

From Boring Tests to Engaging Adventures: A Game-Based Learning Approach in LMS

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Abstract: The paper explores a game-based approach to language placement tests within Learning Management Systems (LMS), addressing issues of incorrect course placement and student disengagement. By gamifying assessments, the initiative aims to create a motivational and playful environment that accurately estimates students' language skills. The game design is guided by player type models and motivational frameworks, ensuring an engaging experience that caters to diverse player motivations. The game, "Journey to Mars," is set in a science fiction environment and uses multimedia elements and interactive modules to integrate educational content seamlessly. Methods for game analysis were adopted to create a gamified placement test in three steps. First, we adopted the basic game structure from the goals of the placement test. Second, we created plot points and settings and derived certain style and interface elements to create a coherent gaming environment. Third, we enriched the gaming experience with additional elements like badges and secret elements. The development process involved utilizing the ILIAS LMS tools, generative AI for content creation, and implementing progressive difficulty and feedback systems to enhance the educational value. Initial feedback indicates positive engagement and motivation among students.

Keywords: Game-Based Learning, Language Placement Tests, Design Principles, Player Motivations, Self-Determination Theory, ILIAS LMS

1. Introduction

In the realm of educational technology, the challenge of maintaining student engagement and accurately assessing competencies is ever-present. This paper presents an innovative approach to addressing these issues through gamification within Learning Management Systems (LMS). The primary objective of the project, "Journey to Mars," was to transform the mundane process of language placement tests into an engaging and motivational experience. The goal of the language center at Wismar University and the author was to create a game-based environment that not only accurately assesses students' language skills but also enhances their intrinsic motivation to participate. Initially, students were often enrolled in incorrect courses, lacking the necessary skills to succeed. To address this, we aimed to ensure that students were placed in appropriate courses and motivated to participate in an assessment that accurately estimated their language skills, leading to the idea of gamifying the assessment process. Our initiative also prompted us to explore practical methods for assessing competencies. We focused on the player experience, ensuring that every game element enhanced engagement and motivation. But at first, there was a simple and important question: *How can we build a good game?*

2. Players & Motivations as Starting Point to Create the Game

To design an engaging game, we first needed to understand the various types of players and their motivations. We drew from established player type models to guide our design decisions. Bartle's model identifies four distinct player types:

- *Achievers:* These players are driven by the need to achieve and succeed within the game. They enjoy earning points, completing tasks, and collecting rewards.
- *Explorers:* These players are motivated by the desire to explore the game world. They take pleasure in discovering new areas, uncovering secrets, and learning about the game's mechanics.
- *Socializers:* These players thrive on interaction with other players. They enjoy forming relationships, collaborating, and engaging in social activities within the game.
- *Killers:* These players seek competition and dominance over others. They find satisfaction in defeating opponents and asserting their superiority (Bartle 1996).

In addition to Bartle's model, Aarseth introduced the concept of the Cheater, a player who finds ways to bend or break the game's rules to their advantage (Aarseth, 2003). This concept is essential for understanding how to design a game that is both engaging and fair. Yee's framework provides a more extended understanding of player motivations by categorizing them into three main areas: Achievement, Social, and Immersion (Yee 2007). *Achievement* encompasses players who are driven by a desire for progression and success within the game. These players are motivated by several factors:

- **Advancement:** These players seek to improve their character's power, capabilities, and status, constantly striving to reach new levels and milestones.
- **Mechanics:** They enjoy understanding and mastering the game's systems and rules. These players take pleasure in figuring out the underlying mechanics and optimizing their strategies to succeed.
- **Competition:** Driven by a desire to compete and excel against others, these players thrive in competitive environments where they can measure their skills against those of other players (Yee 2007, 5).

Social motivations focus on the interaction and relationships formed within the game. This category includes players who:

- **Socializing:** Value the social aspect of games, enjoying interactions and conversations with other players. These players often engage in the game to meet new people and form connections.
- **Relationship:** Seek to develop meaningful connections with other players. They are motivated by building friendships and alliances, finding deeper personal fulfillment through these relationships.
- **Teamwork:** Enjoy working collaboratively to achieve common goals. These players find satisfaction in being part of a team, working together to overcome challenges and succeed collectively (Yee 2007, 6).

Immersion involves players who seek to become deeply engrossed in the game world and narrative. This category includes players who:

- **Discovery:** Love exploring the game world and uncovering its secrets. These players are motivated by the thrill of finding new areas, hidden items, and understanding the game's lore.
- **Role-Playing:** Enjoy creating and inhabiting characters within the game's narrative. They immerse themselves in their roles, crafting detailed backstories and personalities for their characters.
- **Customization:** Seek to personalize their gaming experience, tailoring characters and environments to their preferences. These players take pleasure in customizing every aspect of their gameplay to reflect their individuality.
- **Escapism:** Use the game as a way to escape from real life, immersing themselves in an alternate reality. They find solace and enjoyment in being able to step away from everyday stresses and into the game world (Yee 2007, 6).

By leveraging Yee's comprehensive framework, we were able to design a game that catered to a wide range of player motivations. This approach ensured that our game could engage and motivate players through various avenues, enhancing both the educational and entertainment value of the placement tests.

Secondly, we examined the basic motivational needs for humans to effectively link the gaming experience to our primary didactical goal: the placement tests. To achieve this, we grounded our design in the Self-Determination Theory (Ryan and Deci, 2000), which outlines three fundamental psychological needs.

- **Autonomy:** Players are given the freedom to explore and uncover secrets within the game's open spaces. This freedom empowers players to make choices and take control of their gaming experience, fostering a sense of independence and personal agency.
- **Competence:** To solve in-game mysteries and progress, players must demonstrate mastery of the English language. This requirement ensures that players feel a sense of accomplishment and efficacy as they overcome challenges and achieve their goals within the game.
- **Relatedness:** The inclusion of videos and AI-generated voices adds authenticity to characters, creating a solo experience enriched with parasocial interactions. These interactions help players feel connected to the game world and its characters, fulfilling the need for social connection and belonging.

There is a clear connection between player types and the motivational needs outlined in Self-Determination Theory. Players driven by Achievement are satisfied by demonstrating their skills and progressing in the game, fulfilling their need for competence. Those who seek Immersion enjoy exploring and making choices, meeting their need for autonomy. Players motivated by social interactions find a sense of Relatedness through the game's parasocial interactions and character-driven narratives, addressing their social needs.

Combining these insights with the goals of a language-oriented placement test, we integrated several key elements into our game design:

- **Difficulty Levels:** Adjust the game's difficulty based on player performance to keep challenges stimulating yet not frustrating. This ensures a balanced experience that matches the player's abilities,

following the Flow Concept (Kahyaoğlu Erdoğan & Kurt 2023, 4; Pan & Ke 2023, 463). It also matches the design of the placement tests with progressive difficulty levels.

- Story-Driven Quests: Require players to use their language skills to progress, seamlessly integrating educational goals and mechanisms with game mechanics that enable a sense of gamefulness (Gui et al. 2023, 6)
- Feedback: Provide detailed feedback on player performance and opportunities for reflection, helping players understand their progress and areas for improvement (Kahyaoğlu Erdoğan & Kurt 2023, 3)

By incorporating these elements, we aimed to create a game that is both engaging and educational, motivating players to enhance their language skills through an immersive and interactive experience.

3. Design Principles for Creating the Game

Aarseth (2007) identifies three key components of game design that informed our approach: gameplay, game structure, and the game world. *Gameplay* includes the players' actions, strategies, and motives within the game, shaping their overall experience. *Game structure* involves the rules of the game, including the simulation rules, ensuring consistency and fairness in the game mechanics. The *game world* encompasses the fictional content, topology/level design, textures, and overall aesthetics of the game, creating the immersive environment where the gameplay takes place. We've also included the conception of five levels of game design elements, which include similar elements like game design patterns and mechanics, game interface patterns and game design principles and heuristics (Deterding et al. 2011). To create a game, we've adapted these models that were designed for analysis. These were used to create basic design principles for the gaming environment.

3.1 From Goals to Basic Game Structures

Due to the limitations imposed by the ILIAS platform, our development process began with establishing the game structure. The starting point was the existing assessments and their associated goals, which provided a foundational framework for our game design. Creating the underlying structure of the game involved the use of game design patterns and mechanics. These elements dictate how the game operates, including its rules, challenges, and player interactions. Given the constraints of the ILIAS LMS, we focused on implementing simple yet effective mechanics that could be supported by the available tools.

To create prototype structures, we utilized several key elements within the Learning Management System to support a gameful design. These elements were integral to the development of our game, "Journey to Mars," providing a structured yet flexible framework for implementing engaging and educational content. By leveraging the existing features of ILIAS, we were able to craft a game environment that not only met our educational objectives but also provided an immersive and enjoyable experience for the players.

- *Learning modules* were an obvious choice for segmenting the chapters and sections of the game. They allowed us to organize content systematically, ensuring a coherent flow of information. These modules support the inclusion of various multimedia and interactive elements, enhancing the immersive experience. We leveraged the ability to link different learning modules to create multiple paths in the game, offering players a sense of autonomy and choice. Additionally, applying a consistent visual style across all modules helped maintain a coherent gaming experience, making the game visually appealing and engaging.
- To establish a distinct style and bring the game world to life, we implemented *text, pictures, audio, and videos*. These multimedia components supported our story-based approach, turning the game into a visually rich narrative. In its initial version, this approach gave the game the feel of a visual novel, providing a strong foundation for the evolving game design.
- To incorporate point-and-click game mechanics, we used *interactive pictures*. This choice was crucial for creating an engaging gaming environment. Interactive pictures served as a main element, reminiscent of classic point-and-click adventures. Players could click on objects to open boxes with additional information, media, and links to placement tests.
- *Tests* were used to evaluate the competencies of the students and track their learning progress. These tests provided automated control and immediate feedback to students, enhancing their learning experience. We also incorporated generated audio files to assess listening and comprehension skills, adding another dimension to the language evaluation process.
- *Badges* were implemented as rewards for certain achievements in the game, motivating students to engage and perform well. We differentiated between performance-based badges, which required

students to accomplish specific tests, and more gameful badges that rewarded exploration of game secrets. This system was inspired by popular games with similar rewarding mechanisms. The badges were designed in the reddish Martian style of the learning modules, ensuring visual coherence.

By limiting ourselves to these fundamental elements, we were able to create a feasible and engaging game: a point-and-click adventure where players encounter various situations requiring a certain level of language skills. This approach allowed us to focus on enhancing the learning experience through game-based elements, effectively integrating educational objectives with engaging gameplay.

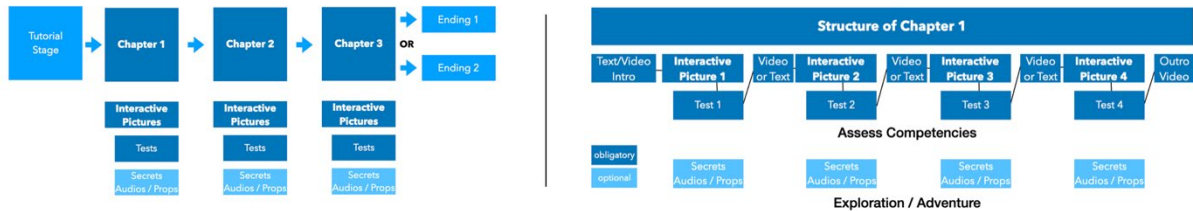


Figure 1: Left side: Structure of the whole game. Right side: Structure of chapter 1 and its elements

3.2 From Structure to Style

Next, we focused on the game world and the overall style of the game. Inspired by the title "Journey to Mars," we chose a science fiction setting. This decision allowed us to incorporate futuristic elements into the plot, such as robots, super intelligence, and routine space tours to Mars. These thematic choices not only shaped the storyline but also influenced the design of the user interface. Game interface design patterns involve the visual and interactive elements that players interact with directly. In the context of ILIAS LMS, this meant utilizing existing interface components to create a cohesive and engaging user interface that mimicked traditional game interfaces. The interface needed to be intuitive and appealing, enhancing the immersive experience of the game.

To align with the Martian setting, we designed interactive elements in a reddish-orange color scheme through the theming options of ILIAS LMS. This color choice not only evoked the iconic Martian landscape but also served a functional purpose as a highlighting element. These interaction indicators were strategically used to guide players through the game, making it easier for them to navigate and interact with the game world (Fromme & Könitz 2014; Könitz 2022).

3.3 Using Useful Addons to Deepen the Gaming Experience

To further enhance player engagement and motivation, we incorporated several additional design elements. Reward systems, such as badges and in-game secrets, were implemented to recognize and celebrate player achievements, drawing on the principles of gamification and the positive effects of rewarding systems in gaming experiences. This also potentially leads to a reduction of cognitive load (Kahyaoğlu Erdoğan & Kurt 2023, 5).

By integrating these design principles and frameworks, we were able to navigate the limitations of the ILIAS LMS and create a game that effectively engaged students and enhanced their learning experience. It turned out that the LMS was the most limiting factor for the game creation process. To accelerate the creation process, we adopted a pragmatic approach:

- **Keeping it Simple:** By focusing on simplicity, we were able to create a functional and engaging game without overcomplicating the design. This approach ensured that we could work within the constraints of the ILIAS LMS.
- **Using Common ILIAS Tools:** We made the most of the existing tools and features available within the ILIAS LMS. This included leveraging learning modules, interactive pictures, and multimedia elements to create a rich gaming experience.
- **Utilizing Generative AI:** Wherever possible, we used generative AI to enhance our content. This included creating images, dialogues, and voiceovers, which significantly streamlined the content creation process.

4. Creating the Game

We set a time limit of two weeks for the development of the first prototype. This tight timeframe forced us to prioritize essential features and make quick decisions, leading to a focused and efficient development process.

The result was a prototype that, despite the limitations of the LMS, offered a compelling and engaging game-based learning experience. To realize this prototype we've used a three step approach.

The development of our game followed a three-step approach:

1. *Creating a Story-Based Environment*: We transformed existing English assessments into engaging plot points, using ChatGPT to craft immersive dialogues.
2. *Extending the Experience*: We enriched the game with multimedia elements, including AI-generated images and voiceovers, to enhance the narrative.
3. *Incorporating Freedom and Playfulness*: We added interactive backstories and alternative endings to strengthen player autonomy and replayability.

4.1 First Step: Creating a Story-Based Environment Using ILIAS Learning Modules

We began our journey by transforming an existing English assessment into engaging plot points for our story. Therefore, the resulting game is a relatively pure game of progression (Juul 2005). Leveraging the capabilities of ChatGPT, we crafted the first chapter with coherent and immersive dialogues. The narrative was designed to be relatable and engaging: a man on Earth wants to visit his childhood girlfriend on Mars, but it seems that his memories are being manipulated by an AI named Aurora, which is controlled by a secret syndicate.

The game's structure was aligned with the three achievable competence levels of the placement tests from the language center. Consequently, the game was divided into three chapters, each incorporating four tests. These chapters were set in three main environments: the first chapter at the Spaceport, the second chapter aboard a spaceship, and the third chapter upon arrival on Mars. To transform an existing English test into an engaging game, we converted test questions and content into plot points. Using ChatGPT, we developed coherent dialogues that seamlessly integrated educational content into the storyline. This approach ensured that the educational objectives were met while maintaining an engaging narrative. With this in mind, this type of game can be classified as an educational game. It seeks to balance playful accessibility with a didactic goal (Wechselberger 2012).

Next, we addressed the technical constraints of the ILIAS LMS, which lacks explicit game elements. To navigate these limitations, we used learning modules for navigation and effortlessly integrated text, picture and audio elements. The interactive picture tool was crucial in allowing free exploration, a staple of point-and-click adventure games. This tool enabled players to click on objects within pictures to reveal additional information, media, and links to assessments, thus creating an interactive and engaging environment.

The basic structure of the game was consistent across all chapters, each containing four situations to explore. These situations included an introductory sequence that familiarized the player with the new setting, providing context and setting the stage for the challenges ahead. Each chapter had four explorable areas accessible through interactive pictures. These areas led to smaller assessments, and object descriptions for certain elements, enriching the gameplay experience.

4.2 Second Step: Extending the Experience Through Interactive Multimedia Elements

To give the game more personality, we infused the main protagonist with a distinct character by inserting ironic options about certain objects in the game. This element drew inspiration from classic point-and-click adventures that our team had played, demonstrating that personal gaming experiences and genre knowledge can be valuable starting points for enhancing the gaming experience. We extended the multimedia content by using various AI tools and creative methods. ChatGPT was employed to further outline the story, ensuring coherent and engaging dialogues. DALL-E was used to generate images that visually enriched the game environment, while ElevenLabs provided diverse voiceovers to add depth to the characters. Videos were produced by combining these generated images and sounds, resulting in immersive multimedia content.

In this second phase, we also revised the initial questions to better align with the storyline. The questions were integrated seamlessly into the plot, enhancing the educational aspect of the game without disrupting the narrative flow. The heavy use of generative AI allowed us to implement AI-generated audio files for these questions, assessing listening and comprehension skills in an engaging manner.

4.3 Third Step: Including More Freedom and Playfulness

Our goal was to strengthen the players' sense of autonomy and exploration. To achieve this, we used generative AI to create a backstory hidden within the interactive pictures. Embedded audio files were chosen to further immerse the players and to enhance their listening and comprehension skills. This approach not only made the game more engaging but also provided additional layers of narrative depth.

We leveraged the concept of Ludoliteracy (Zagal 2011) to create a more immersive game world. Ludoliteracy refers to the ability to understand and appreciate games as complex, rule-based systems. By applying this concept, we aimed to design a game that not only entertained but also educated players on how games function and how to engage with them meaningfully. The third stage of development was heavily influenced by our collective knowledge and experience with games. We recognized that visual novels can be highly immersive. For example, the game "Steins;Gate" demonstrated how a simple gameplay structure with minimal gaming elements could still offer a deeply engaging experience. Inspired by this, we initially created a visual novel using generative AI, which allowed us to produce the game content quickly and efficiently. As the development progressed, we integrated more playful elements familiar from classic LucasArts adventures and the Broken Sword series. The main character was given an ironic perspective on the game world, which helped to strengthen the player's relatability and immersion. This ironic viewpoint provided humor and depth, making the game world feel more alive and engaging. Ultimately, we implemented an alternative ending, a feature known from adventure games like "Blade Runner," offering players choices in how the adventure concludes. This addition not only increased the replayability of the game but also allowed players to feel a greater sense of control over their gaming experience. By providing multiple potential outcomes, we encouraged players to explore different paths and decisions, thereby enhancing their engagement and investment in the game.

Through these efforts, we aimed to create a game that was not only educational but also enjoyable and immersive. By incorporating elements of autonomy, exploration, and player choice, we developed a rich gaming environment that effectively motivated students and enriched their learning experience.

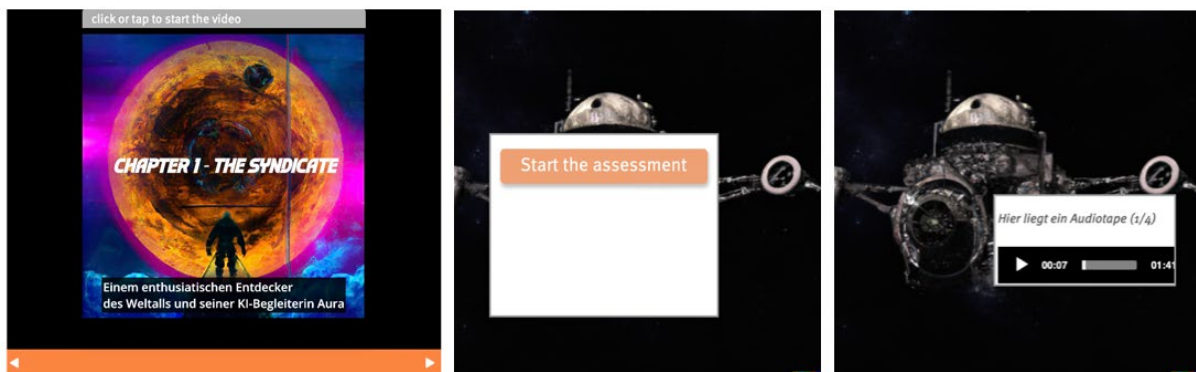


Figure 2: Left side: An English-speaking video with German subtitles in an ILIAS learning module. Middle & right side: An interactive scene with a link to an assessment and a hidden audio-file.

5. Conclusion and Outlook

Our project successfully integrated game-based elements into the ILIAS LMS, demonstrating a positive impact on student engagement and learning motivation. Initial feedback from a small group of students who tested the first version of the game was largely positive. They found the setting relatable and engaging, which validated our narrative and design choices. However, we encountered technical issues, particularly with varying screen sizes, which affected the user experience. Additionally, the login process for ILIAS proved to be a technical barrier for some students, highlighting an area for improvement in future iterations.

Looking ahead, we plan to build on this foundation by developing further chapters and expanding the content. This expansion will not only cover more advanced topics within the current subject but also extend to other subjects and tests, making the game a versatile tool across different areas of study. We recognize the need for a more adaptive design to overcome the current limitations of the ILIAS platform. Future versions of the game will incorporate better adaptive features, ensuring a seamless and flexible user experience regardless of the device or screen size. Accessibility options are also a priority. We aim to ensure the game is accessible to players with diverse needs and preferences, including adjustable difficulty levels and customizable controls. This will make

the game more inclusive, allowing a wider range of students to benefit from its educational content. By providing these options, we can cater to different learning styles and abilities, making the educational experience as effective and enjoyable as possible for all students.



Figure 3: Left side: AI generated picture of the main protagonist in the game. Middle & right side: reworked images of the future character selection to implement light RPG-elements.

Enhancing dynamic storytelling is another key focus. We plan to create a narrative path system that adapts to the player's choices, making each playthrough unique and personalized. This could involve integrating light RPG elements, such as character choices, which would deepen the engagement and personalization of the gaming experience. By allowing players to influence the storyline and outcomes, we can increase their investment in the game and their motivation to continue playing and learning. Additionally, personalized learning paths will be further developed. These paths will allow players to choose their own challenges and directions based on their interests and proficiency levels. This approach enhances their sense of autonomy and competence, key motivational factors that contribute to a deeper engagement with the learning material. Personalized learning paths ensure that each student can progress at their own pace and focus on areas where they need the most improvement, leading to a more effective and satisfying learning experience. A broader rollout of the game to all students is essential for gathering more comprehensive data through quantitative analysis. This will help us refine the game based on a larger dataset, ensuring it meets the needs and preferences of a wider student audience. Finally, we intend to connect the game with the competency management system implemented in ILIAS. This integration will allow us to track student progress more effectively, aligning the game outcomes with academic performance metrics and providing a more holistic view of student development.

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