



The effects of gamification on learner intrinsic motivation.

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## Abstract

Whereas gamification is enjoying considerable attention, there are many who are sceptical due to its use of extrinsic motivators. Nevertheless, it is important to observe gamification's effects on intrinsic motivation before disregarding the concept. There are numerous gaming elements which are intrinsically motivating and prove valuable for use in education. One example of this is the abundance of skill- and topic focused tasks in gaming. By adopting this focus, learners are likely to spend extra time on tasks and show increased engagement. A common yet less effective application is reward systems. Whereas these are a cornerstone of gaming, the use of extrinsic reward leads to a reliance on outside stimuli and underdeveloped intrinsic motivation. An exception to this is "leaderboards", which provide learners with an overview of their progress which acts as a strong intrinsic motivator. The correct situation in which to apply gamification should also be considered. Classrooms where intrinsic motivation is low are helped the most as gamification provides increased engagement and interaction. However, classrooms with an already established high intrinsic motivation show negative results when gamification is introduced due to the "overjustification effect". It is therefore important to provide learners in these classes with choice regarding gamification.

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## Introduction

Candy, stickers, buttons, stars, and other forms of reward have carved out a place for themselves within education. These extrinsic forms of motivation have been made commonplace within classrooms and are part of an ever-expanding arsenal which teachers might employ to help engage their learners. A recent and controversial addition to this arsenal would be the notion of applying elements found in gaming to the classroom. This aspect, coined "gamification", has enjoyed an overwhelming upsurge in popularity ever since its initial classification in 2010 and is predicted to continue this meteoric rise in the near future (Burke, 2012). Whereas gamification has taken the educational world by storm, the effects represented by such reward systems grounded within the principles of extrinsic motivation are under heavy scrutiny from many experts within the field of education as they do not promote the development of intrinsic motivation (Lepper, Corpus & Iyengar, 2015). This has led to some denominating gamification as meritless as it heavily employs the use of these reward systems designed to extrinsically motivate learners. Before dismissing this new and exciting tool, however, it is important that we remember to take the time to explore the actual effects of gamification on learner motivation. Whereas it is true that many aspects of gamification are extrinsic in nature, the application of extrinsic reward in a new vessel could prove beneficial to learner intrinsic motivation which is a desperately sought-after property by teachers. This essay endeavours to research in which ways gamification influences learner intrinsic motivation by exploring previous research into the application of gamification on groups with a previously low or, in contrast, high intrinsic motivation in order to establish when and in which particular application gamification is appropriate.

## Intrinsic motivation

According to Ryan and Deci's self-determination theory there are many types of motivation which can be influenced by a number of variables. These types can be classified within two categories: extrinsic and intrinsic motivation. Extrinsic motivation is defined as motivation derived from a "separable outcome", whereas intrinsic motivation is motivation derived from an "inherently interesting or enjoyable" activity (Ryan & Deci, 2000). The latter has been shown to be incredibly important for learners to achieve a high level of, as it provides learners with "a natural wellspring of learning and achievement" which contributes to the quality of learning, cognitive development, learner engagement, and creativity (Ryan & Deci, 2000). Therefore, it behoves teachers to promote inherent intrinsic motivation within learners, as this not only contributes to the positive development of the learner but could also provide a strong foundation, a willingness to learn, and a natural enthusiasm on which educators can rely. Due to intrinsic motivation's reliance on activities being interesting and motivating, it is important for teachers to take this into account when designing their material. Gamification offers teachers the opportunity to redesign their curriculum to include elements from one of the most popular media among adolescents, videogames. This not only makes an activity more interesting and engaging to a learner, thus bolstering intrinsic motivation, it also shows that the teacher is willing to share in learner interests which is important when creating a safe learning environment, which also facilitates intrinsic motivation (Ryan & Deci, 2000). The most important thing when designing any material in order to increase intrinsic motivation, however, is that the activity itself should be viewed as the reward rather than any extrinsic reward which might be awarded retroactively (Ryan & Deci, 2000). This standard for activities shows that, while extrinsic reward might be the easiest way of implementing gamification, it might not be the most beneficial.

## Applications of gamification beneficial to increasing intrinsic motivation

Whereas gamification can be applied in many ways, only a small number of such applications have been highlighted in previous years. Goal-focused activities, reward systems, and storyline-based learning have been at the forefront regarding introducing gamification to the classroom. Most of the aforementioned are grounded within well-established research findings and provide anything ranging from minor to major beneficial effects on learner engagement. However, although these benefits might be present regarding learner extrinsic motivation, the results of some applications have been shown to have a detrimental effect on intrinsic motivation (Glover, 2013). This essay will now examine these three most popular applications and determine which prove beneficial to increasing learner intrinsic motivation.

### Goal-focused activities

In gaming, activities are clearly outlined regarding objectives, obstacles, rewards, and strategy. This outline is often disguised as a mission or quest and serves as a guide for players to achieve their desired outcome by focusing on the task at hand (McGonigal, 2011). Coincidentally, there is a clear similarity between this approach and the approach used in education, as exercises in the classroom also have a specific goal in mind and build on themselves in order to reach this goal (Glover, 2013). This similarity of using activities to reach specific goals is one of the reasons why gamification has proven to be applicable to education. The difference between gaming and classroom activities lies in the type of goals they set; games favour tasks which focus on the improvement of skills or topics rather than on teacher-set performance targets, which are often the focus in education (Glover, 2013). In gaming, skills such as organisation and creative thinking and topics such as sustainability or equality get the focus, whereas classroom activities are often centred on teacher-set performance targets such as the correct application of a grammar item. Goals which encourage skill-mastery have been shown to encourage learners to spend more time on tasks, which leads to increased intrinsic motivation and engagement (Glover, 2013). On the other hand, goals which focus on performance targets may require additional sources of extrinsic motivation in order to motivate learners to devote as much time to activities; as the goal itself is often less obviously useful and, therefore, less engaging to learners (Meece et al., 2006). Therefore, it might be beneficial to review the goals which are currently being set for learners and, rather than focus on performance targets, follow the example set by gaming and design curricula around achieving clear and prominent skills or topics in order to maximize intrinsic motivation and minimize the need for extrinsic motivators.

### Reward systems

Reward systems, perhaps the most widespread application of gamification, are often the subject of heavy debate in the world of education (Lepper, Corpus & Iyengar, 2015). Whereas these mechanisms are not confined to the practices of gamification, they frequently form the basis of the discussion around the application of gaming elements to the classroom. Games employ a number of ways of rewarding players in order to motivate them to continue playing. According to Glover (2013), a game's reward mechanisms can be divided into three categories, namely: Leaderboards, prizes, and achievements. Firstly, leaderboards are lists of all players' scores ranking them in order from best to worst. Players are motivated by the idea of climbing the board and derive satisfaction from ranking higher than their competition. In the classroom, a leaderboard has proven to be beneficial for learners who derive motivation from tracking their process over a period of time. As these learners find themselves climbing the leaderboard they become more motivated to perform better which would, subsequently, help them climb even higher. Leaderboards are a good example of how the application of an extrinsic motivator might influence a learner's intrinsic motivation as the simple act of climbing the board without supplementary reward provides the learner with a sense of accomplishment (Glover, 2013).

Secondly, prizes are a more direct way of rewarding players after an achievement and their effectiveness is determined by the players' discernment of the desirability of the prize (Glover, 2013). The difficulties which arise with the application of prizes are that different learners value a prize differently, prizes have a tendency to diminish in value over time in learners' eyes, and in order to encourage future motivation prizes should inspire further engagement rather than provide exemption from future tasks (Glover, 2013). These difficulties establish a clear problem when using prizes as the foundation of a curriculum as they provide a fragile motivational structure based solely on extrinsic mechanisms. Thirdly, achievements are a form of reward where accomplishments are made tangible by creating a virtual or real-life badge signifying the player's success. As achievements have famously been adopted by popular gaming consoles so has the number of "achievement hunters", players who derive pleasure from collecting as many of these badges as possible, grown in recent years. Despite these badges not having any inherent value, players display these achievements in order to show their prowess at a particular game or activity. Education has its own examples close to this practice, namely stickers or gold stars rewarded for exceptional work or behaviour. Achievements are more focused on small tasks or objectives, however, and are attainable by everyone rather than only the best performers. Achievements can be considered a combination of the two applications mentioned previously as they are an easy way of tracking progress for the learner as well as a tangible reward for the completion of a task. Naturally, not only the positive aspects are shared but also the negative ones, as the effectiveness of achievements is also dependent on being valued by their recipients as they rely on their extrinsic worth rather than on intrinsically motivating learners (Glover, 2013). In conclusion, reward systems are limited in the way they accomplish increased intrinsic motivation as they are too reliant on extrinsic reward. There are, however, some applications of reward systems such as leaderboards which could translate this extrinsic reward into intrinsic motivation due to the reward awakening the learners' inherent desire to track their progress and compete with their peers (Glover, 2013).

### Storyline-based learning

As the gaming industry has grown, so has it evolved into an industry focused on narrative rather than highscore. These narratives are often rated amongst the most prominent reasons why gamers enjoy their hobby to the degree that they do (McGonigal, 2011). Whereas films, books, and many other media share this aspect of gaming, there is one aspect which no other medium does as well as games in terms of story. Games have the singular quality of providing the player with opportunities to influence the narrative through meaningful choice. A game's narrative could be fundamentally different per player due to the choices they make while playing. By immersing learners in a similarly fashioned narrative wherein teacher-guided opportunities for choice are present, teachers have the opportunity to create a motivating and interesting context in which learners themselves could control the pace and manner in which learning happens (McGonigal, 2011). This provides opportunities for teachers to engage learners and gauge student interest and to create a perfect environment for skill-focused teaching. It also embodies the hypothesis that in order to bolster intrinsic motivation the activity itself should be motivating and rewarding.

## Effects of gamification on previously low intrinsic motivation

Despite various aspects of gamification showing opportunities to increase intrinsic motivation, it is important to keep in mind whether the application of gamification is appropriate within specific classrooms (Lee & Hammer, 2011). Gamification has shown signs of positive influence on learners with a previously established low intrinsic motivation (Rovai et al., 2007). There are two areas that are positively affected by the introduction of gamification which this essay will further explore: learner engagement and intra-learner interaction.

### Engagement

The increase of engagement when implementing aspects of gaming to a non-gamified area has been well-documented and there are numerous examples of this positive effect on engagement within other industries, one of which is the scientific online game *Foldit*. A tool designed by the UW Center for Game Science and the UW Department of Biochemistry, *Foldit* is a game with the purpose of predicting protein structures (Cooper et al., 2010). By opening the tool to the public and disguising it as a puzzle-solving game "players help design brand-new proteins that could help prevent or treat important diseases." (Foldit, N.D.). Naturally, introducing people without a background in molecular biology to protein development is a tremendous task. *Foldit* developers overcame this by implementing tutorial levels, a scoring system, leaderboards, clear visual cues and the elimination of industry jargon (Cooper et al. 2010). *Foldit* currently has almost 740,000 registered players of which many have contributed to scientific results in protein structure prediction in some manner. This particular example and many similar studies show a correlation between the introduction of gaming elements and an increase in engagement which leads to a generally beneficial outcome. If we would apply these same principles in the classroom, there is potential to provide a structure in which learners feel engaged and excited about learning without the need of extrinsic reward.

### Interaction

Interaction is an element which has long played a part within game-design in order to engage players and to help them overcome tremendous challenges. Games achieve the desire for interaction by designing obstacles in such a way that teamwork is often the best strategy in order to progress. A great example of this practice is found in the Pokémon games. Every new generation of games consists of two versions, each with their own exclusive Pokémon. The only way to "catch them all" is to work together and trade with others to obtain the ones which you cannot find by yourself. By creating activities in which interaction proves to be the best course of action, gamification within education attempts to raise awareness of the benefits of interaction thus increasing the amount of intra-learner interaction which subsequently contributes to an increase in intrinsic motivation (McGonigal, 2011).

## Effects of gamification on previously high intrinsic motivation

Despite these positive effects, gamification could prove less beneficial in an environment of learners with a pre-existing high level of intrinsic motivation. Many applications of gamification are designed to recognize learner achievement by means of extrinsic reward for the completion of activities. This reward-based system has been observed to have a negative effect on the level of motivation of learners with a previously established high intrinsic motivation (Groh, 2012). This phenomenon, known as the "Overjustification effect" describes the hypothesis that an increase in extrinsic motivation has a detrimental effect on learner intrinsic motivation (Lepper, M.P; Greene, D.; Nisbett, R. E, 1973). As self-determination decreases and reliance on outside stimuli increases, it gradually becomes harder for learners to develop a strong intrinsic motivation (Lepper, M.P; Greene, D.; Nisbett, R. E, 1973) which may lead to issues when extrinsic reward is no longer provided, and the learner must derive motivation from within. The fact that many gamification tactics are grounded within these principles should provoke a careful application within classrooms which enjoy a healthy amount of intrinsic motivation. Consequently, when implementing gamification in these classes it is important that learners are given the choice to opt out of a gamified element in lieu of a non-gamified activity (Glover, 2013).

## Conclusion

This essay set out to observe whether gamification could prove beneficial as a tool for education regarding the stimulation of intrinsic motivation and in what manner it should be applied. Based on a review of existing literature, it becomes apparent that while many applications of gamification are grounded within extrinsically motivational systems they could provide benefits regarding bolstering intrinsic motivation. This essay has outlined skill- and topic-focused activities and storyline-based learning to be the most effective methods of increasing intrinsic motivation by applying gamification to the classroom and reiterates the need for an adjustment of current curricula to accommodate these practises. Various reward systems might prove to be less beneficial, however, due to their roots within extrinsic properties. A notable exception to this would be the implementation of leaderboards, which despite their extrinsic nature strengthen the hypothesis that extrinsic motivation could stimulate intrinsic motivation within certain learners. Research has shown that gamification can have a positive effect on groups with a previously low-intrinsic motivation as becomes apparent from studies performed by websites such as *Foldit*. If applied to similar groups in education, gamification could help increase learner engagement and intra-learner interaction which provide a strong foundation for intrinsic motivation. Nevertheless, gamification has displayed a detrimental effect on groups with high intrinsic motivation due to the occurrence of the "overjustification effect". In order for gamification to be applied in these groups it is important to give learners the choice between gamified material and the regular curriculum. Due to this disparity between low- and high intrinsic motivation it is important to perform further study in order to fully understand the benefits of gamification on intrinsic motivation.



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