



The Gamification of Learning

Learn the fundamental elements that make up the gamification of learning and how you can apply them to your unique classroom environment.



3P Learning

Introduction

Games and playing games are as old as civilisation itself and at some stage in life, be it adult or child, we have all played games. Whether this is playing football in the park, a board game at home or simple word games on a long journey, playing games is part of what makes us human. The 'gamification' of learning allows us to take the concepts of games, with the associated fun and enjoyment and combine this with the instruction, practice and feedback that is necessary for effective learning to occur. Such gamification results in learners becoming more engaged and importantly in them enjoying the learning process.

Crucially, when students are engaged and enjoying the learning process, they are typically able to focus on a learning task for longer, and are likely to demonstrate improved retention of the content they are attempting to master. This eBook is perfect for teachers that are looking to better understand the concepts behind a 'gamified' learning environment and are looking to integrate this into the classroom.



Exploring Gamification

Harnessing the excitement and fun of games to aid learning is the fundamental concept behind the gamification of learning. This involves incorporating and integrating game elements within the learning environment to maximise the enjoyment and engagement that learners experience through playing games in order to support specific learning objectives.

Gamification of learning often goes hand-in-hand with eLearning. However, there is no reason why the elements of gamification cannot be brought into a more traditional classroom environment. When gamification is effectively integrated into the learning environment it should:

- Capture learners' attention;
- Challenge them;
- Engage and entertain them;
- Teach them.

You will have almost certainly experienced gamification outside of a normal gaming environment. This could be reward points on a supermarket loyalty card, scaffolded targets on a fitness app or even frequent flyer miles on a credit card. Gamification can prove extremely effective in various areas of life to build in an element of fun and reward.

Breaking down and analysing the elements of an existing game is a good way to help introduce the elements of gamification. The classic board game *Monopoly*, where players compete to 'monopolise' the properties on the board, has a number of gaming elements that make up the game mechanics. There are clear rules and the element of competition as players move around the board and attempt to amass properties. There is also an element of co-operation as players can barter for properties or lend money. There are points in the form of money and game pieces such as the car, top hat and battleship, that act as a form of 'avatar' to represent each player within the game. Levels are represented by the houses and hotels that can be built on properties and the elements of risk and chance are created with the dice and randomly selected cards. There are also clear objectives for players to work toward in the form of collecting money, buying properties, building houses and hotels and ultimately dominating the board. It is not necessary to have all of these elements built into a game, although all games contain some combination of these elements. Gamification refers to the process of applying these elements outside of a normal gaming environment and therefore the gamification of learning is incorporating these elements into a learning environment to support specific learning objectives.

What is a game?

Before diving into exploring the concept of gamification it can be useful to answer the question; what exactly is a game? With everything from simple car games to online multiple player computer games such as *Call of Duty* considered games, the term 'game' clearly covers a broad range of activities.

Having a goal is a crucial element of turning simple play into a game; running around in the playground could be considered play, but once the goal of one player tagging the other is introduced this is instantly turned into the game of tag.

Content and structural gamification

Content gamification refers to when elements of gamification are built into the content itself. This can be done by interweaving elements such as story, challenge, curiosity, mystery and character into the learning content. An example of this could be adding the element of story and mystery to a maths problem as students have to navigate their way through a fantasy world solving equations to move onto the next section, uncovering a small part of a 'master' equation for each smaller problem they solve. It's not necessary to turn an entire lesson into one large complex game. Instead it can suffice to add elements of the gaming experience to the content that needs to be learnt in order to increase the intrigue and engagement of the learners and, critically, to support the learning objectives.

An alternative to content gamification is structural gamification. This is when the learning content is very much kept the same, but the structure around the content is gamified. A typical way to implement structural gamification is to take the scoring element of games, such as points and leaderboards and apply it to a simple quiz or test. Students could earn 50 points for watching an instructional video or reading a chapter, then an additional 20 points for each correct answer on a follow-up quiz. The top 5 students could have their names written up on the board, with a small prize to those that get on the leaderboard two weeks in a row.

Structural gamification does not alter the learning content, just the structure around the content. This can therefore be a simpler method to implement within the classroom while you're experimenting with gamification. However, it's important to be mindful that simply adding points and leaderboards will only motivate students in the short term and a combination of interesting content, complemented by the additional reward systems that structural gamification can facilitate is necessary to achieve longer term engagement from students.



Concepts of Gamification

Scaffolding

Within education the term 'scaffolding' refers to offering easier tasks with more support at the beginning of the learning process, and then gradually increasing the difficulty and removing the support as the learner improves their skills and knowledge and are able to complete more difficult tasks. This is very similar to the concept of levels within games. To apply this concept within a gamified environment could simply involve increasing the difficulty of quiz questions with the support of a live peer or instructor/teacher. Alternatively it could involve a series of tips on level one of a game that are gradually removed as learners move towards the next level. If scaffolding is applied correctly, by the end of the game the learner will be able to accomplish tasks that would have been impossible at the beginning of the learning process.

Techniques for adding scaffolding to your gamified learning environment include:

- Provide tips - this can be as the learner progresses, available at any time or after a set number of attempts at a question.
- Offer the chance to narrow the number of incorrect options in a multiple choice question (consider the 50:50 option in *Who Wants to Be a Millionaire*).
- Provide options for the learner to ask for help throughout the game. Without this, learners can become frustrated and disengage from the process.

Motivation

Elements of games undoubtedly have the ability to motivate people, otherwise people simply wouldn't play games. The reason people are motivated by gamification fits neatly into the basic three elements of self-determination theory:

- 01 Autonomy** - People are motivated when they feel that they have a level of control over their lives. The learner should be made to feel that they are influencing their own learning experience. This could be as simple as offering two levels of difficulty in a question or could involve offering the learner multiple routes to reach a finish line or achieve an objective.
- 02 Competence** - People are also motivated when they see themselves mastering a task. This can be achieved by starting off with easier content and then increasing the difficulty as the learner achieves small milestones of learning along the way before they are introduced to more difficult content, building both competence and confidence as the learner progresses.
- 03 Relatedness** - This refers to the motivation that people get when they feel connected to one another. By making the learning experience a social or shared experience with leaderboards or teams, learners obtain motivation from being able to share and discuss the experience with others.



Concepts of Gamification

Intrinsic and extrinsic motivation

Intrinsic motivation refers to the internal motivation that comes from within the individual as they learn. Extrinsic motivation comes from rewards such as prizes or payment that an individual receives that are external to the core learning process. Gamification is often criticised for relying too heavily on extrinsic rewards. This is an easy trap to fall into when attempting to gamify the learning environment. The key is not to view the two types of motivation as opposites, but to view them as complementary. A much better solution is to offer extrinsic motivation in the form of reward points and leaderboards in combination with carefully crafted content that allows students a feeling of mastery and competence as they work their way through the content.

Episodic memory

Episodic memory refers to memories, often intensely strong, of where a person was and what they were doing at a time when they felt strong emotions. As strong feelings are often experienced from playing games (for example joy at winning), it is often possible to anchor information in a player's memory and improve recall from gamification. There is no magic formula for utilising episodic memory in a gamified environment, but there are certain aspects that can be included in order to help encourage episodic memory:

- Add fun to the learning experience
- Use contrasting elements that would not typically go together - such as dinosaurs in a school
- Reward winning, but do not punish/penalise losing
- Balance gaming elements with learning objectives to engage the learners in both the game and the learning process



Gamification Formats

Race games

This format will be familiar to many from computer games such as *Mario Kart* or even the board game *Snakes and Ladders*, where competitors race to be the first to a finish line. There is even a race component in the earlier example of *Monopoly* - although there is no set finish line, players are incentivised to move around the board as they receive money each time they pass the starting point.

In a learning environment a race format can be used as learners race to get to the top of a leaderboard, or answer questions as they move across a board to reach the other side.

Collect to win

This dynamic is where players collect or acquire pieces while playing the game, whereby either the player who collects the most pieces is the winner, or the pieces give the player an advantage along the way to achieving another objective. An example of a collect to win game is *Pokémon* or even a football sticker book. Even games such as the original Mario games have an element of collect to win as collecting coins gives a player an advantage in the form of additional lives.

Collect to win can be used effectively in an educational setting by setting up a scenario where players have to collect pieces of information in order to answer a larger question or uncover a mystery. This complements the competence element of self-determination theory of motivation as each piece of the puzzle that a learner uncovers serves as its own miniature reward.

Mystery and discover

Cluedo is a great example of a game based around mystery and discovery. Players have to move around the board uncovering clues in order to solve a fictitious crime. Mystery and discovery games motivate players as humans do not like open loops or unanswered questions. Players are therefore motivated to play the game and uncover the information needed to close the loop and solve the mystery.

Mystery can provide clear benefit in a learning environment, particularly if some form of investigation is necessary. To apply a mystery format, encourage your students to solve clues in order to uncover more content all building towards uncovering the overall mystery. This could be a series of smaller maths problems that uncover elements of a larger problem bit by bit as learners move around a board.

Consider trying to create intrigue from the very start of the game. An example of this could be instead of setting out the learning objective as learning to apply long division, the objective could be "Can you apply long division?" or "The long story of division", depending on your audience.



Gamification Formats

Strategy games

Strategy games have seen a recent surge in popularity with games such as *Grepolis* and *Clash of Clans* available on mobile. In these games players build cities and use strategy and collaboration with other players to turn these cities into empires within the game. Probably the oldest and most well-known strategy game is *chess*. In chess players have to protect their king whilst simultaneously attacking the other player's pieces, always having to think a number of moves ahead.

Integrating strategy into learning situations is more difficult than integrating dynamics such as a race or collect to win. However, there are a number of things you can do in order to add strategy elements to a game:

- Include opportunities for players to trade game elements either with each other or with a game master (e.g. the Banker in Monopoly)
- Reveal information slowly
- Reward unique solutions to the game
- Reward learners for predicting outcomes of other players or the game itself

Construction and creation

The beautifully simple *Mine Craft* is currently by far the most popular construction and creation game. Players use cuboid blocks to build whatever they wish within a 3D environment. Mine Craft's popularity comes from the way it facilitates players' creativity. Players have built anything from a simple house, to replicas of spaceships and even scale versions of the Taj Mahal; all made one block at a time by players simply to express their creativity.

The construction dynamic can be an effective tool for teaching geometric shapes or could be combined with a reward structure, whereby a series of smaller rewards can be combined together to build something larger that the player would like, in order to add an extrinsic incentive to the learning process. People often like the opportunity to share and show-off what they've built. This can work well to add a social element and motivate learners to discuss the learning process.

Additional dynamics

This is not an exhaustive list of every type of game dynamic. Additional dynamics such as pattern recognition, as well as off-shoots of those mentioned above such as the escape or allocation dynamics also exist and can be useful in the gamification of learning.



Elements of Gamification

Goals and objectives

Defined goals are arguably the most fundamental aspect of games and gaming. Clear goals and objectives ensure that players have a purpose and focus while playing the game. Goals should be clear and visible; this provides players with feedback on progress and increases motivation. Without a clear goal it's impossible for players and learners to understand if their efforts are getting them closer to the overall objective and to ultimately decide who wins the game.

Having a clear goal also gives players the autonomy they need in order to achieve the goal in new and creative ways. Bear in mind that goals and objectives are an essential element in games, but that you should balance these with the learning goals. Too much of a focus on gaming goals runs the risk of distracting from the learning objectives that the game elements are there to support. Goals should be made up of small incremental steps towards an ultimate goal in order to reward players for their progress and keep them engaged.

Rules

Clearly established rules are another essential element of games and gamification. Rules provide the guidelines that players use to achieve the goals. Offering a framework that all players can work within ensures that they compete on a level playing field as they work towards the objectives of the game.

It is a good idea to test out the rules in a pilot session before rolling out your game. This is because humans are endlessly creative and will discover unintentional loopholes and shortcuts within your rules that you may have overlooked when putting the game together.

Conflict and competition

In a gaming setting, conflict refers to a scenario in which players can actively stop each other from succeeding. Competition, refers to when players can focus solely on maximising their own performance and cannot influence the performance of their opponent. Within the gamified learning environment it's better to use competition rather than conflict so that learners focus on their own performance and are not incentivised to obstruct the learning of others in order to win the game.

Cooperation

Adding a social element to gamification can be highly motivating as individual learners feel that they're contributing to group progress. Sharing the experience and having an opportunity to discuss the learning can not only make the learning process more enjoyable, but the discussions can also help to reinforce the learning itself.

To incorporate cooperation within your game, try splitting a larger group into smaller teams or add in useful resources for players to exchange and barter with in order to gain an advantage.



Gamification Formats

Feedback

Games use almost constant feedback as players move through the gamified environment. This feedback typically takes one of three forms:

- 01 Conformational feedback** - This indicates the degree of 'rightness', but does not tell the student how to correct the action.
- 02 Explanatory feedback** - Which provides an indication as to what was done wrong.
- 03 Diagnostic feedback** - Which tells the player what they did wrong and why, and steers them in the direction of correcting the action.

When you're developing your gamified learning environment be mindful of what type of feedback you would like to provide your learners with and how this will be delivered. Conformational feedback can be provided within the game via a dead-end or a correct or incorrect answer to a question. Explanatory or diagnostic feedback is slightly more complicated and may need to be provided via cue cards, or by the educator in person.

Rewards and achievements

When implemented properly rewards and achievements can be a powerful motivating factor in the gamification of learning. However they do need to be implemented carefully as there are a number of common errors that can lead to demotivating learners.

A disproportionate focus on in-game rewards can distract from the learning objectives. When using rewards it is important to be aware of what actions you are trying to incentivise and ensure that these actions are closely linked to the learning objectives.

Points and leaderboards

Points and leaderboards play a crucial part in the gamification experience, allowing learners to monitor their own progress against the learning and game objectives, as well as against other players. Points can be used to unlock levels or additional information and can be an effective part of the reward system.

Displaying player points on a leaderboard provides a chance for players to interact with each other and discuss the game, adding a visible element of competition and an incentive for players to play the game again and again.

When designing leaderboards it's advisable to keep the number of players involved to small groups. If players perceive that there is no realistic chance of them making the leaderboard, the process can be extremely demotivating. Keeping the groups relatively small means that no player is ever too far from the top.



Elements of Gamification

Levels

When developing a game it can be tricky to benchmark the difficulty level in order to keep learners at the proximal level of development. This is where levels come in. By providing multiple difficulty levels it's possible to integrate players of different abilities, giving your game a broader appeal.

Multiple difficulty levels can be achieved by creating easy, medium and hard questions, or by offering different levels of support for each question. Letting players choose which level they play at can increase engagement as it gives users a level of control over their gaming experience, offering more points for playing at more difficult levels can then incentivise players to push their learning within the game.

Storytelling

Stories are present to some degree in a large number of games, but not all. Storytelling within games offers a unique opportunity for an interactive story, which can be hugely engaging. Storytelling can work well within a gamified learning environment as it helps to add context and apply the game to real life situations.

Story can also be a useful tool in order to help guide characters through the game towards the game and learning objectives. The key elements of storytelling to consider are characters; plot; tension and resolution.

Failure and repeatability

Failure is an important part of the learning process and should be built into learning games. Allowing failure with minimal consequences allows players the freedom they need in order to take the risks that are necessary to drive their learning forward and achieve the learning objectives. Games are a perfect environment for individuals to explore the boundaries of a concept as they have the opportunity to experience and learn from failure within a controlled environment. Building in failure can be as simple as rewarding success without punishing incorrect decisions and actions too heavily, along with giving players the opportunity to redo questions and activities if they fail at the first attempt.

Scoring

It is important that learners are aware of whether their efforts are moving them towards success. As the game designer it's important for you to actively guide learners towards the learning outcomes you desire. Scoring is a major component of gamification and a very useful tool in helping to achieve these objectives.

When designing a scoring system consider the following aspects:

- 01 The scoring system should be transparent** - It should be clear how players can increase their score and how this relates to winning or losing.
- 02 Use scoring to drive behaviour** - Players will try to maximise their scores, so it's important to ensure that, in doing so, players are moving towards the learning objectives.
- 03 Consider using multiple scoring methods simultaneously** - There may be more than one type of behaviour that you want to drive. For example, offering points for both speed and accuracy will help to drive one behaviour, without compromising the other.



Implementing Gamification

To implement gamification within the classroom there are several useful guidelines that should be considered:

- 01 Start instructions with action** - A long list of text instructions can quickly disengage players (particularly younger students). Starting off with an easy introductory level with the aim of teaching players the game is infinitely more engaging than long paragraphs of text instructions.
- 02 Play some games** - To help to understand the dynamics and elements discussed in this eBook it will be extremely useful to simply play some games yourself and then try to identify specific elements and think about how you could use these to support the learning objectives you may want to achieve.
- 03 Learners need to be challenged** - Setting the right level of challenge in gamified learning can be tricky, but get this right and learners will enjoy the challenge set whilst working towards the learning objectives.
- 04 Add mock risk** - Adding some form of mock risk, such as moving back a space for every question answered incorrectly, can build tension and increase players' emotional investment in the game.
- 05 Provide an opportunity to demonstrate mastery throughout the process** - It's important that players can see the progress they're making; this can be done in the form of progress bars, running points tallies or an avatar moving through the game. However this is achieved, it's important to let each player see that they're making progress and mastering the topic to keep motivation levels high.
- 06 Immerse learners in a story** - Giving actions and ideas a contextual meaning is an extremely powerful way to increase both engagement and information recall. For thousands of years humans have told stories to help pass on information, by integrating characters that encounter a struggle and then find a way to overcome that struggle - a simple but effective story can be integrated within the gamified learning environment. This is your chance to get creative; you can base the story on an existing story, use a role play relevant to the learning objectives or really let loose and think up something wild and wonderful to completely immerse your students in the learning experience.

Gamification in the classroom

There are infinite options for gamification of learning within a classroom environment. Here are some examples that are easy to implement and can prove extremely effective:

- 01 Trivial pursuit format** - Modifying the questions within the trivial pursuit format is an easy way to gamify a quiz format. From here you can experiment with adding in and taking away game elements to see the effect on the learners.
- 02 Learner designed games** - Get small groups to design a game involving the learning content, then get the groups to swap and complete each other's games.
- 03 eLearning** - There are a plethora of gamified eLearning solutions with varying levels of sophistication. They can be extremely engaging for students and often offer the ability to mark questions and provide instant feedback automatically, freeing up the educator to focus on the intricacies of teaching.

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