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Training a Product Owner with serious games

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Abstract. Agile methodologies are increasingly dominant in software development, focusing on collaboration, adaptability, and predictable progress by continuous iterations. Within Agile, the Product Owner (PO) plays a vital role in shaping the product vision, understanding stakeholder priorities, and continuous conversation with the development team. We deal with the problem of educating, or training, a Product Owner. Agile serious games offer effective training for novice POs through experiential learning. This paper aims to gather evidence on the PO's role, selecting and comparing popular serious games based on factors like time requirements, resource needs, incorporation of Agile rituals, targeted methodologies, and recommended participants. Data collection involves existing documentation, published materials, and firsthand accounts. Qualitative analysis reveals distinct game characteristics and suitability for Agile training.

Keywords: Agile, Product Owner, Digital Transformation, gamification, serious games

1 Introduction

The Agile vision has gained significant popularity in the software development industry due to its ability to include the user/customer in the development effort, adapting to changing requirements and delivering high-quality products efficiently. The Agile Manifesto [1] originated as an effort to embrace the increased frequency of changes in requirements in a more structured and explicit manner [2], [3]. Agile organizations report much better customer satisfaction, staff engagement, improved flexibility, and faster time-to-market [4], [5].

We're particularly interested in Agile's role in supporting the Digital Transformation of companies and public administrations [6]. The Product Owner's role, crucial for those not well-versed in software development, serves as the mediator between stakeholders and developers, emphasizing its political nature. Currently, we're teaching graduate students, not software experts, to take on the Product Owner role in digital transformation projects.

Serious games are valuable educational tools in our context, fostering technical skills, teamwork, and decision-making through experiential learning [7]. This paper comprehensively reviews existing Agile serious games, examining aspects like duration, participants, inventory, and the practical considerations of resource requirements and affordability.

Despite their benefits, serious games pose challenges, especially in tangible resources for sessions. Some games need significant inventories, like numerous LEGO bricks, presenting affordability and logistical hurdles. The financial accessibility of serious games and their ease of integration into educational programs are vital factors in determining their practical utility. Evaluating these aspects ensures selected games align with educational objectives and resource constraints, promoting widespread adoption and effectiveness.

2 Related Works

In recent years, the Product Owner role has surged in significance for companies navigating digital services and transformation projects. It's now pivotal for project triumph, enhancing product quality, hastening development, and boosting customer satisfaction.

The Product Owner steers a product's vision and strategy, sets priorities, and liaises with the development team, demanding an in-depth grasp of market trends, competitors, and customer expectations. Collaboration and tough decision-making are key to ensuring project success. Studying the Product Owner role must encompass diversity and inclusiveness, crucial for representing customer needs fairly and ensuring all team members contribute and feel valued.

This systematic review aims to outline a clear picture of the Product Owner's role, analyzing responsibilities and tasks, focusing primarily on the cross-cutting skills a Product Owner must possess and examining the value they bring to the software development environment.

The research methodology involves using the PRISMA method for systematic literature reviews [8]. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses, provides essential guidelines for reporting systematic reviews. It includes a flowchart and a checklist. The flowchart visually describes the screening, selection, and inclusion process of articles for the systematic review. The checklist consists of 27 points essential for transparently describing the secondary research study. The research utilized databases such as Google Scholar, Scopus, and ACM Digital Library.

Our study addressed the following research questions:

1. Who is the Product Owner in the context of software development?
2. What are serious games in the context of education and how can they be used to educate the Product Owner?

Each research question was translated into a query and queried the databases, following the procedures outlined in the PRISMA approach for each research question.

RQ1 For the first research question, the keywords queried across the three databases were: "Product Owner","Software", and "Product Manager". The RQ1 can be answered as follows: The Product Owner (PO) is a key role in

the Agile Scrum software development method, as it is unique in the team it operates in and holds many tasks and responsibilities crucial to the product's success [9]. Although this role does not actually own the product, it is tasked with maximizing its value by identifying goals and purposes, and handling business-related tasks representing stakeholders. It acts as an intermediary between the development team and external stakeholders, especially the business owner or end users [10]. The PO is responsible for defining the product vision[11], and manages the "Product Backlog" [12].

RQ2 Keywords "Serious games + product owner," "gamification of product owner education," "Agile serious games" were used. Agile serious games have garnered considerable attention in both academia and industry as innovative tools for imparting Agile concepts and practices in a dynamic and engaging manner. One of the key advantages of serious games is that they can adapt some game interaction techniques into educational process. [13] [14] Baumann's research [15] emphasizes the significance of game-based learning for teaching Agile methodologies. Furthermore, research by [16] reports on software development labs with a focus on Agile methodologies, emphasizing the value of hands-on experience in a risk-free academic setting, which contributes to the training of Product Owners and offers insights into the pedagogical value of experiential learning.

3 Method - Selection of Agile Serious Games

Five popular Agile serious games were carefully chosen for comparison, considering their widespread use in Agile training and their ability to address various facets of Agile methodologies. These games were identified through a thorough review of relevant literature on Agile serious games [17, 18]. The selection process prioritized the following criteria:

1. Methodology Replicability: The selected games had well-described methodologies, ensuring that they can be easily understood and replicated by others.
2. Empirical Evidence: Preference was given to games that were supported by empirical studies demonstrating their effectiveness.
3. Diversity of Methodologies: A range of software development methodologies beyond just SCRUM was considered to provide a comprehensive perspective.
4. Product Owner role. Since this is paper about Product Owner education, there should be devided role of the product owner or similar role

Scrumble. A board game based on the roles, events and artifacts of Scrum [19] with business user stories, which development team need to interpret using task dis-aggregation and random factors. The game has Product Owner, Scrum Master and 3-9 development team members. All players are in the same team. Over the game of the game, the team is challenged to solve problems despite random difficulties and the dangers of increasing technical debt. Daily meetings

are [20]. An educational context is added to the daily meetings with daily cards that talk about different Agile concepts, such as the rule for evaluating tasks in story points, why retrospectives are necessary.

Lego blocks. In the game participants are divided into three Scrum teams of 7-8 people, each with a dedicated Scrum Master. The Product Owner, played by the game leader, acts as a stereotypical business person, articulating business goals, and providing requirements for the project for all three teams. Teams work on a project called "Mushroom," aimed at developing an Antarctic exploration set comprising various components like a luxury cabin, sauna, helicopter, etc., with the goal of achieving the first General Availability Release (GA) after three iterations. The game involves phases of introduction, simulation, and reflection. The simulation game involves release planning, sprint iterations, daily scrums, demos, and retrospectives, simulating the Scrum process within a time-constrained environment. Participants learn about Scrum ceremonies, roles, requirements management, estimation, teamwork, and visualization of work and progress.[21]

Another simulation game, **SCRUMIA** [22], involves teams of six students assuming roles like Scrum Master, Product Owner, or team member. The game mimics Scrum activities, including sprint planning, execution, and review. Participants estimate story points, plan and execute tasks, and hold daily SCRUM meetings to track progress. Set in the context of attracting tourists to a fictional planet, SCRUMIA, teams produce paper products to maximize profit and happiness points as outlined in user stories. The Product Owner guides story definition, prioritizes features, and directs product development. Post-game, teams reflect on Scrum principles versus traditional project management methods in debriefing sessions, discussing how to apply their learnings in real-world scenarios.

Recently a new game called **DesignSCRUM**, which unites product design and product development was presented [23]. The game facilitator provides development teams with essential materials like stationery items, LEGO pieces, and predefined user stories represented on sticky notes, initiating a simulated Agile project management experience. Teams embark on a series of structured steps, starting with defining a creative sprint by empathizing with a persona and planning sprint approaches using techniques like the Business Model Canvas and Stakeholders map. Throughout the game, teams estimate sprint velocity, plan user stories, hold daily scrums to track progress, review sprint outcomes with the Product Owner, and conduct retrospectives to reflect on their performance. The Product Owner facilitates the sprint planning sessions, ensuring that user stories are well-understood and appropriately estimated using techniques like Planning Poker. Each sprint, with varying durations, introduces special situations to simulate real-world project scenarios, challenging teams to adapt and make informed decisions. During the sprint review, the Product Owner evaluates the completed work and determines which user stories meet the acceptance criteria for deployment.

Finally, the game, which realises Extreme Programming methodology was choose for this research. **Extreme Construction** is an agile methodology learning game that has remained relevant since its inception in 2005 and continues to be actual. Designed to impart agile values, principles, and Extreme Programming (XP) fundamentals, the game engages participants in immersive learning experiences, either in a full-day format or through multiple shorter sessions. Participants take on roles as customers, trackers, and developers, leveraging art and craft materials to build artifacts based on defined features outlined on story cards. Iterations, typically lasting 20 to 40 minutes. With a focus on learning from challenges and deviations in agile practices, Extreme Construction culminates in a retrospective session, fostering reflection and insights for continuous improvement. This game was used for selection procedure for applicant to the Bachelor degree in Innopolis University to assess the leadership and communication skills of the participants.[24]

3.1 Criteria for Comparison

The comparison of Agile serious games was based on several key criteria:

- **Time.** The estimated duration of each game session, including setup, gameplay, and debriefing.
- **Resources.** The materials and resources required to conduct each game, such as physical props, tools, or digital platforms.
- **Agile Rituals.** The extent to which each game incorporates and emphasizes Agile rituals and practices, such as sprint planning, daily stand-ups, or retrospectives.
- **Methodology.** The specific Agile methodology or principles targeted by each game, such as Scrum, Kanban, Extreme Programming, or Lean Startup.
- **Number of Participants.** The ideal or recommended number of participants for each game session to ensure effective engagement and interaction.
- **PO's responsibilities.** What Does a Product Owner do in the game? How many responsibilities?

3.2 Data Collection and analysis

Data for comparison were gathered from existing documentation, published materials, and firsthand accounts of facilitators and participants who had experience with the Agile serious games. This information included descriptions of gameplay, recommended setups, and insights into the learning outcomes and effectiveness of each game.

The collected data were analyzed qualitatively to identify patterns, differences, and similarities among the Agile serious games in terms of time requirements, resource needs, incorporation of Agile rituals, alignment with Agile methodologies, and suitability for different group sizes.

4 Results

The comparison of Agile serious games revealed substantial differences in terms of organizational complexity, educational focus, Agile practices covered, and Product Owner (PO) involvement. Table 1 summarizes the main characteristics of the analyzed games.

Table 1. Comparison of Agile Serious Games for Product Owner Education

Game	**Time Investment**	**Material**	**Agile Rituals**	**Method**	**People**	**PO resp.**
Scrumble	2–3 hours	Whiteboards, sticky notes, printed materials, dice	Sprint planning, backlog refinement, daily stand-ups, retrospectives	Scrum	5–11	Prioritize user stories, assign business value, clarify requirements
Lego Blocks	3–4 h	LEGO blocks, printed material	Sprint planning, daily Scrum meetings, sprint review, retrospectives	Scrum	21–24	Answer questions, validate increments, provide feedback
SCRUMIA	Approx. 3 h	Printed material, origami paper	Sprint planning, daily Scrum meetings, sprint review, retrospectives	Scrum	10–20	Select stories, prioritize work, accept completed features
Design Scrum	Approx. 3 h	LEGO blocks, sticky notes, stationery material	Product discovery, sprint planning, daily Scrum meetings, retrospectives	Scrum / Design Thinking	16–20	Define business model, prioritize stories, validate sprint outcomes
Extreme Construction	8 h or 3–4 sessions of 2 h	Construction paper, tape, glue, modelling clay, craft material	Iteration planning, daily coordination, retrospectives	Extreme Programming	20+	Create stories, assign business value, select features, validate results

Rather than defining a single quantitative ranking, we adopted a multidimensional qualitative evaluation approach. This choice was motivated by the heterogeneous nature of the observed characteristics: some factors describe pedagogical richness (e.g., Agile rituals and PO responsibilities), while others describe organizational constraints (e.g., duration, number of participants, and required materials). Aggregating such dimensions into a single numerical value would require arbitrary assumptions regarding weights and relative importance.

The analysis therefore focuses on four complementary dimensions that capture both the pedagogical value and the practical feasibility of the games in educational environments.

- **Educational richness**. This dimension evaluates the extent to which the game exposes participants to core Agile principles and practices. In particular, it considers the variety of Agile rituals represented in the activity, such as sprint planning, backlog refinement, daily stand-ups, sprint reviews, and retrospectives. Furthermore, this dimension examines the degree of Product Owner involvement, including responsibilities related to prioritization, stakeholder communication, backlog management, acceptance testing, and business value assessment. Games with a broader representation of Agile interactions and decision-making processes are considered educationally richer because they provide a more realistic simulation of Agile teamwork.
- **Organizational complexity**. This dimension estimates the effort required to organize and facilitate the game effectively. It includes the recommended number of participants, the number of facilitators or instructors needed, and the coordination effort necessary to manage the activity. Games involving multiple teams, role rotations, or synchronized Agile ceremonies generally require more preparation and facilitation skills. Organizational complexity is particularly relevant in academic settings where class size, available teaching staff, and time constraints may limit the applicability of certain games.
- **Material requirements**. This dimension considers the quantity, cost, and specificity of the physical or digital resources required to conduct the activity. Some games rely only on lightweight materials such as sticky notes, printed cards, or whiteboards, while others require larger inventories including LEGO blocks, construction materials, or dedicated game kits. The analysis also considers the reusability and portability of the materials, since these factors may influence the affordability and scalability of the game in educational programs with limited budgets.
- **Time investment**. This dimension evaluates the total duration needed to conduct the game effectively, including setup, gameplay, facilitation, and debriefing activities. Agile serious games differ significantly in duration, ranging from short classroom exercises to full-day workshops. Longer activities may provide deeper immersion and richer learning experiences, but they also require greater scheduling flexibility and participant commitment. The debriefing phase is considered especially important because it allows participants to reflect on their decisions, connect gameplay events with Agile principles, and consolidate the acquired knowledge.

From an educational perspective, all analyzed games simulate core Agile principles such as iterative development, collaboration, planning, and feedback cycles. However, they differ significantly in the degree to which the Product Owner role is emphasized.

Scrumble provides a relatively balanced environment where the PO actively prioritizes user stories and assigns business value. The game explicitly incorpo-

rates several Scrum rituals, including sprint planning, backlog grooming, and daily stand-ups, making it suitable for introducing Agile coordination practices.

Lego Blocks strongly emphasizes teamwork and Scrum ceremonies through a large-scale simulation involving multiple teams. The PO role is present but comparatively centralized, since it is typically played by the facilitator acting as a business stakeholder.

SCRUMIA offers a more structured educational setting in which participants rotate across Scrum roles. The game highlights sprint planning, execution, and retrospectives while maintaining a moderate organizational complexity.

DesignScrum extends the traditional Scrum focus by integrating product discovery and design-oriented activities such as personas, stakeholder analysis, and business model definition. This broadens the scope of the Product Owner responsibilities beyond backlog management alone.

Extreme Construction differs from the other games because it is based on Extreme Programming rather than Scrum. Although the Product Owner role is less explicitly formalized, the game strongly emphasizes customer collaboration, iterative feedback, and collective decision making. Furthermore, its flexibility in session duration and relatively low material cost make it easier to adapt to different educational contexts.

Overall, no single game can be considered universally superior. The selection of an Agile serious game depends on the educational goals, available resources, participant background, and desired emphasis on the Product Owner role. Games such as Scrumble and SCRUMIA are particularly appropriate for introducing Scrum practices and PO responsibilities, whereas DesignScrum is more suitable when product discovery and innovation aspects are relevant. Extreme Construction appears especially effective in contexts where accessibility, adaptability, and experiential learning are prioritized.

4.1 Limitations

The comparison presented in this study is based on published materials, available documentation, and facilitator reports rather than direct controlled experimentation. Consequently, some gameplay variations and contextual nuances may not be fully captured.

Moreover, educational effectiveness depends on several external factors, including facilitator expertise, participant engagement, prior Agile knowledge, and organizational setting. Future work should therefore include empirical classroom studies and controlled experiments to assess learning outcomes more systematically.

5 Conclusion

The games we've examined offer unique features tailored to various learning environments and objectives, especially concerning the Product Owner (PO) role.

Among these games, Extreme Construction offers a good trade-off accessibility vs. efficiency, thanks to its balanced mix of roles, rituals, affordability, and comprehensive integration of agile practices. However, the choice of games depends on factors like learning objectives, target audience, and available resources. Other games like SCRUMBLE offer distinct benefits, such as real-life tasks: Develop an IT service for travel agency.

We remark that we have also explored a GQM framework for self-evaluation in agile games [25].

Integrating agile learning games into education can greatly enhance the skills of future Product Owners. These games provide immersive experiences mirroring real-world scenarios, allowing participants to practice essential responsibilities and decision-making processes.

In conclusion, while evaluating flexible learning games has offered valuable insights, future research should prioritize experiments to further test their impact on learning outcomes. Controlled experiments with different participant groups can provide more convincing evidence of games' effectiveness in teaching flexible methodologies and developing necessary skills.

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