and collaboration*). For instance, player P01 liked the "collaboration, see how we were all sort of dependent on one another", and player P17 was most engaged when "cooperating with other countries to prevent war" (P17).

People felt also strongly engaged when talking to other people, other teams and the press and talking about their plans (*Interacting and talking with others*): "When I made 'a bond' with the journalists. I just like to work together and make fun with each other" (P16).

People felt connected during the megagame, which led to engagement (and probably immersion). Working and having fun or being in a story together, seeing people getting into their role and seeing that everyone is involved, enthusiastic and participating (*sense of closeness and belongingness*).

Players were also explaining and helping each other and people felt very engaged when feeling that they could help the team (*helping others*). Player 23, who was a control-player, felt most engaged when "shifting from explaining the game rules and thoughts to guiding the table to participate more in the story, and suggests 'story development options'". For this player "it was all great fun that got even better the longer we played".

Conversely, people felt disengaged in situations where interaction was missing, as in the case of the control players when players were away from the table to negotiate with other teams: "The even rounds, where the players went in all directions to discuss and I just came up with ideas and did the administration" (P18).

4.1.4 *Experiencing and dealing with complex situations*

Complexity refers to the state of feeling difficulty to understand or find a solution to a problem, which cannot be solved through linear methods, and it involves multiple paths or perspectives. Creating the experience of complexity was one of the reasons to use megagames and we were curious to see how players experienced this in their game-experience. We saw this theme emerging from participants descriptions in three main forms: complex, increasing complexity and high workload. Players experienced the game as chaotic but in a good way, they related with joyful feelings although also overwhelming (*complex*). For instance, player 13 describes his/her experience as 'nice but a bit overwhelming and too much'.

Players felt that negotiation became difficult while the game was going on (*increasing complexity*). For instance, player P01 felt disengaged "when things were becoming too overwhelming" and "negotiation becomes difficult".

Mostly, players experienced some kind of difficulty and workload before and during the game. They need preparation (you need to read the role before the game); it is difficult to be a control player: "I was control. It felt like quite a heavy job to steer the group in the right directions" (P24). Stepping into the game was considered difficult. Many players referred to the difficulty in understanding the rules, determining priorities and develop the first products: "In the beginning it was quite hard to figure out what I had to do" (P09); "I also sometimes found it difficult to understand the rules and determine the priority" (P26).

4.1.5 *Freedom, uncertainty, progress and trust*

The open character of the megagame evoked divergent feelings among the participants. There were players who experienced and appreciated it and liked the freedom to come up with alternatives. This was the case for player P03, who liked "the freedom and the amount of background information provided" the most, and player P12 valued the "liberty to come up with alternatives that aren't guarded by a strict rule set". The absence of winning conditions was noticed and appreciated by some players. Player P25 stated "it was also nice not knowing the specific goals but having a general idea of the goal as we were going. This meant that the end felt satisfying seeing that you did make choices that awarded something at the end without knowing if you were doing the right thing". Player P10 enjoyed that "everyone had different goals".

There were also players who felt out of comfort zone, too much freedom, unprepared, didn't know what to do and felt insecure when rules were not clear, or when feeling not having enough knowledge on AI: "Too much freedom, not clear what the options are. Everything can be done but that blocks me sometimes" (P19). This player commented that the use of scaffolding and examples would work better for her/him. Player P03 experienced as unpleasurable the game's "complexity and not knowing how you progress". This player suggested adding a dashboard to the game.

Starting to understand the game and accomplishing particular tasks and goals were turning points and allowed players to gain trust: "I think I was engaged around the middle part to the end, I gained some trust and figured out what my role was" (P09). Player P07 got engaged when feeling progress and accomplishment: "I finally had the feeling like I was starting to understand the game."

4.2 **Learning about AI and Ethics**

The majority of the 28 participants reported having learned something about AI and Ethics (n=11) or a little (n=10). Some players reported that they didn't learn (n=7) and none reported having learned a lot about this topic. Nineteen participants gave more detailed answers, mentioning having learned about specific topics such as data concerns, complexity and multifaceted character of the problem, difficulty to match ethics and production, influence of the press, resources and consequences, risks of corruption, and perspectives on implementation [of AI] in the energy sector.

We also asked players whether they had learned specific knowledge related to AI and Ethics from the game, or whether they already had this knowledge. An overview of these issues and the participants' answers is presented in Table 1.

Table 1: Knowledge on AI and Ethics in the megagame

To what extent do you agree with the following statements? After participating in the megagame:	Agree	Disagree	I already had this knowledge
I can describe an example of an AI application that addresses a societal problem	25%	25%	50%
I can explain a benefit and a disadvantage of AI adoption from different societal perspectives	39%	14%	46%
I can describe an ethical issue related to human agency and oversight	32%	29%	39%
I can describe an ethical issue related to technical robustness and safety	32%	21%	46%
I can describe an ethical issue related to the environment	39%	7%	54%
I can describe an ethical issue related to privacy and/or data governance	36%	7%	57%
I can describe an ethical issue related to diversity, non-discrimination, and/or fairness	21%	36%	43%
I can describe an ethical issue related to transparency	43%	21%	36%
I can describe an ethical issue related to accountability	25%	39%	36%
I can explain and justify solutions that might mitigate the different ethical risks associated with the application of AI	21%	46%	32%

Participants shared additional reflections on their learning, including: “how many different interests various parties can have, especially regarding data safety and regulations” (P11), and “the importance of the government’s possession of personal data”—not just avoiding misuse, but “but keeping it safe in the first place.” (P13).

4.3 Megagame Application to Education or Workplace

We investigated how participants would use (or not) megagames in their learning, teaching, research, or other educational practice and why. People who would use megagames (n=6) would do it for the following reasons: to foster awareness and/or introduction to the world of AI and Ethics, as well as an active learning activity or icebreaker or to learn about gamification. For instance, one professional from a Tech company “would use it to work with companies that are looking to adopt AI - as a fun engagement in parallel to the base case definition workshops”. A teacher would use the megagame format as a whole class activity as an example of gamified learning.

The majority of participants (n=16) had doubts about whether they would use it in their educational practice or workplace. The three main concerns related to its application in education were the difficulty of adapting it to one’s own context, the time that it takes to play, and the effort or resources needed to organize it: “I think that it requires a lot of time and resources to manage and the return is a bit low”. One teacher doubted about the use of the megagame with students: “For my students it might be too difficult as it was played today. I think modeling 2 rounds in a video or something would help”.

The participants who would not use megagames (n=6) did not have a role in education or were teaching in secondary education. Also, one teacher would not use it because “It takes many people and a lot of time to play it, we don’t have the opportunity to do that in our teaching environment”.

5. Conclusion and Further Research

The findings highlight various aspects of participants’ megagame experiences that help prepare students to navigate complex situations and global challenges. Understanding how and why megagames can be used for learning in higher education is essential for lecturers and researchers aiming to apply this format effectively. Based on these findings, we propose the following working definition of learning through educational megagames in higher education, offering insight into their educational value:

“In a megagame learning involves feelings such as joy, pleasure or displeasure and in some cases playing the megagame can be very immersive. Players are exposed in a fun way to complex learning that involves multiple and diverse perspectives, different points of view, and shifting priorities and urgencies. People learn about the topic and other people’s views through discussions, negotiation and design. The social interaction enacted

during the gameplay, which involves communication, collaboration and connection, motivates players to keep playing, develop critical thinking and knowledge and feel connected. The gameplay takes time which is needed to experience and overcome less pleasure experiences”

The definition above aligns with previous research on learning through megagames. For example, in studies by Ludert et al. (2023) and Moreno and Melgoza (2024), players reported feeling immersed in the game, engaging in experiential learning, collaborating, and sharing multiple perspectives. The megagame format has also been shown to create a safe environment for learning through experimentation and dialogue (Fleming et al., 2020).

However, other aspects of our definition—such as feelings of joy and fun, a sense of belonging, and personal and moral dimensions—are less frequently discussed in the existing literature on megagames.

Many of the elements included in the above definition are also present in other educational game formats, so what distinguishes learning within the megagame format? We believe it is not a single feature, but rather the combination of several elements—such as the openness of the game’s goals and the high level of interaction among players. Together, these factors significantly expand the range of possible solutions, participant perspectives, game scenarios, and learning outcomes, resulting in a more immersive and dynamic learning environment compared to more traditional and predictable formats.

Additionally, the extended duration of gameplay appeared to be a crucial factor for participants in our study. It allowed them time to fully immerse themselves in the experience, engage meaningfully with the gameplay, and work through moments of confusion or frustration.

Implementing megagames in practice involves resources and organization that are usually not available in traditional higher education. In addition to play the game in another setting requires effort and expertise to adapt it to a new environment and its specific problems. Especially teachers see possibilities for using the megagame format for awareness and introduction to a topic, but not much beyond this. Follow-up research is needed to better understand the particularities of learning with megagames and to develop ways to support teachers who are interested in using them in practice.

Ethics declaration: Ethics declaration was not required for the research.

AI declaration: No AI tools were used for the creation of this paper besides for correcting writing. The main language of the authors is not English.

References

- Creswell, J. W., & Poth, C. N. (2024). *Qualitative inquiry and research design: Choosing among five approaches* (5th ed.). Sage Publications.
- European Commission HLEGAL (2019). *Ethics Guidelines for Trustworthy AI*. High-Level Expert Group on AI. Retrieved May 1, 2024, from <https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>.
- European Commission (2024, Aug 1). *AI Act enters into force* [Press release]. Brussels, European Commission. Retrieved May 1, 2024, from https://commission.europa.eu/news/ai-act-enters-force-2024-08-01_en.
- Fleming, K., Abad, J., Booth, L., Schueller, L., Baills, A., Scolobig, A., ... & Leone, M. F. (2020). The use of serious games in engaging stakeholders for disaster risk reduction, management and climate change adaption information elicitation. *International Journal of Disaster Risk Reduction*, 49, 101669.
- Kossoff, G., & Irwin, T. (2021). Transition design as a strategy for addressing urban wicked problems. In *Cities without capitalism* (pp. 90-120). Routledge.
- Ludert, E., Castellanos, E.C.O., & Ramírez-Cavazos, L.I. (2023). Kuxtal: Student Motivation Through Megagames in Higher Education Design Students. In *European Conference on Games Based Learning 2023* (pp. 390-400).
- Moreno, A. C., & Melgoza, M. A. C. (2024). 谈判: Mega-games as Catalysts for Deep Experiential Learning in Higher Education. In *Proceedings of the 18th European Conference on Games Based Learning*. Academic Conferences and publishing limited
- Uhrqvist, O., Leifler, O., & Persson, M. (2021). *Citizens’ views on climate-change adaptation: a study of the views of participants in the 2020 Climate Change Megagame*. Linköping University Electronic Press.