MitiGate: Risk Management Collaborative Tabletop Strategy Game

Martin Sillaots
martin.sillaots@tlu.ee
Tallinn University, Tallinn, Estonia

Abstract: Risk management is a critical component of project management and academic training. However, traditional pedagogical approaches often fail to engage learners, leading to a shallow understanding of risk mitigation strategies. In practice, risk management is frequently perceived as a bureaucratic requirement rather than a strategic tool, resulting in hastily generated documentation that lacks practical relevance. Furthermore, time constraints in training schedules frequently lead to the omission of risk management modules. To address these educational and practical challenges, this study explores the potential of game-based learning through MitiGate—a collaborative tabletop strategy game designed to introduce risk management methodologies and simulate real-world countermeasures across academic and corporate training environments. Following a Design-Based Research framework, MitiGate underwent three cycles of prototyping and playtesting with university students, corporate learners, project management trainers, and professional game designers. Data were collected via feedback questionnaires, observations, and expert reviews to evaluate game mechanics and player perceptions. The findings demonstrate high overall player satisfaction and show that MitiGate successfully facilitated strategic risk discussions. While participants identified opportunities for mechanical refinement—specifically regarding the balance of luck and victory conditions—the iterative design process converted complex risk concepts into playable mechanics with the potential to support collaborative decision-making and soft-skill awareness.

Keywords: Project Management, Risk Management, Collaborative Learning, Educational Board Game, Design-Based Research.

1. Introduction

Project management provides a structured framework for addressing complex problems across diverse domains, covering processes from scope definition to procurement. Within this framework, risk management is a vital component. Proactive preparation for uncertainties is essential during the planning phase, while continuous monitoring remains crucial throughout the project lifecycle.

In practice, however, the risk management section of a project plan is frequently rushed to meet proposal deadlines. These initial risk logs rarely reflect real-world operational challenges—a shortfall that only becomes apparent when issues arise during execution (Dulin et al., 2025). Furthermore, risk management is often positioned at the end of PM training curricula, leaving inadequate time for deep comprehension. Research indicates that students frequently perceive risk management as overly abstract (Taillandier & Adam, 2018), making it difficult to link theoretical concepts to actual project realities (Xia et al., 2012). Traditional instructional methods struggle to offer the hands-on experience required for practical problem-solving, constrained by tight course schedules and the inherent difficulty of simulating high-stakes scenarios in a classroom. To overcome these limitations, educators are increasingly adopting games and simulations. These active learning tools enable participants to navigate simulated project crises within a low-risk environment, allowing them to learn from failure without real-world consequences (Oliveira et al., 2013).

To address these instructional and managerial challenges, this study applies a game-based approach to facilitate experiential learning. By designing and implementing a serious game, the complexities of risk identification, qualitative analysis, and countermeasure planning are converted into an interactive challenge. This approach aims to support collaborative problem-solving, enhance strategic decision-making, and convert passive instruction into an active learning process. By simulating the pressures of a project lifecycle, the game enables players to experience the direct consequences of their risk-related choices while learning established risk procedures and methods.

The objective of this study is to design, iteratively refine, and evaluate a serious game for project management students and practitioners. The aim is to deliver a balanced tool that integrates risk management theory with practical application, while evaluating how the game format influences player engagement and perceived competency development.

To achieve this objective, the study addresses the following research questions:

1. What are the essential game components and rules needed to create a realistic tabletop simulation of project risk management?
2. How do players evaluate the engagement, educational potential, and design adequacy of the game?
3. What modifications do game design experts recommend to better align MitiGate's mechanics with effective risk management training?

2. Theoretical Framework

Project management is defined by the strategic application of expertise, methodologies, and tools to achieve specific project objectives (Project Management Institute, 2021). Far from being restricted to large-scale industrial operations, these practices are now applied across diverse contexts, including small businesses and organisational operations. This widespread adoption has led scholars to describe a "projectification" of society, where project-based frameworks are replacing traditional, sequential work habits (Paredes & Ribeiro, 2018).

Within this framework, risk represents any uncertain event or condition that could positively or negatively impact project objectives, such as scope, cost, schedule, or quality (Project Management Institute, 2021). Effective risk management aims to maximise positive opportunities while mitigating potential threats through a continuous cycle of identification, qualitative and quantitative analysis, response planning, and control (Project Management Institute, 2021).

As the field evolves, contemporary research emphasises the critical role of behavioral and soft skills in project success (Özsoy & Sezgili, 2024). Project management has transformed from a purely technical discipline into a core driver of organisational change (McGrath & Košťálová, 2020). This shift toward more flexible and adaptive frameworks requires a reassessment of established teaching methods (McGrath & Košťálová, 2020; Özsoy & Sezgili, 2024).

Despite the growing demand for project management expertise, traditional university curricula often fall short by overemphasising technical theory at the expense of practical experience and behavioral competencies (Bukvić et al., 2020; Ewin et al., 2017; Özsoy & Sezgili, 2024). Many academic approaches prioritise narrow definitions of project success while neglecting adaptive decision-making under uncertainty. To address these educational limitations, scholars recommend active learning strategies, including Design Thinking (Ewin et al., 2017), Project-Based Learning (Ríos et al., 2010), and Game-Based Learning (Özsoy & Sezgili, 2024).

Modern pedagogy views project management as a specialised profession requiring immersive, interactive tools to build real-world skills (Paredes & Ribeiro, 2018). Educators have observed that game-based environments enhance student engagement and foster a memorable context for knowledge acquisition (Jääskä & Aaltonen, 2022).

Traditional instructional formats often struggle to convey the dynamic, high-stakes nature of risk management in real-life scenarios. Simulation-based learning, however, can effectively replicate complex work-related experiences (Tasantab et al., 2021). Advanced applications include integrating 3D game engines with Building Information Modeling to support safety managers (Sorbi et al., 2024), whereas "wargaming" and tabletop role-playing exercises have proven effective for exploring "what-if" scenarios in crisis management (Amakama et al., 2024; Kleinke & Kleinke, 2022). Although serious games are frequently designed for domain-specific applications—such as flood risk or coastal hazards (Forrest et al., 2022; Solinska-Nowak et al., 2018; Taillandier

& Adam, 2018)—their underlying educational mechanics are broadly transferable. While digital simulations like SPRITE (Taillandier & Adam, 2018), Simsoft (Xia et al., 2012), and eRiskGame (Oliveira et al., 2013) have explored risk management in specialised settings, MitiGate focuses on a collaborative tabletop format to prioritise face-to-face team dynamics and real-time negotiation.

3. Methodology

3.1 Research Strategy and Process

This study implements Design-Based Research (DBR) (Design-Based Research Collective, 2003) to integrate project management theory with game-based learning. Given the study's applied focus, DBR was selected for its capacity to improve educational interventions through iterative cycles and its direct impact on classroom practices (Reimann, 2011). Although DBR can support theoretical development and design frameworks (Edelson, 2002), in this research it was utilised primarily to structure the design process and evaluate outcomes across multiple game iterations.

The research was structured into two primary activities: game design and stakeholder evaluation. This process followed three iterative cycles corresponding to the game's evolution: low-fidelity prototype (V1), high-fidelity prototype (V2), and final product (V3). Each iteration integrated feedback from diverse stakeholders, including university students, corporate trainees, project management (PM) experts, and serious game (SG) experts. This feedback served as direct input for game refinements. The workflow is illustrated in Figure 1.

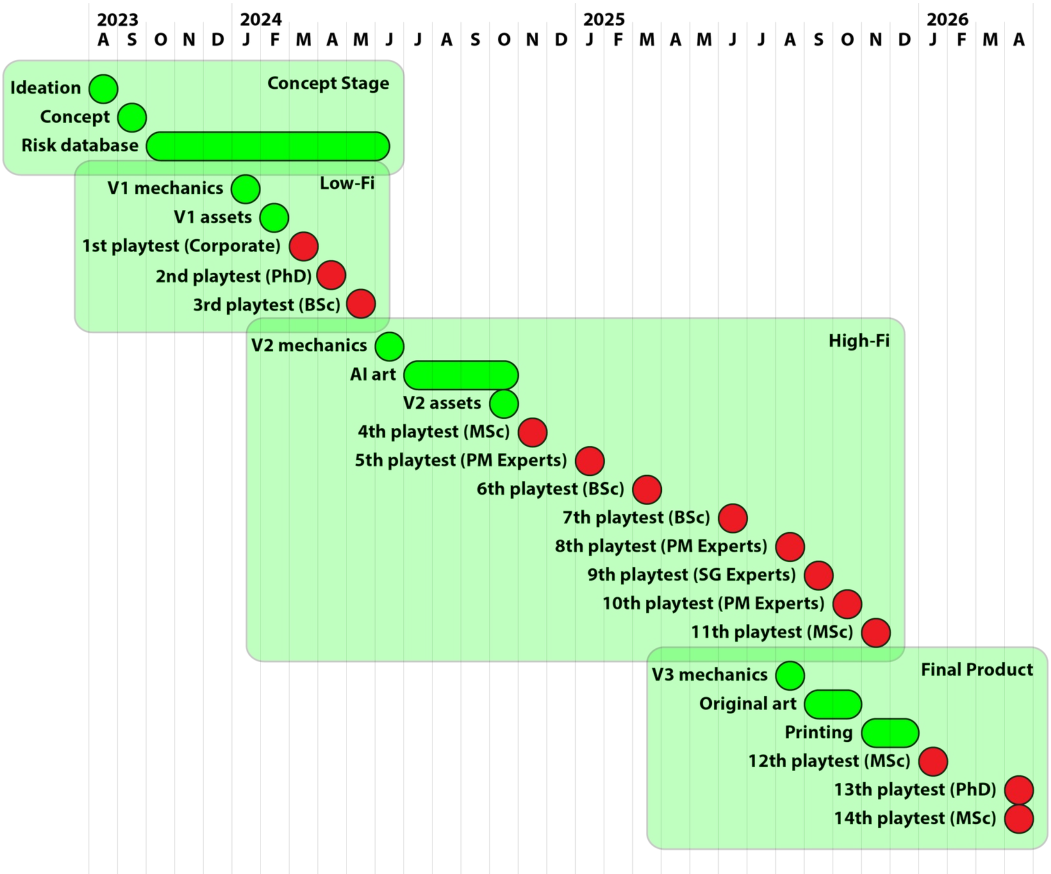

Figure 1: Gantt chart of the MitiGate game design (green) and feedback (red) activities.

3.2 Design Methods

The game design followed the framework proposed by Adams (2014), focusing on the Concept and Elaboration stages. Initial brainstorming was conducted during an international EdTech Talents project meeting with four project management experts from Estonia, Germany, and Serbia. Out of 11 generated ideas, a risk management strategy game was selected. A game concept document was developed following Adams (2014), outlining the core game idea, educational and entertainment goals, gameplay mechanics, genre, target audience, interaction mode, and similar games.

The game's risk database was mapped to the Risk Breakdown Structure (RBS) from the PMBOK Guide (Project Management Institute, 2021). Data tables were structured by risk and countermeasure categories alongside their impact on project objectives. Based on the author's project management experience and theoretical recommendations (Project Management Institute, 2021), a database of 80 risks and 80 countermeasures was generated. To ensure gameplay fluidity and maintain physical component constraints, a core set of 36 risk cards and 36 countermeasure cards was selected for the tabletop game; a primary selection criterion was that individual countermeasures could apply to multiple risks. The complete database of 80 risks and countermeasures is available in the online version of the game at dlg.tlu.ee/mitigate.

The risk and countermeasure database served as the primary tool for balancing the game content, ensuring that risks' 'hit-points' and countermeasures' 'protection-points' were mathematically aligned across all project objectives. First, it was checked that the 'hit' or 'protection' points were in accordance with the risk or countermeasure impacts on project objectives (scope, quality, time, and cost). Then, it was verified that the combined impact of risks and countermeasures was more or less even across each project objective. Finally, it was ensured that the countermeasures' total positive impact neutralised the risks' total negative impact.

The game board and cards were developed through three iterations, transitioning from low-fidelity prototypes to professional production. V1 utilised text-only assets to validate core mechanics. V2 introduced AI-generated imagery to add playful elements and foster player immersion. V3 used a production pipeline with three artists focusing sequentially on initial sketching, digital line art, and final colorisation and asset layout.

3.3 Sample

The MitiGate game was evaluated through 14 playtesting sessions involving a convenience sample of 129 participants across three game iterations. The total sample comprised university students, corporate trainees, PM experts, and SG experts. The cohort composition varied by iteration, and is presented in Table 1.

Table 1: Breakdown of the sample by iteration and participant group.

Groups	V1	V2	V3	Total
Corporate trainees	16	-	-	16
PhD students	2	-	8	10
BSc students	14	23	-	37
MSc students	-	16	35	51
PM Experts	-	12	-	12
SG Experts	-	3	-	3
Total	**32**	**54**	**43**	**129**

The testing procedure varied by group: university students engaged in the game following assigned preparatory reading on risk management; corporate participants received a 15-minute theoretical briefing; and experts jumped directly into gameplay without a theoretical introduction to test the game mechanics and content.

3.4 Data Collection and Analysis

Feedback was collected using a mixed-methods approach across the three iterations. During V1, players provided open-format feedback in post-game discussions, which was recorded in a test log. For V2 and V3, a structured online questionnaire was used to evaluate engagement, achievement of learning goals, and design adequacy. This instrument utilised 5-point numerical rating scales (1 = Disagree, 5 = Agree), single-select items for game elements, and open-ended questions for qualitative insights. The questionnaire is accessible at: https://forms.gle/rBZWQuwKsbN7y7xq6.

Feedback from SG experts was captured via audio and transcribed using an AI-assisted workflow (Gemini), with the resulting summaries manually verified and validated by participants to ensure accuracy.

Quantitative data collected via 5-point numerical rating scales were analysed using descriptive statistics (mean and standard deviation). To assess the potential impact of design refinements between V2 and V3, Welch's t-tests were conducted. Given the unequal sample sizes and the V3 response rate (30%, n=13), which introduces potential self-selection bias, these tests were framed as exploratory analyses to indicate design trends rather than definitive statistical proof ($p < 0.05$). Qualitative responses were pseudonymised, and content analysis was employed to identify recurring design issues and preferred game elements.

4. Results

4.1 Game Concept

A summary of the MitiGate game concept is structured as follows:

Idea: Players operate collaboratively as a project risk management team. As project progresses, unforeseen risks emerge that threaten key project objectives: scope, quality, schedule, and cost. The team must negotiate and deploy appropriate countermeasures to mitigate adverse impacts on project performance. The project fails, leading to cancellation, if the degradation of any single objective exceeds 25% of its baseline.

Serious Goal: The game is designed to facilitate experiential learning of the risk management lifecycle, focusing specifically on qualitative risk analysis, impact-probability assessment, and the mapping of risk severity to appropriate mitigation strategies.

Entertaining Goal: Players try to complete the project successfully through strategic collaboration and real-time negotiation. Engagement is supported by thematic content, realistic scenario trade-offs, and turn-based social interaction.

Genre and Interaction: A collaborative, turn-based strategy tabletop game for 2–4 players

Target Audience: Project management students in higher education and vocational training, as well as practitioners in corporate professional development.

Uniqueness: Unlike existing tools that focus primarily on initial risk identification, MitiGate emphasises the iterative nature of risk monitoring and control throughout the project lifecycle. Furthermore, it explicitly models the trade-offs between mitigation costs and their direct impacts across the four core project objectives.

4.2 Game Components

The MitiGate game has the following components:

- Game board with a risk impact-probability matrix, project objectives, and project timeline.
- 36 risk cards in 4 categories.
- 36 countermeasure cards in 4 categories.
- 5 game markers and 1 die.

Figure 2: Layout of the MitiGate game board (V3 - final product).

4.3 Game Rules

1. Deal 4 countermeasure cards to each player.
2. Take the top card from the risk deck and discuss the likelihood and impact of the risk. Place the risk on the appropriate spot in the probability-impact matrix. If the Risk is on the:
   - Blue square: no countermeasure card can be played (the risk must be accepted).
   - Yellow square: players decide whether to play a countermeasure card or not.
   - Red square: a countermeasure card must be played.
3. Each player can propose one countermeasure. Discuss which is best for the current risk. Place the chosen measure on the table in front of the player who proposed it.
4. Every countermeasure impacts the project's objectives. Move the markers on the objective bars according to the values on the card. Some measures depend on luck. If required, roll the die.
5. Roll the die to let chance decide if the risk happens:
   - Low probability risk occurs if you roll 1 or 2
   - High probability risk occurs if you roll 1 to 4.
6. If the risk occurs, move the markers on the objective bars based on the risk card values.
7. The player who used their countermeasure draws 2 new mitigation cards from the deck.
8. Move the marker one step forward on the project timeline.
9. The game continues by playing the next risk card.
10. The game is lost if any project objective drops 25% below planned (reaches the red zone).
11. The game is won if players successfully reach the end of the project.

4.4 Game Assets

The game assets underwent refinement across three iterations based on participant feedback. Figure 3 illustrates the evolution of the card design.

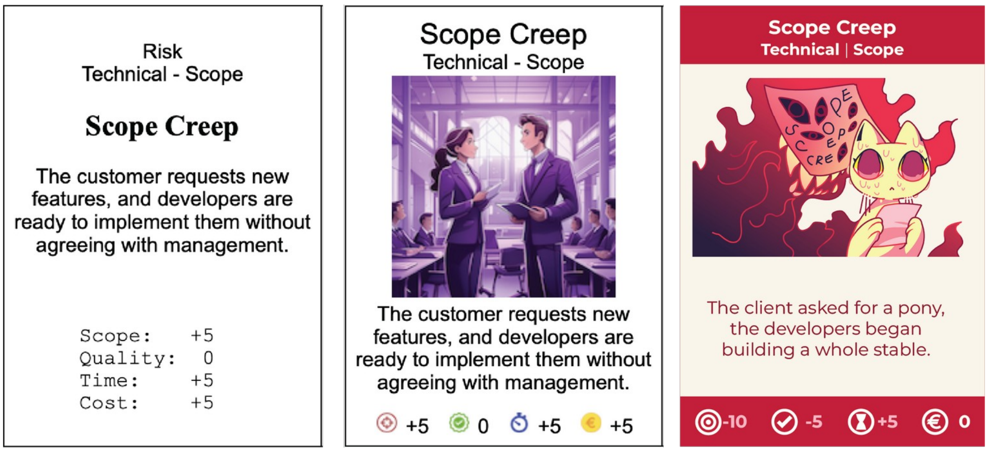

Figure 3: Evolution of the card design: V1 text only; V2 AI-generated art; V3 original art, updated content.

The game board and other mechanics have went through a similar evolution. In V1, the matrix was hand-drawn on paper; risk occurrence was determined by a coin flip. V2 had a printed 3x3 matrix; the coin was replaced by a 4-sided die (D4). V3 has a 2x2 matrix; replacing the D4 with a standard 6-sided die. The original 4-phase timeline was expanded into a 12-step progress board to allow for more granular interaction.

4.5 Player Feedback

Feedback from the first iteration indicated high engagement but highlighted mechanical imbalances, such as a binary 50:50 risk probability and "hand-lock" scenarios where players lacked suitable cards. In response, the countermeasure database was expanded with universal mitigations, and the probability mechanics were redesigned.

Feedback for subsequent versions was collected via an online questionnaire (V2: 87% response rate, n=47; V3: 30% response rate, n=13). Summary results are presented in Table 2.

Table 2: Players' average responses on feedback questions

Question	V2		V3		V3-V2 Differ	T-test p value
	Mean	StDv	Mean	StDv		
I'm satisfied with the overall game experience	4.36	0.673	4.31	0.947	-0.05	0.850
The game is engaging	4.28	0.852	4.69	1.109	0.42	0.228
The game makes the risk management process clear	3.96	0.908	4.38	0.650	0.43	0.067
The game makes the qualitative risk analysis clear	3.91	0.929	4.23	0.725	0.32	0.205
The game makes the risk impact on the objectives clear	4.28	0.743	4.38	0.768	0.11	0.656
The game makes the risk response planning clear	4.13	0.850	4.08	0.641	-0.05	0.817
The game instructions are clear	3.94	0.942	4.23	0.927	0.29	0.325
The winning condition is clear	4.26	1.073	4.46	0.967	0.21	0.514
The losing condition is clear	4.13	1.209	4.46	0.967	0.33	0.309
I would like to play this game again	4.15	0.780	4.77	0.599	0.62	0.005

Both versions scored high on engagement and educational alignment. Most metrics improved in V3, with an exploratory Welch's t-test indicating a significant increase in willingness to play again ($p = 0.005$). However, given the lower response rate in V3 and potential self-selection bias, these statistical differences represent preliminary trends rather than conclusive proof. Differences may also reflect variations in cohort composition across convenience samples.

Qualitative feedback from V2 informed several key changes in V3:

- Strategic vs. numeric play: To prevent players from simply matching card numbers, V3 introduced a narrative requirement: players must justify card use through a narrative explanation if questioned.
- Spatial constraints: The 3x3 matrix was streamlined to a 2x2 layout to free up physical space and simplify decision-making.
- Objective tracking: Inverse scales for time and cost versus scope and quality created cognitive friction. A unified "red zone" failure threshold was adopted for visual clarity.
- Collaborative balance: Despite requests for individual winners, the design remained fully collaborative to mirror real-world team dynamics.

Participants noted that the game visualised abstract risk management processes. As one player stated: “The game visualises the concepts… which was difficult to imagine when reading the book.” Overall, player evaluations suggest that game-based simulations can support classroom instruction by making theoretical frameworks more accessible through active peer discussion.

4.6 Experts’ Feedback

Feedback from SG experts focused on evaluating rule balance and social dynamics, leading to several refinements in V3:

- Risk-mitigation balance: Experts observed a "net loss" bias where risk impacts consistently outweighed mitigation benefits, particularly regarding project cost. Following their recommendations, the risk-countermeasure values were re-balanced across all four objectives.
- Avoiding dominant players: To prevent a single dominant player from controlling group decisions, experts suggested keeping card hands hidden. This was adopted in V3 to encourage individual participation and collaborative negotiation.
- Player agency: Suggestions to assign specific roles (e.g., scope manager) and rotate the responsibility of drawing risk cards were integrated to increase accountability.
- Rejection of conflicting suggestions: Some expert recommendations were intentionally declined to preserve educational alignment. For example, proposed visual changes separating risk names from impacts were rejected to keep players focused on standard risk assessment methodology.
- Self-facilitation: While a dedicated game master was recommended to manage gameplay, it was deemed impractical for large classroom settings. Instead, rules were clarified to allow self-facilitated play across multiple simultaneous groups.

5. Discussion

The transition to V3 revealed a core design paradox. By incorporating expert feedback to balance mitigation impacts against risk severity, the game became significantly easier to win. This creates a friction between educational realism and player motivation. Although real-world projects are notoriously "over budget and over time" (Flyvbjerg, 2017), the current MitiGate mechanics allow for idealised outcomes, such as finishing under budget or with increased scope. Whereas players reported higher satisfaction with this less punitive version, it raises questions regarding the emotional valence of learning. As Pekrun (1992) and Mustafina et al. (2020) suggest, positive emotions generally aid engagement, yet negative emotions—such as the frustration of project failure—can occasionally trigger deeper critical reflection. In MitiGate, the simulated environment allows these negative outcomes to be explored safely, though the current balance leans toward positive reinforcement.

A notable finding in V3 was the interpretation of the "positive side" of the objective scales. In traditional project management, an uncontrolled increase in scope is viewed as a failure (scope creep), yet within the game, players perceived it as a bonus. Although advanced balancing mechanics could address this, the current rules were maintained to avoid cognitive overload. This highlights a fundamental game-based learning tradeoff: prioritising rule clarity and flow over a 1:1 replication of professional constraints.

Uncertainty is often minimised in traditional instructional design, but MitiGate intentionally utilises it to reflect project realities. Applying Costikyan's (2013) framework, the game employs randomness (die roll) and hidden information (player hands). Feedback across iterations indicated that as probability mechanics were clarified, players accepted uncertainty as an essential project dynamic rather than a mechanical flaw.

Beyond technical risk management, player evaluations suggest that MitiGate provides a structured setting for fostering peer discussion and collaborative negotiation, which Dyet (2023) highlights as the most difficult competencies to coach. However, observed differences between V2 and V3 satisfaction metrics must be interpreted with caution, as variations in sample composition across iterations may influence player perceptions. Future research can examine how players navigate negotiation and risk trade-offs under uncertainty across different professional contexts.

6. Conclusion and Future Work

The development of MitiGate demonstrates that an iterative design process—incorporating feedback from students, corporate trainees, and experts—can transform abstract risk management concepts into an engaging collaborative exercise. Although the current version is optimised for classroom settings and rule clarity, its future application lies in two distinct pathways: as a standalone educational tool or as a facilitated training service. Whereas the game's viability in the commercial board game market requires further exploration, it shows clear utility as a specialised corporate training format.

To maintain gameplay clarity during initial prototyping, positive risks (opportunities) were excluded. Future iterations aim to integrate these elements to provide a broader perspective on risk management. While the current cards address general project and IT scenarios, future iterations could introduce domain-specific card decks designed for sectors such as construction, R&D, or heavy manufacturing.

Ultimately, evaluation results indicate that MitiGate provides a framework to support the transition from theoretical reading to active application, allowing learners to explore the iterative nature of project risk management in a collaborative environment.

7. Ethics Declaration

This study was conducted in accordance with ethical standards for research involving human participants. Participation across all playtesting sessions was voluntary and based on informed consent from adult stakeholders (university students, corporate trainees, and experts). No sensitive personal or demographic data were collected. Feedback collected via open-ended responses and audio transcripts was fully anonymised to ensure participant privacy. Under institutional guidelines, formal ethical approval was not required for this low-risk educational evaluation.

8. AI Declaration

During the preparation of this work, the author utilised Gemini to refine the academic writing style. Gemini was also used to generate summaries from audio transcriptions of expert feedback sessions. The resulting summaries were manually verified against the original recordings to ensure accuracy and contextual integrity. Additionally, Midjourney and DALL-E were used to generate temporary visual assets during the V2 prototyping phase. These AI-generated assets were fully replaced by original artwork in the final V3 iteration.

9. References

Adams, E. (2014). Fundamentals of Game Design. New Riders.

Amakama, N. J., Dusserre, G., Cadiere, A., Schuette, R. W., & Zacharewicz, G. (2024). How Effective are Tabletop Role-Playing (Serious) Games in Understanding and Validating the Predictive Capabilities of Disaster Response Agent-based Models? American Journal of Multidisciplinary Research and Innovation, 3(4), 49–61. https://doi.org/10.54536/ajmri.v3i4.2937

Bukvić, I. B., Buljubašić, I., & Ivić, M. (2020). Project management education in Croatia: A focus on the IT sector needs. Management - Journal of Contemporary Management Issues, 25(1), 255–278.

Costikyan, G. (2013). Uncertainty in Games. MIT Press.

Design-Based Research Collective. (2003) Design-Based Research: An Emerging Paradigm for Educational Inquiry. (2003). Educational Researcher, 32(1), 5–8. https://doi.org/10.3102/0013189X032001005

Dulin, S., Bredikhin, A., Bridges, N., Williams, L., Keisler, J., Russo, E., & Linkov, I. (2025). Civil works megaprojects: Cognitive biases and lessons for effective risk mitigation. Project Leadership and Society, 6, 100198. https://doi.org/10.1016/j.plas.2025.100198

Dyet, M. (2023). Tabletop Games for Training: Teaching Soft Skills to Game Development Students. https://creo.sae.edu.au/cgi/viewcontent.cgi?article=1019&context=staffscholarship

Edelson, D. C. (2002). Design Research: What We Learn When We Engage in Design. Journal of the Learning Sciences, 11(1), 105–121. https://doi.org/10.1207/S15327809JLS1101_4

Ewin, N., Luck, J., Chugh, R., & Jarvis, J. (2017). Rethinking project management education: a humanistic approach based on design thinking. Procedia Computer Science, 121, 503-510. https://doi.org/10.1016/j.procs.2017.11.067

Flyvbjerg, B. (2017). Introduction: The Iron Law of Megaproject Management. In B. Flyvbjerg (Ed.), The Oxford Handbook of Megaproject Management. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198732242.013.1

Forrest, S. A., Kubíková, M., & Macháč, J. (2022). Serious gaming in flood risk management. WIREs Water, 9(4), e1589. https://doi.org/10.1002/wat2.1589

Jääskä, E., & Aaltonen, K. (2022). Teachers' experiences of using game-based learning methods in project management higher education. Project Leadership and Society, 3, 100041. https://doi.org/10.1016/j.plas.2022.100041

Kleinke, D., & Kleinke, A. (2022). WARGAMING: A PRACTICAL AND AFFORDABLE APPROACH FOR STRATEGIC PLANNING. Proceedings of the International Annual Conference of the American Society for Engineering Management.

McGrath, J., & Košťálová, J. (2020). Project Management Trends and New Challenges 2020+. Univerzita Hradec Králové. https://doi.org/10.36689/uhk/hed/2020-01-061

Mustafina, R. F., Ilina, M. S., & Shcherbakova, I. A. (2020). Emotions and their Effect on Learning. Utopía y Praxis Latinoamericana: Revista Internacional de Filosofía Iberoamericana y Teoría Social, (Extra 7), 318–324.

Oliveira, C., Cintra, M. and Neto, F.M., (2013) Learning risk management in software projects with a serious game based on intelligent agents and fuzzy systems. In 8th conference of the European Society for Fuzzy Logic and Technology (EUSFLAT-13) (pp. 874-879). Atlantis Press. https://doi.org/10.2991/eusflat.2013.123

Paredes, C., & Ribeiro, P. (2018). Future Trends in Project Management. 2018 International Conference on Intelligent Systems (IS), 637–644. https://doi.org/10.1109/IS.2018.8710551

Pekrun, R. (1992). The Impact of Emotions on Learning and Achievement: Towards a Theory of Cognitive/Motivational Mediators. Applied Psychology, 41(4), 359–376. https://doi.org/10.1111/j.1464-0597.1992.tb00712.x

Project Management Institute. (2021). A Guide to the Project Management Body of Knowledge.

Reimann, P. (2011). Design-Based Research. In L. Markauskaite, P. Freebody, & J. Irwin (Eds), Methodological Choice and Design: Scholarship, Policy and Practice in Social and Educational Research (pp. 37–50). Springer Netherlands. https://doi.org/10.1007/978-90-481-8933-5_3

Ríos, I. de los, Cazorla, A., Díaz-Puente, J. M., & Yagüe, J. L. (2010). Project–based learning in engineering higher education: Two decades of teaching competences in real environments. Procedia - Social and Behavioral Sciences, Innovation and Creativity in Education, 2(2), 1368–1378. https://doi.org/10.1016/j.sbspro.2010.03.202

Solinska-Nowak, A., Magnuszewski, P., Curl, M., French, A., Keating, A., Mochizuki, J., Liu, W., Mechler, R., Kulakowska, M., & Jarzabek, L. (2018). An overview of serious games for disaster risk management – Prospects

and limitations for informing actions to arrest increasing risk. International Journal of Disaster Risk Reduction, 31, 1013–1029. https://doi.org/10.1016/j.ijdrr.2018.09.001
Sorbi, T., Getuli, V., Capone, P., & Rahimian, F. P. (2024). Agent-based simulation framework for enhanced construction site risk estimation and safety management. https://doi.org/10.36680/j.itcon.2024.054
Taillandier, F., & Adam, C. (2018). Games Ready to Use: A Serious Game for Teaching Natural Risk Management. Simulation & Gaming, 49(4), 441–470. https://doi.org/10.1177/1046878118770217
Tasantab, J. C., Gajendran, T., Owi, T., & Raju, E. (2021). Simulation-based learning in tertiary-level disaster risk management education: A class-room experiment. International Journal of Disaster Resilience in the Built Environment, 14(1), 21–39. https://doi.org/10.1108/IJDRBE-04-2021-0045
Özsoy, T., & Sezgili, K. (2024). Exploring the Current Practices and Future Directions in Project Management Education and Training. Sage Open, 14(1). https://doi.org/10.1177/21582440241236053
Xia, J. C., Caulfield, C., Baccarini, D., & Yeo, S. (2012). Simsoft: A game for teaching project risk management. https://www.roger-atkinson.id.au/tlf2012/refereed/xia.html