

Gamification and the Way It Can be Used to Influence Learning

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Gamification

Educational Games

Motivation

This chapter presents an engaging discussion of the way that gamification and learning technology have developed over recent years, as well as examining some of the theoretical contestations in the field, mapping out avenues for future research and development, and providing clear advice for designers considering adopting gamified approaches. The chapter begins by defining the game and recognizing that gaming and gamification both have a long history. It notes that gamification is distinct from games, and uses Kapp's (2012) discussion of the elements of gamification to discuss this. From that point, a conversation is developed about the need to design gamification in such a way so that is fit for its intended purpose. This leads into a discussion about how various learning theories, including behaviourism, and motivation theories, relate to gamification design. It notes the distinct advantages that have been lent to the development and adoption of gamification via mobile technology, and especially internet enabled devices. It will also recognize that some of the promises of gamification, especially as it relates to learning and instructional design, have failed to materialize. The chapter concludes with advice for designers to consider as they design their own gamification, including how they might leverage the most value on gamified resources. The chapter makes significant use of authentic examples and case studies drawn from a range of different industries and areas, thus ensuring that students of all backgrounds are able to access the material and apply it to their own experience.

Defining a Game

It should be no surprise that people love playing games and that they have done so for a very long time. For example, archaeologists have found chess sets that might be more than 1500 years old. Go (a Chinese abstract strategy game where players try to capture territory on a game board) is much older—dating back to 2000 BCE. For many, games of any form are a distraction from everyday life and are often dismissed as nothing more than that; however, that ignores the potential for learning that takes place in games. We, as learning designers and educators, need to be mindful of these opportunities, especially as **gamification** is a buzzword in education and training today.

It is easy to be distracted by new and innovative ideas. One of our challenges as educators is to look at these ideas through a critical lens and consider whether these new ideas are viable, sustainable, and actually contribute to learning—or whether they are educational flim-flam destined to go the way of interactive whiteboards!

So, what is a game, and how is that it to gamification? There are many definitions of what a game is, given the diverse forms and contexts in which games are played. Salen and Zimmerman (2003, p. 5) proposed the following: “A game is a

While this definition is a good fit for many board games, or even sporting games, it does not necessarily harmonize with other definitions. What about those games where there is little player involvement, such as the so-called idle genre (for an example, see [Raid: Shadow Legends](#))? Modern interpretations of games need a more measured definition. One game designer defined a game as “a system in which players engage in an abstract challenge, defined by rules, **interactivity**, and **feedback**, that results in a quantifiable outcome often eliciting an emotional reaction” (Koster, 2003, p. 12). This is a much more comprehensive definition that includes a few new ideas, such as the emotional reaction that games produce.

Karl Kapp (2012) examined the **elements** that comprised both definitions (Salen and Zimmerman’s, and Koster’s) and created a new, workable definition. He said,

Together these disparate elements combine to make an event that is larger than the individual elements. A player gets caught up in playing a game because the instant feedback and constant interaction are related to the challenge of the game, which is defined by the rules, which all work within the system to provoke an emotional reaction and, finally, result in a quantifiable outcome within an abstract version of a larger system. (p. 9)

Each of these elements of games in Kapp’s framework are explained below (see Figure 1).

Figure 1. The Elements of Games

Defining What Gamification Is and Is Not

Using Kapp’s (2012) elements of games, it is now possible to consider what gamification means in the context of learning. Kapp suggested that gamification involves using elements traditionally thought of as being part of games, or elements that are fun, to promote learning and engagement. He defined gamification as “using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems” (2012, p. 10). We will explore these elements in the next section.

Kapp (and others) are also firm about what gamification is not. This is important because being aware of some of these ideas will help us more critically determine which educational technology integrations are likely to be successful and which are not. Kapp argued that gamification is not just the implementation of badges, points, and rewards. While these implementations are elements or **mechanics** of gamification, they alone are not sufficient for true gamification—nor is gamification a trivialization of learning.

The debate about whether game-based learning is the same as gamification is a point of some contention. Serious games are described as complete experiences that use game mechanics and game thinking to educate individuals. On the other hand, gamification – the use of game mechanics to engage learners – is often seen as more limited. Gamification allows for meaningful learning in a range of contexts. The effectiveness of this learning and the application of gamification depends on embracing all the elements of gamification, not just the simple ones such as badges and rewards. These elements, such as storytelling, have much in common with those of serious games. Thus, the distinction between serious learning and the more effective applications of gamification is largely meaningless.

The field of game-based learning is a bit older (in terms of research) than gamification. One of the key researchers in the field has been James Paul Gee, who identified [16 principles](#) of good game-based learning in 2013. He wrote mostly about video games, but many of the elements he identified as being central to game-based learning are also elements of gamification. For the purposes of our discussion, we will consider them to be essentially the same thing. These elements are incorporated into the discussion below (see Figure 2).

Another point to consider is that gamification is not new. We know that war games have been used to train soldiers since the 7th century. Similar games-based learning approaches are still used in military academies around the world

settings can be seen as an example of gamification.

Finally, Kapp (2012) indicated that gamification is neither perfect for every learning situation, nor easy to create. Good processes of gamification are time and resource intensive. Creating a learning activity that is both enjoyable and instructional is no easy task.

Elements of Gamification

We have probably all played games that we have found to be intensely interesting—almost becoming addicted to them, returning to them over and over again because we just want “one more go!” This can be the hallmark of a well-made game (although that, of course, depends on what you mean by “well made”). The elements that contribute to the making of that game are also important to designing a satisfactory gamified learning experience. These elements are presented in Figure 2 (adapted from Kapp, 2012).

Figure 2. The elements of gamification.

Some examples of these elements in action are presented in Table 1.

Elements of gamification	Example learning activity
Rules	<p>Natural selection simulation</p> <p>This learning resource uses game-like mechanics to create a simulation of an ecosystem. Students can change the rules of the system and observe the outcome just like they do when playing a video game such as Minecraft.</p>
Aesthetics	<p>Fire and Evacuation VR Safety Training</p> <p>This video of a VR Fire safety training module shows how leveraging aesthetics such as full 360 vision, sound, and interactivity from games creates an engaging and immersive experience.</p>
Conflict, competition, or cooperation	<p>Communication puzzle</p> <p>In this activity, learners must work collaboratively, communicate, and problem solve to complete the activity.</p>

Table 1. Examples of gamification

Try this simple gamification strategy.

1. Open the last multiple-choice quiz you created or completed.
2. Use [this spinner](#) to select an element of game to use.
3. Use [this spinner](#) to find out what tool you will use to apply your element of game.
4. Create a different version of the quiz by using the element of game and design tool.

Notes

- At first glance, some of these combinations of tools and elements may seem to be incompatible, but they are just an opportunity to stretch your creativity. For example, if you were assigned the game element of 'random' and the tool of 'branching scenario', you could create an assessment where the learner is randomly assigned different responses in a scenario, asked to explain whether these are the right or wrong choice in that situation, and instructed to justify their answer.

Ensuring Gamification Is Fit for Purpose

Not all gamification is created equal. As discussed earlier, gamification can be reduced to the trivial. For example, a learning designer can add points, badges, and/or multiple-choice questions to some presentation slides they turned into a video. They might even rank participant's scores on a leader board and claim the learning activity has been gamified. Ultimately, this will be a transient and unsatisfactory experience. It does technically meet the definition of being "gamified," as it incorporates several of the elements discussed above, and it may be slightly more engaging to some users, but it fails because it does not combine all, or most, of the elements of gamification into an event that is larger than its individual parts.

Choosing which activities to gamify and how to gamify them is a key part of **learning design**. Competitive elements of games such as scoring, recognizing winners and losers, or providing a league table can be motivating or engaging to certain types of learners but strongly de-motivating to others—particularly low-ability or low-interest learners. Similarly, adding a scenario to your learning activity may be very interesting to learners, but if your learning activity is one that must be repeated regularly, the story will rapidly become stale and demotivating.

A different pitfall that designers often fall into is the trap of seeking **engagement** over learning. A gamified learning activity can be fun to learners. In fact, usage statistics and feedback may tell you that your learners are engaged and motivated by the activity. However, if the assessment shows no appreciable improvement in learning or change in behavior, then the learning activity has not been a success. Good, gamified learning experiences should improve engagement—but not at the cost of learning.

Another concern that must be addressed when gamifying a learning activity is the lack of equity and accessibility. For example, a virtual reality experience could be wonderfully engaging to your learners but may be inaccessible and inequitable to learners with a range of disabilities. Equally, a gamified activity that requires an able body will exclude many adult learners in a workplace setting and should be chosen with caution.

Ideally, any application of gamification to a learning activity will begin with thoughtful consideration of your learners and their context to ensure that you are making choices that are fit for the intended learning objective. Table 2 showcases some poor examples of gamification.

<p>Too competitive</p>	<p>Kahoot is a very popular cooperative online quiz software. Kahoot! tournaments and similar tools are used by large companies to train and gather data on their employees. While this approach is touted as giving the company lots of useful data and a fun way to train large groups of employees, there is no consideration for the employees who may be alienated by this kind of competitive approach.</p>
<p>Engagement without learning</p>	<p>The Reading Eggs program is a very popular program designed to help children learn to read.</p> <p>Watch this video</p> <p>The key selling point in this video is how engaged the children are. However, in a classroom, teachers may see students rushing through their readings in order to earn points to be able to play games. The design of this program places emphasis on the rapid completion of reading tasks instead of children developing an intrinsic interest in reading.</p>
<p>Inaccessible</p>	<p>Gamification in learning design is not always about learning a skill or concept—it can be about changing behavior. This example of gamification is inaccessible to everyone who is not able bodied. If your learners cannot access the learning experience or activity you are offering, your design will be less successful.</p>

Table 2. Poor Examples of Gamification (LIDT in the World)

Scenario-based learning is often an excellent tool of gamification, but just like the examples given above, it can fail if applied poorly.

Cathy Moore is an internationally recognized training designer who follows a specific approach to scenario-based learning. Her useful website includes a number of examples of scenarios to help you understand how to use or, in this case, not use her scenario-based learning approach.

- Complete the scenario [Classroom management by Cathy Moore](#). Consider how these elements are present in the scenario:
 - feedback
 - storytelling/ engagement
 - problem solving
 - learning outcomes
- Can you think of a situation where this kind of scenario would be highly effective? When could it be a ineffective?

Gamification and Learning

One of the main criticisms of gamification is that, in most forms, it uses limited behaviorist theories to inform teaching and learning practices. While this concern might be the case when regarding the use of rewards and some forms of feedback, this mindset fundamentally misunderstands the wider applications of gamification and ignores the way other theories of learning have informed the development of gamified principles and approaches to learning. In this section, the links between gamification and some key ideas relating to learning and instruction are examined.

Conditioning

The ideas of conditioning (from the behaviorist approach to learning) are present in many forms of gamification—most often in the form of operant conditioning, where players are rewarded for demonstrating a particular behavior. This reward reinforces the behavior and increases the probably that it will be demonstrated again. The most effective mechanism for this is, somewhat counter-intuitively, a **variable interval schedule**, where a player is rewarded after demonstrating the behavior a certain number of times but on an uneven schedule that cannot be predicted.

Motivation

A key concept of gamified learning is encouraging **motivation**. The argument is that gamified learning is more effective because the learner is more motivated to complete the learning. This motivation comes because they are more engaged and are having fun. However, there are two different kinds of motivation, and good gamified models make use of both. The first type of motivation is extrinsic motivation—the motivation that comes from outside the learner and is often developed through rewards and punishments. The second type of motivation is intrinsic motivation, which is when a person undertakes an activity for its own sake, the feelings of enjoyment, learning, and accomplishment they receive from that activity. Kapp (2012) explained,

When people are intrinsically motivated, they tend to be more aware of a wide range of phenomena, while giving careful attention to complexities, inconsistencies, novel events, and unexpected possibilities. They need time and freedom to make choices, to gather and process information, and to have an appreciation of well-finished and integrated products, all of which may lead to a greater depth of learning and more

A good method of thinking about motivation is through John Keller's ARCS model (2009). Keller explained that motivation has four main characteristics:

Attention: Good learning must gain the attention of the learners to pique their interest in the content. There are different kinds of attention (or arousal). Perceptual arousal means gaining attention through specific relatable examples, incongruity or surprise. Inquiry arousal involves stimulating curiosity by presenting a question that the learner is interested in solving. Variability in delivery method is important too, as it can be used to hold the learner's attention.

Relevance: There are three different methods of ensuring relevancy: goal orientation, which means orienting the learner to the importance of achieving the goal and explaining how it will help in the future; familiarity, which is related to linking new knowledge to existing knowledge; and modelling the learning of new knowledge.

Confidence: If learners are confident that they can learn the material, they tend to be more motivated.

Satisfaction: If learners are satisfied with the experience and believe that the learning has value, they will perceive the experience as being worthy of continuing the effort.

Distributed Practice

An element of gamification related to cognitivist theories of learning is the idea of distributed practice. This element has different names. Sometimes, it is called "spaced learning" or "spaced practice." It is the idea that learning is more efficient if it is spread over multiple shorter sessions, rather than in one long session. Distributed practice helps learners remember information over long periods of time because the spacing prompts deeper processing of the learned material.

Social Constructivism

Social constructivist theories of learning often refer to Vygotsky's Zone of Proximal Development (1978). This is the idea that we learn best when the learning is pitched at the right level. If it is too easy, we don't learn. If it is too hard, we often struggle or give up. Scaffolding is a pedagogical approach that is used to assist in structuring the learning to ensure that learners receive the appropriate level of support in the Zone of Proximal Development. Scaffolding is like the use of levels in games and gamified learning. As Kapp (2012) stated,

Scaffolding and the use of levels in games provide educational advantages but also maintain interest in the game as a player moves from level to level having different experiences and achieving success as he or she progresses toward the ultimate goal. The levels usually become more difficult and challenging as the players move toward the end of the game, and the skills they exhibit at the final level would not be possible without the experience of playing the preceding levels. (p. 67)

Learn More About Social Learning Theory

To learn more about Social Learning Theory, we recommend reading another chapter from this textbook titled [Sociocultural Perspectives on Learning](#) by Allman, Casto, and Polly.

Social Learning Theory

Finally, Albert Bandura's social learning theories (1977) are sometimes present in gamification too, often in the form of cognitive apprenticeships and modelling. Modelling is the process by which people learn to behave through observing,

desired behavior through modelling.

Advice for Using Gamification Effectively

As stated earlier, gamification is popular in many settings. However, this can sometimes work against educators, as learners might have had previous bad experiences with gamification. The overuse of some elements of gamification and poor gamification design has led to a level of mistrust in learners, subject matter experts, and content owners. Because of this mistrust, they are resistant when educators suggest gamification of a specific learning activity. Understanding good gamification and how it is different from what has gone before will help educators make a better case for these design approaches.

When poor quality examples of gamification are reviewed, the following elements of game design are often over-represented:

- conflict, cooperation, competition
- levels
- reward structure
- goals
- abstractions
- rules

There is a reason these elements are commonly overused, as they are cheaper and easier to apply to learning activities. They also link back to the discussion about creating activities that are suitable for learners and their contexts, as well as the idea of the elements being used to create something that is greater than the sum of its parts. Many of these elements, when used on their own, create activities that are overly competitive, lead to short-term engagement without learning, or are inaccessible to a variety of learners.

In contrast, the list of underused elements is shorter. It contains all the elements that are more difficult to apply, and yet lead to richer, more robust learning activities.

- feedback
- storytelling
- aesthetics
- replay or do-over opportunities
- time (when used as a motivator or distributed as a finite resource)

Not all elements of gamification can be considered equal. In fact, some elements are more impactful than others.

Figure 3 presents a framework developed by Seldon and Kolber (2017) about the relative importance of various gamification elements. For example, while rewards will provide slight gamification benefits, the strongest benefits and most transformational changes come from introducing strong storytelling and elements of discovery to the learning. It is not that rewards, competition, rules and so on are not useful in gamification. Rather, on their own and without higher order elements, the lower order elements risk alienating learners, driving engagement without actual learning, or simply being inaccessible to a reasonable percentage of your learners.



Figure 3. Change and Gamification

To gamify effectively, educators should start with a purposeful approach to these elements and choose them based on the specific learning outcome required as well as the strength, weaknesses, and contexts of the learners.

An Example of Effective Gamification

To see these elements in play, you may view the following example of a gamified learning resource. It is a [VR experience of a bushwalk in the endangered Cumberland Plains woodland.](#)

First, note that this resource is not a game. It is a virtual learning experience designed to provide information to school students who are 5–16 years old. It could have been created solely as an educational webpage with images and text about plants and animals, but the designer added elements of gamification to create a more fulfilling learning experience.

The resource displayed above has the elements of aesthetics, feedback and discovery, replay or do-over, and time (See Figure 2). As a learner moves through the space, they are able to explore a high-quality image with surround sound in an immersive way. The interaction icons are small and do not crowd the viewing space. Also, the map in the top right-hand corner helps to orientate the learner in the virtual environment.

The learner makes choices about where they visit and what they look at by selecting question marks to learn about the space and by using arrows to move around. Each question mark gives the learner feedback about what plants, animals, insects, and hazards they might find in that ecosystem. The question mark was chosen and used deliberately to increase the learner’s motivation, attention, sense of discovery, and sense of choice. If the icons had been chosen to represent what was located at that point (e.g., a plant, animal, or insect), learners might only select what they think they are interested in instead of discovering all the different and interesting parts of a functioning ecosystem.

The ability for a learner to move through the walk as many times as they want, or even jump to a specific location using the map, gives them the opportunity to explore at their own pace. This feature also ensures they feel safe and confident to revisit places and information as many times as they like rather than pushing them through a linear experience.

This chapter introduced the concept of gamification, explored its relationship to games themselves, and discussed how the elements of gamification relate to the mechanics of games. It also briefly considered the history of games as tools for learning and noted that gamification is not something that must rely upon technology in order to be effective. This chapter also explored how gamification relates to some of the common theories about learning.

More importantly, this chapter also discussed which of the elements of gamification are most effective for learning. The notions of story, discovery, choice, and problem solving are harder to implement; however, but they are far more likely to produce meaningful learning outcomes than simpler elements such as rewards and competition. In order to demonstrate ways in which these more complex elements might be utilized, a number of examples from various contexts were discussed.

LIDT in the World

Academic integrity is an important topic at every university but is also the kind of boring mandatory training that students avoid or think they already know all about. It is therefore a learning situation that is ripe for the application of gamification.

1. Play through the scenario.
2. How has the designer used the following elements of gamification well?
 1. Feedback
 2. Storytelling
 3. Aesthetics
 4. Replay or do-over
 5. Time
3. How would you improve this example if you had an unlimited budget?

Think About It!

Encouraging a learner to discover something for themselves, rather than simply telling them a key information or guiding them through the steps of a skill, is a key part of constructivist pedagogy. This example of gamification turns away from the traditional short video and quiz format. Instead, it challenges high school students to discover the key parts of computational thinking and develop their own working definitions.

1. Complete the learning task.
2. Evaluate how this approach is different from watching a short video about computational thinking.
3. Explain how the gamification approach in the Learning Check above is more difficult to apply.
4. Imagine that you need to pitch or sell a gamified learning activity to your manager or supervisor. What talking points should you prepare to help explain why simplistic approaches of design are not always the best approach to gamification in instructional design?

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