Chapter 4
Games Are Learning Systems

Abstract The basis of creating a learning system is quite similar to game-based learning. When you get right down to it, the objectives of both are almost the same. Serious games, specifically, and gamification both try to solve a problem, promote, and motivate learning by using game-based techniques and thinking. This is true but there are certain differences and subtleties that designers must know before going forward with gamified or game-based learning systems. This chapter highlights the role of games as learning systems, traditional and pedagogical learning models in games, the benefits of gamification through learning as well as pros and cons of games as learning systems. Lastly, the application of gamification to an actual learning product is also part of the chapter.

Keywords Games · Learning systems · Playing is learning · Learning in schools · Learning in a workplace · Learning in everyday life · Learners · Teachers · Gamers · Pedagogical models · Level design learning · Quest design · Learning game design · Learning curves in games · Game-based learning · Increase memory capacity · Computer fluency · Simulation fluency · Strategic thinking · Problem-solving · Skill building · Criticism · Theory in practice

4.1 Introduction

Arguably, gamification transforms the learning process in a game-like context, and game-based-learning defines game as a part of the learning process. Karl Kapp, the writer of the book "The Gamification of Learning and instruction" states that (Timmers and Veldkamp 2011):

> When you get right down to it, the goals of both are relatively the same. Serious games and gamification are both trying to solve a problem, motivate, and promote learning using game-based thinking and techniques.

Gamification and game-based learning are slowly but surely becoming the fundamental designs in our new digital learning environments. It is of no surprise that they represent everything that is motivating, from the intrinsic rewards to

teamwork to occasional external rewards to collegial support once the required task is completed or an action or behavior is exhibited. The blend of these advantages successfully develops the skills and knowledge that positively affect productivity.

It is to be remembered that when considering the gameplay as the asset in your blended learning event, people desire to play the game having educational content, i.e., they don't play to win, but to learn and achieve. Winning badges, for instance, is fun and exciting, but not the required end goal. Learners strive to get intrinsic motivation, an internal sense of success or achievement that arises from successfully completing a complex task or solving a difficult problem. They want the real-world applications and positive outcome coming from them. Gamification and game-based learning should as mentioned be carefully designed, drawing on a positive psychology of the play and its usefulness as a learning strategy.

4.2 Games Are Learning Systems

As told, game-based learning is the integration of the actual games into the learning process, typically to teach a specific skill or get a specific objective achieved. This approach gives the learners an opportunity to be engaged in the learning process and to have excitement and fun while doing so. Gamification, in the blended learning context, is the idea of applying game elements to nongame activities for promoting the participation and motivation of users. The goal of game thinking used as in learning system is to inspire the users to interact and participate with one another in a goal or an activity-oriented community (Van Eck 2006).

Games as a learning system involve using the game-like interactions, structures, or simulation strategies to support the pedagogical goals and results. When you use the game or game design as a part of your learning materials, you are in the game-based learning. A general example of this includes using sports games to teach teamwork with other social skills. There are surely more times we are learning via game for which we give credit.

Though definition differs, the games offer visual information to the players (learners), accept their inputs, and use a collection of rules. Games are complex, need collaboration with all stakeholders and based on developing insights, values and knowledge about the end users. Having diverse goals, the games have become complex learning systems.

4.3 Playing Is Learning

Using games for learning and teaching is not a new concept. There is much research that supports the power of play in knowledge and skill development. Playing is proven to enhance memory, cognitive function, and collaboration, all among a wide range of positive outcomes (Squire 2008).

Games and play are effective learning environments not just because that they are fun but because they
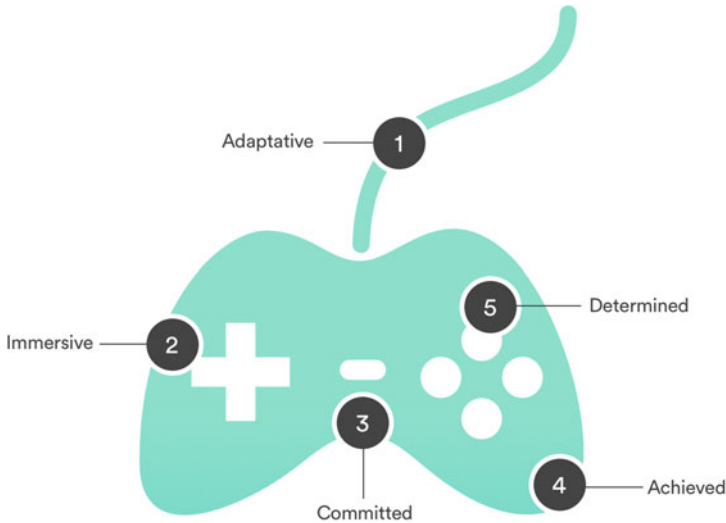
- Adapt to every player's individuality,
- Are immersive,
- Engage with a social network,
- Clear in terms of goals, and
- Require the learners/players to make important decisions on a frequent basis.

Playing embodies a number of attributes related to how people learn: games are experiential and social. They require the learners to recall their prior learning and build new understanding. Having success while playing a game is based on problem-solving.

Another important aspect of games and playing is the community that is developed around them. Communities of the users share their ideas and group-problem identification and problem-solving, not to mention a good way of socializing occurs. In fact, the explanation of a game community reflects the definition of an academic community of practice. The community thrives on a culture of learning; every player is involved in mutual effort of understanding. Group members also bring different expertise to this community and individual members are recognized and valued for their contributions that help to develop further since the group keeps advancing its collective skills and knowledge.

4.4   How to Understand Games for Learning?

Though games are effective learning environments, not all games are educational and effective. In a similar way, not all games are ideal for all learners and for all learning outcomes. The key is how the games are used. Just adding the games to

learning content or curriculum doesn't mean that they are integrated within it. Think of how best you can add games to the learning toolset, blending them with a number of other activities. This integration needs an understanding of the adopted medium and its coherence with the subject, the instructional strategy, intended outcome, and the students' learning style (Squire 2005).

You can integrate games into education via a range of approaches like letting students create their own games, incorporating the commercial games into the curriculum, or analyzing the games to determine what is wrong or lacking it, which enables students to determine not only the subject but how the games are structured.

Gamification and game-based learning, while structured in a different way, share elements that drive learning. For instance, they involve, motivate, challenge the players, ask them to apply prior knowledge to address incremental complexity, respond to the learners' need for intrinsic and extrinsic rewards as well as hone competencies to apply beyond the learning environment.

In terms of game-based learning's contribution in the blended learning, experts say that it
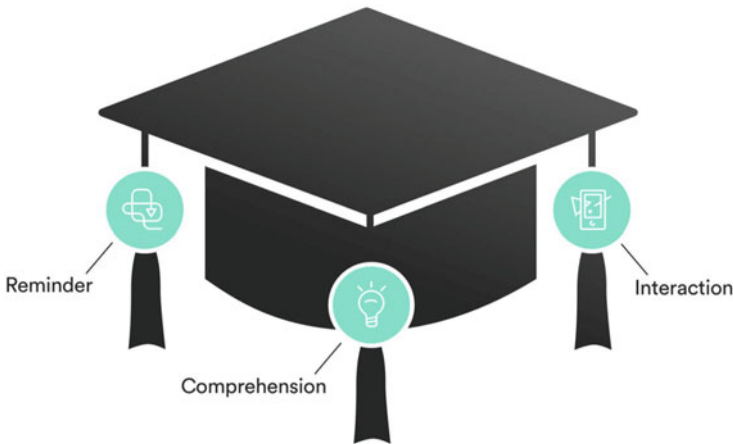
- Reminds the participants of what they learned and signifies their achievements along the learning journey,
- Can make complicated concepts easier to comprehend, and
- Offers activities that let the participants to interact and demonstrate the topics they are learning.

In addition, a well-structured and carefully executed game-based learning application incorporates the layered strategies that engage the learners in multifaceted manners. Serious games reflect the evolution of play in learning. They are the kinds of gamification and game-based learning instances that do what was explained earlier, i.e., build or improve the skills while still retaining fun (Olimpo et al. 2010). The term serious games also seem to attract adult learners (e.g., employees) as they

don't tend to think of this as play and want to apply their higher order skills to the realistic, complex conditions, combined with social collaboration, which is often provided in the game-based learning experience.

4.5   The Benefits of Game-Based Learning
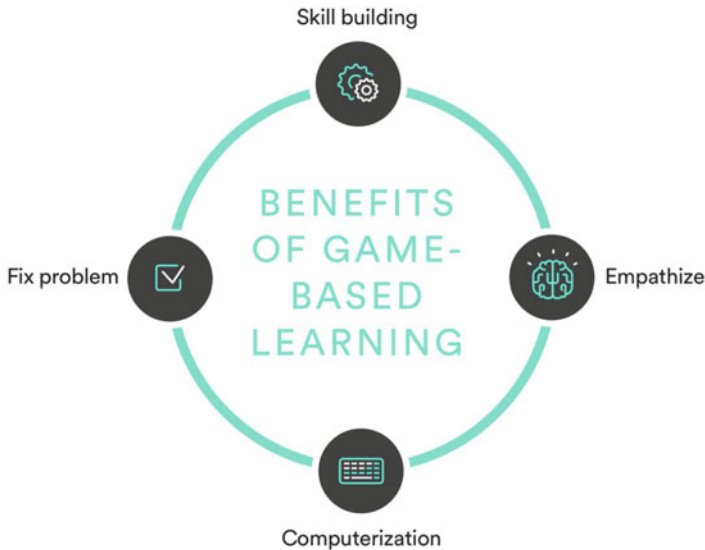
- **Increases learner's memory capacity**

Game designs usually focus on the memorizing power of the players. Players have to remember the aspects of the games to solve the puzzles, memorize critical sequences to achieve task, or track narrative elements to clear the levels.

- **Computer and simulation fluency**

Paying a game on the Internet lets players, specifically children, to gain familiarity with how a computer works. Learning games teach them to use gadgets, not to mention browsing and general computer navigation.

- **Strategic thinking and problem-solving**

Most learning games require players to think fast, as well as using logic to thing beforehand to complete upcoming levels and solve problems.

- **Skill building**

Games for learning help learners with specific skills. For instance, a lot of adventure and mystery games contain maps that players have to read. This builds their map

reason skills as well as practical thinking. All games whether a basic game of tag or a complex board game offers invaluable opportunity for learning to understand and follow rules and directions. Consequences for not listening to and following the rules, such as disqualification, are natural ways children learn the importance of rules and directions. Sharing, taking turns, being a gracious winner or loser, and other important social skills can be taught and practiced through games and play.

4.6   Learning in Schools, Workplace, and Everyday Life

Effective learning takes place when you are completely engaged in what you are doing, whether at school, job, or in any aspect of everyday life. In a similar way, when you want to get the most out of watching a movie or reading a book, giving it your complete focus makes all the difference.

However, when you are learning, it becomes even more important as the activity is not only receptive but also makes all types of demands on memory as well as your understanding.

In schools, one of the biggest challenges for the teachers is to successfully teach big groups of students, all of whom have various personalities, diverse competencies, and learning preferences (Johnson 2005). Game-based learning that blends the subject matter with gameplay is one way of achieving an effective learning. Rewards (like stars or lives gained or lost) are usually closely combined with quick feedback on the choices made or the answers given. This is way more effective than the feedback at the end of the lecture or the following week, by which time any regular student has lost interest. However, game-based learning must be more than just persuading the students that they are playing. It is an error to believe that students only enjoy learning if it is given in a game form. Learning itself is a pleasure when learners are succeeding at it. The power of game-based learning in schools can push the students toward the next level.

Game-based learning is a fairly common component at workplaces, especially for training and development of employees. This is because the learning games produce great results and game-based learning approaches have proven to transform training across all the industries, from retail to human resources to defense, and with the market showing huge growth potential. An increasing number of organizations have never found a better time to unleash game-based learning in their training, learning, and development strategies (Bellotti et al. 2009).

Game-based learning is the key to unlock the maximum engagement from the training content. Rather than subjecting the learners to passive e-learning (learning for the sake of learning), the learning games are more interactive, enjoyable, and hence, more effective.

People involved in high-risk jobs are unable to afford mistakes during their training. Game-based learning or simulations help them learn in a totally risk-free environment. In addition, if training becomes another distraction from the actual work, learning games often deliver bite-sized content in a highly engaging format.

4.7   We Are All Learners and Teachers (and Gamers)

While many of us may not define games or gamification as part of their life, most of us have unknowingly experienced it, probably every single day.

Whether you see it or not, a good percentage of the apps installed in your smartphones use gamification as a technique to keep you always hooked. Think of notifications, rewards, points, and competition among your friends. But game thinking reaches far beyond the smartphones. Your local grocery store has a rewards program, your gym offers a progression scheme, and your nearest coffee shop offers loyalty points. These all are examples of gamification.

From the discussion above, we can say that game-based learning or learning via gamification works in any industry and setting. Give people tracking abilities, challenges, and rewards, and are going to come back for more. Moreover, when it comes to the corporate training, we saw that so many training and development practitioners are now adopting game-based techniques as part of their blended learning solutions (Barab et al. 2009).

It implies that the business world is far ahead of the academic industry with proven success using gamification designs and game-based learning, and we all are learners, teachers, and gamers at the same time, experiencing the game-based experience somehow, somewhere.

## 4.8   Learning Models in Games

Engagement in the game design tasks may help preservice the teachers develop technical and pedagogical skills for teaching as well as promoting the problem-solving and critical thinking skills. Through the game design process, the preservice teachers not just exercise these skills but also know the instructional method to support the potential students' problem-solving skills. Getting comfortable with games and game design needs first-hand design experiences, which teacher education program rarely provides (Van Eck 2016a).

Though using the game thinking has benefits and potentials in teaching, preparing the teachers to use it in their future practices may be challenging. Even though teachers can be taken as the enthusiastic users of the new concepts, they hardly see how to integrate them effectively in their future practices. Successful incorporation goes beyond the technical knowledge but also necessitates the nuanced understanding of the multilayered relation among technology, pedagogy, and content.

4.9   Level Design Learning

A game level is the part or segment of the game. To complete or finish the game level, a gamer typically needs to complete specific tasks or achieve particular goals to advance to the next level. The levels become more difficult as the player goes ahead.

Following are the steps involved in the level design process:
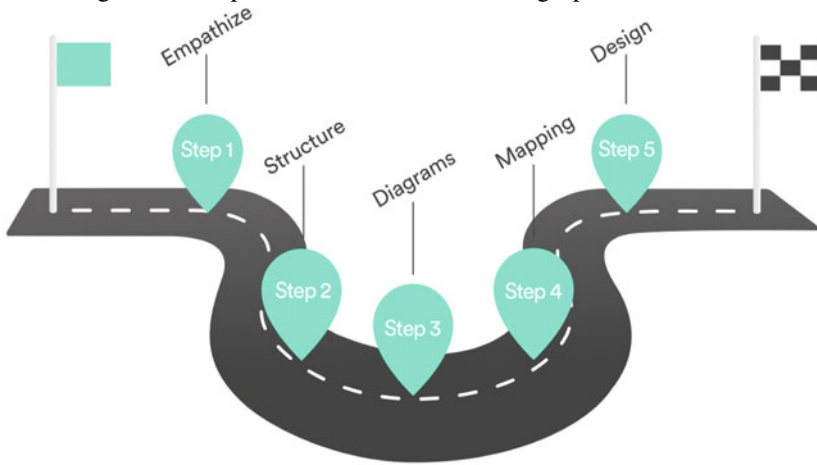
Step 1: **Understanding the constraints**: The designer goes through the common limitations while designing game levels.

Step 2: **Structure and brainstorming**: At this step, a designer decides what goes into the level.

**Step 3**: **Diagrams**: The designer adopts a visual method to outline what goes into each area of the level.

Step 4: **Rough maps**: A designer figure out from the diagrams that what goes into each area.

Step 5: **Finishing the design**: The designer moves from the basic design to develop the final spaces.

4.10   Quest Design

The quest in the games is the task that the player-controlled "party" or "character" or a "group of characters" can complete to gain a reward. Instead of telling people what they need to know, encourage them to find it or figure it out if they want to succeed in the game. Make succeeding in the game mirror what it takes to succeed in their jobs; for sales reps, success should mean they meet high sales goals, and so on. In the game, you make the measure of success hitting a targeted sales goal while making complaints and customer dissatisfaction negatively impact points or progress.

Here is a brief guideline for creating the best quest design:
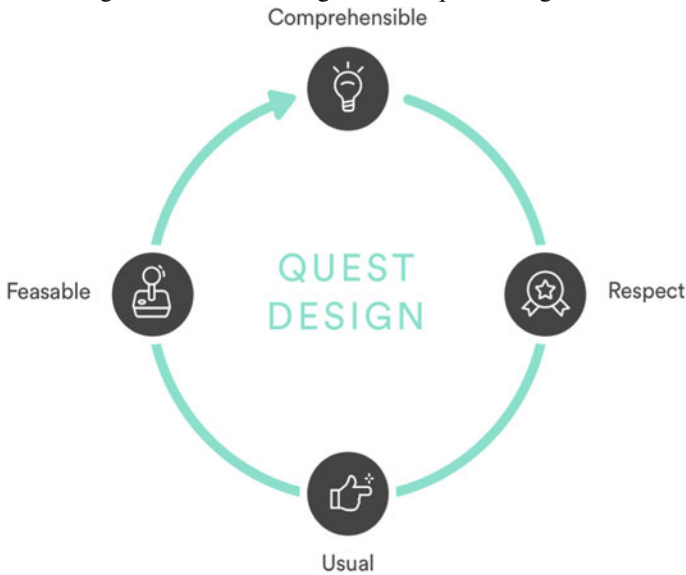
- A good quest informs clearly the main plot or the area it is in all respects—lore, even through rewards you get.
- A bad quest upstages the key quest in terms of enemies, stakes, or even the lore.
- The quest should be fun and fast to complete.
- The quest should utilize the core gameplay mechanics and avoid the special case new functionality. This entails having the same range of choices, reactivity, and results as a normal quest in the key plot, though the scope of these elements can be smaller.

4.11   Learning Game Design

Learning game design is unique from the instructional design. It needs experience and skills that are different from the instructional design. Learning game design creates a more engaging and exciting experience for the learners (Pringle 2014).

Game design integrates the same game activities that people find fun along with one more feature. These game designs aim to help players develop new knowledge or skills and reinforce their existing knowledge and skills. The goal of the learning game design is to not just engage the learners and make them understand the learning process but also to achieve a specifically designed learning outcome.

Usually, a game is relied on the reality abstraction as well as fantasy elements in the learning process and may not be the exact replica of the real-life situation.

4.12   Learning Curves in Games

The learning curve is a critically important element in determining how easy it is for the new players to understand your game and begin playing. However, when it comes to approaching, assessing, and developing the learning curve in games, you have to jumble together everything. The movement is put together; other assets such as weapons are added, maps are developed, features are added, etc. (Van Eck 2016b).

The primary learning curve usually looks like a general learning curve (downward slopping) but is often shorter apparently and in terms of time in relation to difficulty. This is due to the fact that this curve is reduced to what the player has to learn initially in the game, to be effective. It means that the initial learning curve is the representation of the amount of time related to the difficulty it takes the player to learn the bare minimum of what is needed for them to be able to start enjoying the game.

The initial learning curve for a general game typically consists of the following:
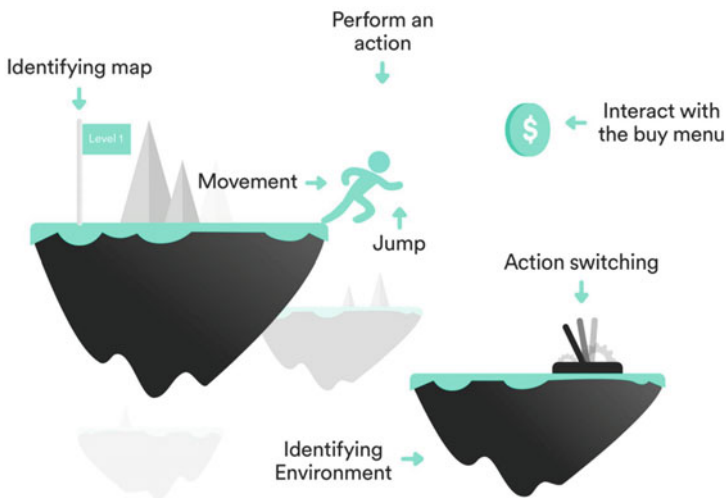
- Movement (forward, backward, side to side),
- Jump,
- Perform an action,
- Action switching,
- Interacting with the buy menu,
- Identifying maps, and
- Identifying environments.

The trick is to have a stepped challenge curve that tracks closely to the learning curve, so the player is always learning, but there are short plateaus where a player

can flex their knowledge of the game and feel powerful for a while before being challenged again. And from then on, we use level and quest design to teach players how to use the mechanics in different ways, combining them together to solve puzzles. The player doesn't actually get to use one of the coolest ideas in the game until the penultimate level.

4.13   The Criticism

Among the criticisms associated with games for learning in general is that games can lead to isolation and often anti-social behavior and may eventually result in short attention span. The claim on short attention may be considered true today due to the fast-paced and dynamic nature of the technological advancements.

However, the anti-social behavior aspect might not, since an increasing number of games are being developed for the social play. While few games may not enable face-to-face interactions, they surely mirror the real-world communication that is proved to be useful in personal as well as business transactions.

Others argue that using either a completely digital game-based curriculum or even one that is based heavily on the games needs additional equipment, software, as well as the training of teachers, and thus it may increase the admin costs. Some also believe that playing the games distract the learners from developing their valuable skills.

4.14   Conclusion

Gamification and game-based learning both promote engagement and sustained motivation in learning, but they do not necessarily result in improved learning outcomes. Game-based learning describes an approach to teaching, where students explore relevant aspect of games in a learning context designed by teachers. Teachers and students collaborate to add depth and perspective to the experience of playing the game. Good game-based learning applications can draw us into virtual environments that look and feel familiar and relevant. Within an effective game-based learning environment, we work toward a goal, choosing actions and experiencing the consequences of those actions along the way. We make mistakes in a risk-free setting, and through experimentation, we actively learn and practice the right way to do things. This keeps us highly engaged in practicing behaviors and thought processes that we can easily transfer from the simulated environment to real life. Most games feature elements such as rules, goals, interaction, feedback, problem-solving, competition, story, and fun. Though not all of the elements are needed to successfully gamify a learning activity, carefully selecting those elements that help meet the learning objectives of the course can be useful.

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