



Gamification: A Primer

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Abstract Gamification is basically adapting game-design elements (fun, play, transparency, reward, incentive, competition, and challenge) and game thinking to non-game services and applications. It is the most exciting and promising area in gaming. It improves player/user motivation, enhances engagement, and changes behavior. Recently, gamification has raised a lot of popular interest both in industry and academia. This paper provides a brief introduction to gamification.

Keywords Gamification, game design, game-based learning, digital games

Introduction

The games industry is one of the most lucrative industries due to the billion dollar sales of digital games. The global game marketplace includes video game console hardware and software and online, mobile, and PC games. Games are designed systematically, thoughtfully, and artistically for the purpose of creating fun and enjoyment. Although games and gamification have a lot in common, they are not exactly the same [1,2].

Gamification is the process of applying the science and psychology of digital gaming (such video game elements) in a non-game environment. It is the craft of deriving all the fun in games and applying them to productive activities. Some regard it as mass-market consumer software that takes inspiration from video games. It involves taking something that already exists and integrating game mechanics into it to motivate participation and increase engagement [3]. For example, it is being employed to enhance user engagement by adding playfulness and fun to existing information systems.

Gamification (or game-based techniques) does not involve playing games, but it simply absorbs the fun game-like elements (attractive interfaces, medals, progress bars, leader boards, etc.) in a game into real-world applications. It is the process of applying game thinking to solve problems and engage individuals. It works by making technology more engaging, informing, and educating. Gamification has positive influence on individuals. When you gamify high-value interactions with customers, you boost sales, stronger collaboration, deeper loyalty, and customer satisfaction.

The word "gamification" was coined in 2002 by Nick Pelling, a British inventor, but it did not gain popularity until 2010. The idea of gamification came from the fact that the gaming industry was the first to master human-focused design and we are now learning from games. Gamification is not a new concept, but it is deeply rooted in marketing endeavors, such as points cards, grades, and degrees, and workplace productivity [4]. The main goal of gamification is to motivate individuals to change behaviors, develop skills, or foster creativity. Typical examples of target behavior can be donating money, buying a product or sharing ideas with a friend.



Components of Gamification

Gamification is a multidisciplinary technique covering a wide range of domains including game study, human-computer interaction, and psychology. Looking at the components (or core drives) of gamification will help us understand what a gamified system actually consists of.

- *Games*: Digital games involve programming computers to play games. They have become the fastest growing section of the entertainment industry. The educators, military, government, and health-care providers use digital games. Games used for serious purposes or “serious games” are used by the military.
- *Gamification Elements*: These include [5]:
 - (a) Awards: A particular award is given to the player on the completion of a behavior.
 - (b) Point-based reward system: The players obtain a reward in the form of points on the completion of a certain behavior.
 - (c) Badges: These represent certain achievements of the user/player. They are common extrinsic rewards employed in gamification efforts.
 - (d) Levels: The users have a level that increases as they reach a certain number of points.
 - (e) Quests: The tasks the player has to complete are presented as a quest.
 - (f) Voting: Players can vote on another player’s behavior.
 - (g) Ranking: A ranking with the top players is presented to all players to increase competitiveness.
 - (h) Betting: Players/users bet on a certain event, such as an estimation, for example. The winner of the bet is rewarded.
- *Game mechanics*: Gamification model are based on games mechanics such as rewarding system, customization, and leader-boards. The game mechanics represent the modes of interacting with games. These consist of rules, roles, and stories [6].

Fun is the secret ingredient that makes the gamification a truly unique experience. It is a consequence of brain adaptation to pattern recognition. Like games, gamification includes goals, challenges, competition, and collaboration.

Applications

Gamification can be used almost everywhere. It has been widely applied in different areas such as education, business, health care, edutainment, information studies, human–computer interaction, financial services, transportation, engineering, manufacturing, medicine, and military [7,8].

- *Education*: Education is perhaps the most successful and well-known area of application for gamification. Traditional education has been found to be ineffective in motivating and engaging many students. Gamification in education is a viable alternative to some of the existing educational delivery methods. It is fast emerging as an effective technique to motivate and engage learners. It facilitates better learning experience and environment, increases recall and retention, provides instant feedback, engages and entertains learners, and drives strong behavioral change [9]. The goal of education gamification is not to replace regular lectures but to be a supplemental tool for students in learning concepts. Gamification simply means improving the learning that occurs in an experience. It unifies educators and engages learners through an effective, systematic approach [10]. It inherently promises is to provide student with learning at comparably low cost. It has a positive effect of making difficult subjects (such as engineering) more manageable, increase intrinsic motivation, scientific knowledge, and collaboration [11].
- *Business*: Gamification has been implemented in business, especially in marketing and e-commerce. It has its roots in marketing endeavors, such as rewards memberships and point cards. It transforms business models by creating new ways to increase engagement and drive customer interest. It empowers businesses to create true loyalty. It has been used in an attempt to improve employee productivity and increase profitability through higher customer engagement. As Emily Dickinson rightly said, “It is easy to work when the soul is at play.”



- **Health Care:** Health professionals have used gamification in self-management of chronic diseases and common mental disorders. Health gamification practices, involving children and parents, lead to better quality of life, reduced risk of disease, and increase life expectancy. *Fitocracy* is a typical example of gamification app used for motivating user exercise behavior. When applied to mobile health care, gamification has the potential of greatly facilitating patient self-management [12].
- **Industry:** Gamification has been used widely in many industries to motivate people to use products or services. Two categories of companies deploy gamification: those that are looking for improvements to their loyalty solutions and those that want to find the right employee engagement tools [13]. Companies and organizations use it to train their employees, solve problems, and generate new ideas. The benefits derived from enterprise gamification include selecting the best employees during recruitment, employee engagement, productivity enhancement, innovation, and efficiency improvement. Companies that are using gamification include Cisco, Microsoft, eBay, American Express, Samsung, Foursquare, Dell, and Siemens.

Other applications include computer science, software engineering, online communities and social networks, crowd sourcing, and politics. Some benefits of gamification are illustrated in Figure 1 [14].



Figure 1: Some benefits of gamification [14]

Key Issues

As a new trend, gamification has many advocates and critics alike. Like any other emerging concept, gamification is suffering from growing pains. There are concerns and limitations to consider when applying gamification. Gamification may be flawed and misleading for those unfamiliar with gaming. Some worry that it may trivialize the learning experience. Others doubt whether it works.

While we can benefit from the applications of gamification, not every learning activity can be gamified [15]. While gamification can be used to affect the behavior of learners, its actual effects are greatly dependent on characteristics of the learners and the context in which the gamification is implemented. The same gamification mechanism can be motivating to some students while disliked by others [16]. Sometimes gamification can encourage unintended behaviors.

Identifying gamification involves high level of subjectivity and contextuality. It may be difficult to implement effectively. Failure to successfully implement gamification will bring costs in morale and productivity. It may produce adverse and unanticipated consequences. When gamification is not properly implemented, it runs the risk of making learning become a game where people participate only to have fun rather than to improve their



skills. Organizations that plan to use a gamification strategy must understand the target audience's behavior and motivation and decide how success will be measured.

Multiple legal restrictions (such as virtual currencies, data privacy laws, and data protection) may apply to gamification. Gamification features in some local cultures may require incentives that included ideals of reciprocity, face-saving, and social obligation.

Conclusion

Gamification is the new concept of applying game-design thinking to non-game, real-world applications. As a new concept, its key theoretical understandings are still unfolding. It involves using game-based mechanics and game-thinking to engage people, change behavior, motivate action, and solve problems. It is a powerful weapon for effective learning, marketing, and behavioral change. It can facilitate innovative learning and promote de-stressing activities. It has flourished in the corporate world and is gradually driving popular interest in the educational community as reflected in the growing number of papers published. It is a concept that needs to be part of every professional's tool box. More information about gamification can be found in the books in [17-19] and similar books available on Amazon.com.

References

- [1]. M. N. O. Sadiku, S.M. Musa, and R. Nelatury, "Digital games," *International Journal of Research and Allied Sciences*, vol. 1, no. 10, Dec. 2016, pp. 1,2.
- [2]. B. Kim, "The popularity of Gamification in the mobile and social era," *Understanding Gamification*, chapter 1 or *Library Technology Report*, vol. 51, no. 2, February-March 2015, pp. 1-10.
- [3]. J. Dale Prince, "Gamification," *Journal of Electronic Resources in Medical Libraries*, vol.10, no. 3, 2013, pp. 162-169.
- [4]. K. Seaborn and D. I. Fels, "Gamification in theory and action: A survey," *International Journal of Human-Computer Studies*, vol. 74, 2015, pp. 14–31.
- [5]. O. Pedreira et al., "Gamification in software engineering – A systematic mapping," *Information and Software Technology*, vol. 57, 2015, pp. 157–168.
- [6]. A. Martens and W. Mueller, "Gamification - A structured analysis," *Proceedings of IEEE 16th International Conference on Advanced Learning Technologies*, 2016, pp. 138-142.
- [7]. "Gamification," *Wikipedia*, the free encyclopedia <https://en.wikipedia.org/wiki/Gamification>
- [8]. Y. Chen, "Examining the use of user-centered design in gamification: a Delphi study," *Doctoral Dissertation*, Purdue University, 2015.
- [9]. C. I. Muntean, "Raising engagement in e-learning through gamification," *Proceedings of the 6th International Conference on Virtual Learning (ICVL)*, 2011, pp. 323 -329.
- [10]. D. J. Fisher, J. Beedle, and S. E. Rouse, "Gamification: A study of business teacher educators' knowledge of, attitude toward, and experiences with the gamification of activities in the classroom," *The Journal of Research in Business Education*, vol. 56, no. 1, January 2014, pp. 1-16.
- [11]. A. P. Markopoulos et al., "Gamification in engineering education and professional training," *International Journal of Mechanical Engineering Education*, vol. 43, no. 2, 2015, pp. 118–131.
- [12]. A. S. Miller, J. A. Cafazzo, and E. Seto, "A game plan: Gamification design principles in mHealth applications for chronic disease management," *Health Informatics Journal*, vol. 22, no. 2, 2016, pp. 184–193
- [13]. S. Dale, "Gamification: Making work fun, or making fun of work?" *Business Information Review*, vol. 31, no. 2, 2105, pp. 82–90.
- [14]. A. Sanal, "7 undeniable benefits of gamification of corporate training" November 2018, <https://playxlpro.com/gamification-of-corporate-training-7-undeniable-benefits/>
- [15]. K. M. Kapp, *The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education*. San Francisco, CA: John Wiley & Sons, 2012.



- [16]. L. Hakulinen and T. Auvinen, "The effect of gamification on students with different achievement goal orientations," *Proceedings of International Conference on Teaching and Learning in Computing and Engineering*, 2014, pp. 9-16.
- [17]. T. Reiners and L. C. Wood (eds.), *Gamification in Education and Business*. Springer, 2015.
- [18]. G. Zichermann and J. Linder, *The Gamification Revolution: How Leaders Leverage Game Mechanics to Crush the Competition*. McGraw-Hill Education, 2013.
- [19]. S. Stieglitz et al. (eds.), *Gamification: Using Game Elements in Serious Contexts*. Springer, 2017

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