Gamification Design: Learning Management System

Anita Knox
anita.Knox@my.unt.edu

Learning Technologies
University of North Texas, USA

Abstract: The appeal of video games for entertainment can be harnessed to learning interventions with gamification. Research indicates that gamification not only motivates but adapting the enjoyment of game play to learning can foster performance. To reap the benefits game mechanics should align with learning objectives. The body of research is limited on empirical studies for gamification design. Morschheuser et al. (2018) presented research for a framework that included project preparation, context and user analysis, ideation, design and implementation. This process was exemplified in a use case for gamification of a learning management system.

Introduction

Video games as entertainment attract players of all ages. Corporate and educational organizations have a growing interest in harnessing that video game appeal for learning interventions. Emerging techniques include game-based learning and gamification. Although this paper focuses on gamification, past research tends to intertwine definitions, making it difficult to understand practical uses. Each include a video game feel, and have some common benefits, however, there are differences. Turner et al. (2018) referenced game-based learning as the design of games for the purpose of learning. It is the intertwining of learning theory and video games (Roodt & Ryklief, 2019). This may be digital, using technology like the internet or mobile devices and incorporating a multimedia experience, or traditional using physical objects like a board game. A common definition of gamification is to use game-like elements in a non-game context (Landers & Armstrong, 2015; Su, 2015; Fui-Hoon). Gamification includes game-related design elements, or features, to enhance the user experience in a non-game context (Gunwan & Jupiter, 2018). This includes game elements, thinking, design and mechanics (Jayalath & Esichaikul, 2016). Gamification has been used in industries such as marketing, fitness and healthcare for years, eventually finding a place in education. Both game-based learning and gamification incorporate mechanics similar to video games; however, appropriate use of each technique varies. Game-based experiences are the end

product which presents multimedia content incorporating audio, visuals, animation and interactive challenges. Gamification is not the end product, but an add-on to an existing product (Landers et al., 2018). Meaning mechanics can be layered on to existing learning materials to aid in achieving goals.

Gamification is not meant to be a new way to teach a subject but a way to drive the achievement of learning goals (Coccoli et al., 2015). Typical benefits for integrating gamification are improved motivation and an engaging feel (Landers & Armstrong, 2015). Adopting the enjoyment of game-like design principles into a learning context can foster performance (Fui-Hoon et al., 2019). Since having fun can influence the time spent with the learning content (Su, 2015).

Applying sound design principles present opportunities to bridge the positive aspects of game interaction with learning outcomes (Fui-Hoon Nah et al., 2019). Feature selection and integration must be appropriate for the audience, available technology, and learning content. The design of gamification can influence the success or failure in achieving goals (Kim, 2021). The challenge is research lacks in providing design and implementation guidelines (Morschheuser et al., 2018). This paper addresses a framework used to design a gamification experience for a corporate learning portal. The methodology discussed was presented in research by Morschheuser et al. (2018). The use case exemplifies how gamification can be designed for a learning management system and accommodate a complex range of goals.

Design framework

Morschheuser et al. (2018) surveyed gamification experts to identify best practices for gamification design and implementation. The resulting methodology included project preparation, context and user analysis, ideation, design and implementation.

Project preparation is an opportunity to set goals, clarify objectives, and develop the project plan. This provides a framework for aligning learning goals with game mechanics and establishes a baseline measurement for the gamification integration (Morschheuser et al., 2018). Goals should focus on motivational challenges, and user needs that gamification will address (Morschheuser et al., 2018).

Analyzing the context should include an understanding of business processes that gamification will affect. Analyzing the target user group includes characteristics and typical behaviors. Understanding the context assists with where and when to implement components to better assist the user (Morschheuser et al., 2018). The actual design process begins with ideation, a brainstorming process, used to identify potential ideas for accomplishing the learning goals. This includes identifying potential gamification mechanics that align with goals.

Morschheuser et al. (2018) discussed the design phase as an opportunity to develop prototypes to better evaluate ideas generated in ideation. It is essential to note this step must consider the behaviors of the target user to determine the feasibility of the design, and consider resources needed for gamification integration. Integration failures happen when key stakeholders are not included in the planning process (Morschheuser et al., 2018). Resources may consist of technology, subject matter experts, and visual designers. Finally, design implementation includes development, technology integration, and testing. Gamification can be released and monitored for functionality and achievement of goals upon successful testing and updating.

Use Case

Qlik is known for offering self-service data visualization products, with a full-service cloud offering, and data integration products. Vast amounts of training materials have been developed to enable users and support ongoing growth of Qlik products. A new corporate learning portal was implemented, to support partner, customer, and team development for data visualization products. The portal serves as a central repository, pulling together asynchronous video-based training, instructor-led, webinars, assessments, certifications, and academic program learning. In addition, features were added offering guided learning paths, and personalized learning, as well as directions for self-management of individual and corporate accounts. The portal was a solution for organizing large amounts of content, bringing together multiple programs, and personalizing the learning experience. Although it succeeded in addressing all of this, new challenges surfaced. Users were not exploring the portal or watching instructional videos; instead, they would frustrate easily and submit help desk tickets. Features designed to improve the learning experience were not being used, and overall, the portal started receiving less activity than expected. The solution was to layer on gamification to generate excitement about learning and encourage exploration into portal features. Project stakeholders representing each area affected met to work through the design process.

The methodology studied by Morschheuser et al. (2018) of project preparation, context and user analysis, ideation, design was applied to design the gamification experience. This design served as a guide for the final step of implementation.

Project preparation

The primary goal was to increase adoption of the learning portal, training products and ultimately enable users on data visualization products. Supporting goals for the gamification intervention are to motivate learners to reach their goals and continue to participate in ongoing learning. In addition, gamification needs to reduce help desk tickets by promoting self-exploration. Based on the goals desired user behaviors were identified and grouped by portal tasks and learning tasks.

Portal related behaviors:

- Independently explore the portal.

- Commit to a learning path (guided or personalized).

- Visit the portal regularly (weekly or monthly).

- Watch directional videos to learn about portal features.

- Self-service account management.

Learning related behaviors:

- Participate in skills assessments to determine training that is needed.

- Complete training videos as part of a learning path or on an ad-hoc basis.

- Commit to completing a learning path.

- Register and take certification exams.

- Participate in Instructor-led training (webinars, etc.).

- Desire higher expertise beyond current roles.

Context and user analysis

User characteristics vary greatly. Users may be new without ever taking any training, which would require gamification mechanics to provide very specific paths through the portal. Some users may be experienced and only visiting the portal to learn a task for a current project. In this case specific gamification paths might not meet user needs. This identifies the need for flexible integration of gamification mechanics.

The context that gamification is applied to is a learning portal. Unlike other gamification contexts like course design, consideration should be given to current behavior and desired behaviors. A broad application, like a portal, will need to account for a diverse range of paths. For example, a course may apply points to completing an assignment, which every user is expected to do. Designing gamification for a portal should consider multiple learning paths and adapt to a more personalized experience.

Ideation

After identifying goals, ideation began with a deep dive into gamification mechanics. This phase was approached more as building a wish list, with feasibility addressed in later stages. The definition of mechanics varies in literature. da Rocha Seixa (2015) refer to mechanics as the game features or components used. Kim (2021) distinguishes mechanics as the rules or procedures of gamification, and components like challenges, points and badges are referred to as elements. For the purpose of this paper all gamification components will be referenced as mechanics.

As identified in the goals, selection of mechanics should motivate consistent visits to consume training and promote exploration on the site so users will become familiar and require less one-on-one guidance. Common elements are points, challenges, badges, and leaderboards (An, 2020). These elements provide a competitive feel, which offers some level of motivation. However, layering on a fully featured experience can create an engaging game-like feel (Coccoli et al., 2015). These include a storyline with themed progress map, user personas, prompts, challenges, and leaderboard. In addition, a reward system will aid in motivation, this includes points, leveling and badges.

Storyline: Sets the theme of components, all narrative, activities, and sub-stories tie back into the main story. All components are smoothly brought together to create an excitement to find out what happens next in the story. Storytelling adds an engaging narrative that will enhance participation (Coccoli, 2015), and aid in providing context (Herzig, et al., 2015).

Challenges: Drive users to complete activities that align with learning goals. and promotes engagement and retention. Activities can be individual or collective (Herzig, et al., 2015), and aid in engaging learners (Coccoli, 2015), and has shown to influence motivation (An, 2020).

Personas: Storyline-based characters that users can identify with based on multicultural, gender, race, etc. Specific traits of the characters can be integrated into feedback. Viewpoints from themed characters promote a more personalized learning experience (Coccoli, 2015).

Point system: Earned by completing tasks or challenges. Accumulation of points show on the leaderboard, which is visible to all users, and represent advancement in the gamified environment. Badges can be aligned with point accumulation milestones. Points are a resource for measuring learning outcomes (Herzig, et al., 2015).

Progress map: A big picture individual view of progress, accomplishments, and next steps. There is little research on the use of progress maps. Herzig, et al. (2015) uses the leaderboard to show individual progress. Typically, games show progress towards the win or milestone (An, 2020).

Leaderboard: Scoreboard displaying accumulated points, compilation of scores, achievements, and completed lessons (Coccoli, 2015). Design may include visibility to the entire population or smaller organizational groups. Learner achievement can be compared with others and ranked, creating competition that motivates regular participation (Coccoli, 2015).

Badges: Achievement award for reaching designated milestones. Badge categories can cover expected or unexpected achievements (Herzig, et al., 2015). A reward system will motivate ongoing participation (Kim, 2021). Badges carry meaning within an organization; however, the current social eco-system allows individuals to brag about

accomplishments giving organizations expanded marketing networks (Prakash & Rao, 2015).

Prompts: Pop-up messages triggered by specific accomplishments, to provide instant feedback and guide the user through learning stages. It may include feedback offering praise, corrections, or additional information (Herzig, et al., 2015).

Design

A space theme was chosen after brainstorming possible ideas. The storyline sets up a mission asking players for help. Points are earned by completing structured activities, as well as course completion. The first structured challenge is setting-up a gamification profile, which includes choosing a user persona.   When the challenge is complete points are earned, a box in the progress map changes color, profiles are displayed in the leaderboard, and a prompt pops-up with the next task. Challenges include setting up a learning path, participating in training, and trying out features on the portal. The competitiveness of challenges will motivate users to visit regularly. Badging is awarded for milestones in point accumulation, training completion, and portal exploration. Badges were the only mechanic that used company branding instead of the space theme. However, one set of badges were created for completing milestones related to the storyline, which did align with the theme.

The design not only depends on the mechanics used, but also the context in which they are used (An, 2020). To accommodate a diverse range of users multiple paths were considered. Some users would be excited to participate in the full experience, while others might find this an annoyance. This motivated the design of two different paths the learning adventure is a fully featured experience with specific tasks outlined to promote learning and portal exploration. Learn and earn is a paired down experience where points can be earned for unstructured tasks, badges are earned, and progress is displayed on the leaderboard.

Integration

At this point in the project the design and mechanics have been identified, and available technology is being reviewed. Feasibility of implementation is aligned with current portal capabilities to determine system capabilities, and what needs to be added. Success of a gamification implementation can depend on the capabilities of the platform (Coccoli, 2015). Prakash & Rao (2015) recommend implementing a new system that can support gamification, however, this is not always possible due to costs. In this example, the portal was put into place to solve a different problem, and gamification is added as an enhancement. Analyzing technology and thoughtful integration into an environment is essential; however, beyond the scope of this paper.

Discussion

This paper focuses on the design methodology to align game mechanics with objectives. To date, the design is in the implementation stage. Analyzing resources and planning implementation is a vital step in the process. Detailing this process and providing best practices would be beneficial for future discussions. Future research is scheduled after gamification launches to study how this design framework, and the mechanics used, influenced achievement of objectives. This would contribute to current gaps in gamification integration with learning management systems.

In general, gamification research would benefit from studying design frameworks to provide a stronger theoretical basis. Practical implementation challenges, combined with a gap in research highlight a need to better understand how gamification design can address goals (Morschheuser et al., 2018). Currently research does not distinguish how mechanics could work together or be used to achieve specific goals (Kim, 2021). Understanding this is an important element in creating a more effective system design. Finally, research on how gamification mechanics motivate users is lacking (Hammedi et al., 2017). Individual mechanics can be studied to determine how they can influence behaviors.

Conclusion

Gamification can integrate the enjoyment of video games with courses, modules, learning paths, and as exemplified learning management systems. Sound design practices are vital in experiencing benefits like motivation, engagement, and achievement of learning goals. The current body of research lacks in providing design guidelines for gamification interventions. This paper hopes to contribute to filling that gap by not only applying a design framework identified in previous research, but also offering a use case that exemplifies an adaptation of that framework. The next phase of research would include measuring the success of this design, to determine if the goals of this project were addressed. Future phases could also measure interaction and feedback with specific mechanics to determine if they are fostering expected behaviors.

References

An, Y. (2020) Designing effective gamified learning experiences. *International Journal of Technology in Education (IJTE), 3*(2), 62-69.

Coccoli, M., Iacono, S. & Vercelli, G. (2015) Applying gamification techniques to enhance the effectiveness of video-lessons. *Journal of e-Learning and Knowledge Society, 11*(3), 73-84.

da Rocha Seixas, L. Sandro Gomes, A. & de Melo Filho, I. J. (2016) Effectiveness of gamification in the engagement of students. *Computers in Human Behavior, 58*, 48-63.

Fui-Hoon Nah, F., Eschenbrenner, B., Claybaugh, C. C., & Koob ,P. B. (2019) Gamification of enterprise systems. *Systems, 7*(13).

Gunawan, F.E., & Jupiter. (2018) Gamification analysis and implementation in online learning. *ICIC Express Letters, 12*(12).

Hammedi, W., Leclerq, T. & Van Riel, A. (2017) The use of gamification mechanics to increase employee and user engagement in participative healthcare services. *Journal of Service Management, 28*(4), 640-661.

Herzig, P., Ameling, M., Wolf, B. & Schill, B. (2015) Implementing gamification: Requirements, and gamication platforms. *Gamification in Education and Business*, 431-450.

Jayalath, J., & Esichaikul, V. (2016) Gamification-embedded eLearning courses for the learner success of competency-based education: case of technical and vocational education and training. Proceedings of *Pan Commonwealth Forum 8*, At Kuala Lumpur, Malaysia. Retrieved from: http://oasis.col.org/handle/11599/2540

Kim, S. (2021) How a company's gamification strategy influences corporate learning: A study based on gamified MSLP (Mobile social learning platform). *Telematics and Informatics, 57*, 101505.

Landers R.N. & Armstrong, M.B. (2017) Enhancing instructional outcomes with gamification: An empirical test of the Technology-Enhanced Training Effectiveness Model. *Computers in Human Behavior, 71*, 499-507.

Landers, R. N., Auer, E. M., Collmus, A. B. & Armstrong, M. B. (2018) Gamification science, its history and future: Definitions and a research agenda. *Simulations & Gaming, 49*(3), 315-337.

Morschheuser, B., Werder, K., Hamari, J. & Abe, J. (2018) How to gamify? A method for designing gamification. *Information and Software Technology, 95*, 219-237. http://dx.doi.org/10.1016/j.infsof.2017.10.015

Prakash, E.C., & Rao, M. (2015) Transforming learning and IT management through gamification. *International Series on Computer Entertainment and Media Technology*. DOI 10.1007/978-3-319-18699-3_8

Roodt, S., & Ryklief, Y. (2019) Using digital game-based learning to improve the academic efficiency of vocational education students. *International Journal of Game-Based Learning (IJGBL), 9*(4), 45-69.

Su, C. (2016). The effects of students' motivation, cognitive load and learning anxiety in gamification software engineering education: A structural equation modeling study. *Multimedia Tools and Applications, 75*(16), 10013-10036.

Turner, P. E., Johnston, E., Kebritchi, M., Evans, S., & Heflich, D. A. (2018). Influence of online computer games on the academic achievement of nontraditional undergraduate students. *Cogent Education, 5*(1), 1437671.