Increasing Engagement through Explicit and Implicit Gamification in Higher Education

INTRODUCTION

This chapter will consider the role of games, game-based learning, and gamification in higher education. It will discuss how encouraging student engagement is of increasing importance in higher education, and the power of successful games to engage players is something that is highly sought after in higher education. This has led to the introduction of games for teaching and the adoption of game related teaching strategies. This adoption of game-based approaches is an area of ongoing research, in terms of the appropriateness, effectiveness and applicability of games and game-based strategies to teaching. The authors will present definitions of the related but distinct terms "game", "game-based learning" and "gamification" and will consider the underlying psychological factors that motivate players to play.

The issue of engagement for higher education is a significant one, with retention and attainment seen as key challenges for the sector globally. The chapter demonstrates how the concepts of intrinsic and extrinsic motivation drive engagement with both with games and with teaching and proposes that engagement with both games and learning are driven by these same types of motivations. This blurs the line further between what can be considered gamification and leads to the proposal of the concept of explicit and implicit gamification.

To illustrate this concept a visualisation of the relationship between game and game like artefacts associated with learning, charted in a conceptual space based on their membership of explicit or implicit gamification. To further bolster these ideas, a taxonomy of mechanics and attributes that frequently manifest in gamification is proposed. Finally, an example of the relative alignment of game-like mechanics with desired outcomes or goals is presented – highlighting the need for careful consideration when attempting to incentivize specific behaviour.

BACKGROUND

In this section, the authors briefly outline the importance of student engagement in higher education, and the desire to draw inspiration from games including a description of perspectives from games design on the potential of games as general learning and teaching artefacts, and the role that all games take learning. Next, some definitions of important relevant terms games, game-based learning and gamification are offered. Following this, some theories of motivation of engagement are outlined with explicit links to learning and to games where appropriate – highlighting some of the potential pitfalls that could arise when trying to influence specific behaviour.

Engagement in Higher Education

Student engagement in Higher (also called Tertiary) Education is of vital importance both to the success of education providers, and for the students that make use of them. The growth of Higher Education across the world (Choudaha and Van Rest, 2018) has seen increased staff-student rations and pressures on resources, as institutions adapt to manage larger classes. This growth has also created more varied student qualification profiles and a more varied student cohorts, leading to new challenges for institutes of Higher Education, including increasing issues of engagement and support and the need for differentiated teaching. Changes in student finance – such as the move in many countries to tuition fees – mean that many students try to balance work alongside their studies, whilst others must balance family and caring commitments. These changes have an impact on student engagement and attainment. In the UK, Woodfield (2014) considered many of these issues, and how they correspond to different attainment and success outcomes in different disciplines, and later work has considered how to model and approach these diverse populations (Quaye et al, 2019). Work by Gordon and Grey (2018) considered approaches to measuring engagement, as well as different approaches to increase motivation, as considered below. The political pressure to increase participation in Higher Education in many countries is also altering the nature of students, and in many cases seems to have a negative impact on the level of engagement of these reluctant students.

Motivation for Games and Gamification

In this section, a brief description of games as engaging artefacts is presented. The authors will present perspectives of games designers who argue that learning is a direct outcome of play, and that games are at their core teaching artefacts that promote a lusory attitude. The authors will also discuss challenges such as the view that play is seen as childish, and game players (Gamers) are wasting time.

Play and games are often seen as trivial ventures; however, through his work on the function of play in culture Huizinga (1971) highlights that play is a fundamental part of human culture, with an important role to play. Interestingly, Huizinga points out that the origin of the word ‘school’ “Meaning originally ‘leisure’ it has now acquired precisely the opposite sense of systemic work and training” (1971, p.148).

Game designer Chris Crawford claims that “the fundamental motivation for all game playing it to learn” (2011, p.13) claiming that the purpose of games was to learn about the game domain, solve the problems and beat the challenges it presents by developing the required skills to do so. Koster goes further to make the claim that “Fun is just another word for learning” and that games are ultimately teachers (2010, p.46) and further emphasises the link between good games as engaging experiences, and games as teaching artifacts with the definition of a good game as “one that teaches everything it has to offer before the player stops playing.” (2010, p.46).

The role of play and games in learning is well established, yet also holds some amount of stigma. As we grow older, there seems to be a drive to distance ourselves from childish things. Adults who play video games adopted the term “gamer”, rather than “player” to add legitimacy to their hobby that they dedicate so much time to. Furthermore, when chastising another for inappropriate behaviour one might ask them “What are you playing at?” yet when we embark of a learning journey, or a journey of discovery we might say that we are “playing around with an idea”. This stigma may present barriers to learner engaging in learning through the medium of games.

Definition of Games, Game-Based Learning, Serious Games, Gamification and Playful Learning

In this section, the authors make formal distinctions between games, game-based learning, serious games, gamification, and playful learning, and will suggest definitions based upon literature of each. This will set a foundation and context for the idea of explicit and implicit gamification.

Games

Many attempts have been made to define games, and once a definition for games is agreed upon, defining games-based learning comes more easily. Schell presents a detailed, comprehensive, and evolving description of definitions for games, highlighting their benefits and shortcomings finally settling upon "a game is a problem-solving activity, approached with a playful attitude" (2008, p.47) Other attempts to define games seem less nuanced, and so more elegant. Esteemed games designer Sid Meier describes games as a "series of interesting decisions." (Alexander, 2012, "GDC 2012" section), however this could be interpreted more like advice to design a game, and without more clarity many things that are not games would be consider as games.

McGonigal presents more pragmatic approach, defining games as anything that has four defining traits: a goal, rules, a feedback system and voluntary participation (2012, p.21). Some important distinctions to make are the necessity for a playful approach, which could manifest itself through voluntary participation. The existence of rules and a goal distinguish games from toys. Finally, a feedback system allows players to assess the consequences of their actions in a game and the efficacy with which they are progressing towards their goal. Under this definition, it is argued that engagement with an institution of higher education could also be considered a game for many students, as they incorporate all four of the elements McGonigal presents. Firstly, goals manifest themselves in the form of marks for modules or units contributing to an overall qualification. Secondly, rules are provided in terms of academic conduct and the requirements of a particular learning activity. Thirdly, feedback should be provided for formative and summative work. Finally, by its nature Higher Education is normally considered a voluntary level of education, though that is under pressure, as it has now become a gateway to an increasing array of careers, and with a variety of incentives or penalties to encourage students to enter Higher Education. McGonigal claims that video games are not an easy option; citing philosopher Bernard Suits eloquent description of playing a game as "*the voluntary attempt to overcome unnecessary obstacles*" (2012, p.22). Not all games are good games though, and there is active research into what makes a good game as opposed to a bad one. As such, it seems appropriate that the people who design higher education may learn something from this work into the design of good games that engage players.

Game-based Learning

Learning is a core aspect of game playing experience, and this is not lost on game designers. Game designer Chris Crawford points out "… the fundamental motivation for all game-play is to learn" (2011, p.13). Similarly, Koster makes the bold claim "…games are, in the end. Teachers. Fun is just another word for learning." (2010, p.46), and uses the example of tic-tac-toe to demonstrate that once a game system is fully understood they become boring, and the player's desire to engage is diminished. Huizinga (1938) describes how animals play according to a set of rules. The purpose being to learn how to fight, as well as establishing a dominance hierarchy in a relatively low risk environment.

Game-based learning is any learning that is acquired through engaging with a game that was not created with the specific primary goal of creating a teaching artefact. Learning can manifest itself in many ways. Learning could be embedded within the mechanics of the game, and players could learn about patterns of movement, tactics, and strategy. Alternatively, learning could primarily be included within the narrative of the game and the game world itself. Kurt Squire describes the accurate historical, cultural and geographical knowledge he acquired inadvertently through playing Sid Meier's perpetual simulation game "Pirates!" (2011). More recently, the modern action-adventure game franchise "Assassin's Creed" includes over 20 games. In each game, the protagonist uses a device that unlock "genetic memories" of their ancestors to re-enact events during a significant time and place in history. The publishers of the

Assassin's Creed franchise take great pride in create accurate depictions of the times and places their protagonist visits, and for Assassin's Creed: Odyssey even enabled players to explore the virtual environment whilst removing any risk mechanics usually found in games in a game mode called "Discovery Tour".

"Discovery Tour is a dedicated game that lets visitors freely roam Ancient Greece and Ancient Egypt to learn more about their history and daily life. Students, teachers, non-gamers, and dedicated players can discover these eras at their own pace, or embark on guided tours curated by historians and experts." (Discovery Tour by Ubisoft: Teacher learning resources | Ubisoft (UK), n.d. "Discovery Tour" section)

For this sort of incidental learning it is important that games remain authentic to their source material, to prevent the spread of misconceptions. One artefact of that is the popular YouTube channel Gamology (n.d.) which regularly publishes "Experts Reacts" videos in which an expert in a particular field provides commentary on the accuracy of the depiction of their field in video games.

Other games that have been credited with this "implicit" domain-based learning effect include titles such as Civilisation (http://www.civilization.com), Transport Tycoon (http://www.transporttycoon.com) and Sim City (http://www.simcity.com/en_US). These are typically games in which success requires strategic planning and systemic thinking. Whilst these are examples of games that can teach something about the domain in which they are set, it seems that they were created as commercial ventures, and were not specifically created with learning in mind. Rather they happened upon the potential of games to teach something almost as a by-product of playing.

These are examples of game based learning. Other games have been created specifically with the aim of providing opportunities of learning, or with the aim of creating lasting behavioural change. Perhaps the most famous example in terms of its reputation and success is "Where in the world is Carmen Sandiego" which was released in 1983 (http://www.carmensandiego.com). Unfortunately, commercial genre of games labelled "edutainment" seems to be more associated with poorly designed, poorly executed games (Goldstein, 2012). It is proposed that this is largely due to a combination of poor game design, poor understanding of learning and teaching, and a lack of funding in comparison to mainstream games. That does not mean that there is not a place for game based learning, but many games make the mistake of taking a good game and trying to retrofit some learning activity. For edutainment to be successful the primary goal, the learning outcomes must be central to the design.

When designing games specifically to be used in teaching, Grey et al propose that it is important to closely align game mechanics with the desired learning goals, otherwise there is a risk of emergent behaviour resulting in misleading models of understanding due to the mode of delivery (2017). Abbot however advocates for adapting existing games (2018). Whilst this may result in all the learning goals being embedded in the narrative which could potentially be removed there is definitely merit in delivering learning games with tried and tested engaging mechanics that provide a lower barrier to entry for players already familiar with games.

Serious Games

A generally more successful application of games for learning is the field of serious games (Burden and Slater 2008). Serious games are games that are made for a specific "serious" purpose. Often serious games take the form of training simulations. Serious games are widely used in the military, where funding is less of an issue. As well as games for training, military simulation games are also created for propaganda purposes (Chacksfield, 2009). The relative success of serious games often seems proportional to the quality of game, which is in turn linked to the available budget.

Similarly to Grey et al (2017), Supriana et al (2017) also highlight the need for learning and teaching strategies to be closely aligned to game mechanics, thus avoiding the phenomenon of "chocolate covered broccoli" – which describes serious games in which the learning material is not well aligned or integrated with the game mechanics. Lopez et al (2021) acknowledge that trainees should approach serious games with an accepting and open mind, highlighting the stigma that games are play-things. Analysis of trainees attitudes towards using Lego as a management training tool revealed that trainees perception of the usefulness of serious games was key to acceptance.

The Games for Change movement is also worthy of a mention. Games for change (http://www.gamesforchange.org) is a global organisation founded in 2004 with the primary goal of facilitating "the creation and distribution of social impact games that serve as critical tools in humanitarian and educational efforts". This represents a recent, significant, and active body in this field of research.

Gamification

Gamification is a term that describes the use of game-based mechanics in nongame contexts. Gamification is by no means a new thing, as any sort of reward system such as giving badges for achievement (as with the boy scouts) points-based loyalty scheme can be considered a form of gamification (growthengineering, 2021). Often gamification is reliant upon a layer of intrinsic motivators.

This section will briefly consider what a game is, the impact of play on learning, and the distinction between gamification and game-based learning. Next, compelling video games will be considered with reference to the motivational theory covered previously to identifying some key concepts of motivational theory that are applied to motivate players to play games. Finally, we will consider how these concepts can be applied to learning and teaching to motivate engagement. Key concepts include flow, fast feedback, continual and cumulative feedback, the importance of choice and the idea of tasks having low risk and fun failure.

Zichermann and Cunningham define gamification as *"The process of game-thinking and game mechanics to engage users and solve problems"* (2011, p.xiv). Deterding et al provide a systematic dissection of gamification beginning with the proposed definition that gamification is *"the use of game design elements in non-game contexts"* (2011, p.10). Later Kapp combines elements of a variety of definitions to arrive at the definition *"Gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems."* (2012, p.10). Werbach and Hunter also offer the definition of gamification as *"The use of game elements and game design techniques in non-game contexts"* (2012, p.26)

Stereotypically gamification is sometimes summarized as giving feedback for engagement through points, badges and leader boards. It is argued that points, badges and leader boards represent little more than another layer of extrinsic motivators (described later) (Zichermann and Cunningham. 2011; Werbach and Hunger, 2012) which can lead to undesirable outcomes. Werbach and Hunter caution that designers should not *"mindlessly attach extrinsic motivators to activities that can be motivated using intrinsic regulators."* (2012, p.62). It is proposed that if implemented appropriately badges in particular can offer the opportunity to reflect on progress to date by providing sustained competence feedback as it is proposed that carefully selected set of badges would give a visually satisfying representation of the cumulative accomplishments to date. Such use needs careful planning, to ensure that the implementation does indeed meet the needs of the learners (Xi & Hamari, 2019).

Playful Learning

Playful learning includes games, game-based learning, serious games and any other playful approach that is applied to learning and teaching. Playful learning encompasses all these things and refers to an approach to learning and teaching that adopts a lusory attitude. This more inclusive term removes the tendency to worry about distracting definitions, that can become unhelpful and exclusive. Adopting a lusory attitude can alleviate some of the stigma associated with extrinsic motivation, that can have unintended negative consequences such as narrowing focus, diminishing intrinsic motivation and increasing fear of failure. This can be especially true if extrinsic motivation is not well aligned with the desired learning behaviours. Playful learning could be framed as any practice which rejects the potential negative consequences of systems driven by metrics in favour of embracing low risk experimentation in safe spaces, encourages a process of failure and reflection, and allows participants to be immersed in learning (Whitton, 2018). It is natural to learn through play and playing with ideas and lowering the social barriers to allow for free play is conducive to this type of learning.

As demonstrated by Lopez et al (2021) order to engage with learning in a playful way participants require an open mind, which could be termed a lusory attitude. This presents a conflict between playfulness, which is sometimes seen as a frivolous activity for children, and the importance of the task in hand. The term "Serious Games" that could be considered to be an oxymoron emphasises this point – games are to some people a playful pursuit for children; they are not "serious". This distinction is also highlighted by Whitton and Langam (2019) who note that many academics consider more playful approaches to learning to be *"inappropriate and frivolous, undermining the academic nature of higher study"* (Whitton and Langam, 2019, p.1002) whilst also finding that students are receptive to efforts to make learning more fun.

Acceptance of games in adulthood is embodied in the concept of the "magic circle" (Nørgård et al, 2016) which can be described as a virtual barrier that must be crossed by players in order to engage with the rules, mechanics and narrative associated with play. Accepting the metaphor of the magic circle and result in greater intrinsic motivation, promoting exploration, reflective risk taking and participation (Nørgård et al, 2017). Parallels can be drawn between the idea of entering the magic circle as a state of acceptance and developing an open mindset (Dweck, 2017). In both cases participants are required to cultivate a specific mental state in which they can be playful, suspend disbelief, encourage risk taking and deliberate experimentation and recognise embrace failure as opportunities that are necessary for learning and growth.

Summary

In this section the terms games, game-based learning, serious games, gamification and playful learning have been introduced. Table 1 presents a summary of key differences between the various terms with respect to their use, their intended use and the degree to which the artifact is a game. These terms are not exclusive. For example, a Serious Game uses an explicit game to deliver an engaging learning experience to its players, and so is encompassed within game-based learning. However, in some cases players learn from a game (often through engaging with an accurate narrative) when the intended use for the game was to entertain rather than to be a teaching tool.

Table 1. Summary of the key differences between games, game-based learning, gamification, serious games and playful learning

	Uses a game	Intended use	Actual use
Games	Yes	Engagement in entertainment	Engagement in entertainment

Game-Based Learning	Yes	Engaging entertainment	Learning
Gamification	No	Engagement	Engagement
Serious Games	Yes	Engaging learning	Learning
Playful Learning	Maybe	Learning	Learning

The next section will bridge the gap between motivation of engagement and learning and teaching.

Games and Gamification in Learning and Teaching

In this section, the authors will consider the role of games and gamification in learning and teaching. This includes considering examples of the explicit use of games and gamification in learning and teaching, both computer-mediated system and manual systems that are not based on technology. Examples here include games for entertainment such as Sid Meier's Pirates and the Assassins Creed franchise, serious games typically used for training such as RescueSim (De Gloria, 2014) and extra-curricular activities that are games, for example Game Jams that are often competitive and sometimes incentivized by prizes. These examples of explicit gamification illustrate the application of actual games in teaching. In this section, will also the authors also highlight game like elements employed in teaching generally that are not typically considered under the banner of games – labelling these as examples of *implicit gamification*. This is consistent with other commentators and authors (Chou, 2013).

Gamification has been making an impact in business for several years (Johnson et al, 2013), but it has only recently been adopted in education. It is perhaps unsurprising that game designer turned lecturer Lee Sheldon redesigned his entire academic course as a game, using his experience as a game designer to fix flaws in the academic system resulting in his "multiplayer classroom" (2011). By using this method within institutional constraints Sheldon was able to increase engagement and improve marks by presenting his course as a game, with rules, goals, and feedback, and perhaps most importantly by introducing a playful environment. Sheldon also presents several recent case studies playing with similar concepts.

Games and gamification are emerging technologies that are expected to have a significant impact on higher education soon as more educators recognize that "games simulate productivity and creative inquiry among learners" (Johnson et al, 2013, p.20). Gordon et al present data from a study that included "natural" game-based mechanics such as multiple attempts, low risk, adaptive difficult to match skills and immediate feedback (2013). All of these are qualities that have been borrowed from games and games design. However, in some case these would be considered implicit gamification rather than explicit gamification. For example, natural game mechanics are considered implicit gamification, whereas extrinsic motivators for engagement, such as points, badges, or marks for completing work is considered explicit gamification.

Dichev and Dicheeva (2017) present a comprehensive review of gamification in education with a focus on empirical evidence of attainment of learning outcomes. The outcome of this review is inconclusive, with still more study being required. One interesting conclusion however is that *"the practice of gamifying learning has outpaced researchers' understanding of its mechanisms and methods"* (Dichev and Dicheeca, 2017, p.25) which alludes to some of the risks of gamified learning experiences, and the need to align game mechanics with desired behaviours and learning outcomes.

Kusuma et al present an analysis of gamification models in education (2018) drawing inspiration from the MDA model for game design (Hunicke et al, 2004), which places emphasis on the separation between the game mechanics as created by the designer, and the aesthetic experience of the player. Kusuma et al

identify a wide variety of mechanics that have been adopted through the gamification of education, but do not evaluate their potential to result in effective learning, of the separation between designing learning mechanics and the learning experience – which is a key feature of the MDA model. Ignoring this aspect can lead to game mechanics that are misaligned with learning outcomes.

Advances in learning analytics can also contribute to the reach of gamification, allowing more ways to monitor engagement and provide fast feedback. It was also predicted that learning analytics would reach the mainstream by 2016 (Johnson et al, 2013) which has proven to be largely accurate. In this context, learning analytics can be considered big data applied to education. Learning analytics is concerned with understanding and making decisions based upon data collected in educational domains. That data could be used to drive systems such as personalized or flexible learning facilities (Gordon 2014). Learning analytics can also be used to measure the impact of such systems.

It is proposed that there is an explicit link between gamification and learning analytics. If the desire for engagement is such that the effort into setting up a gamified solution can be justified it follows that there is a desire to understand how well the gamified solution worked, how engaged its users are and why they were engaged. The scalable technologies often used to implement such systems facilitate the collection of vast amounts of data on user interactions. Therefore, we have a large amount of data, and a desire to derive some understanding from the data. Analytics provides the bridge in between.

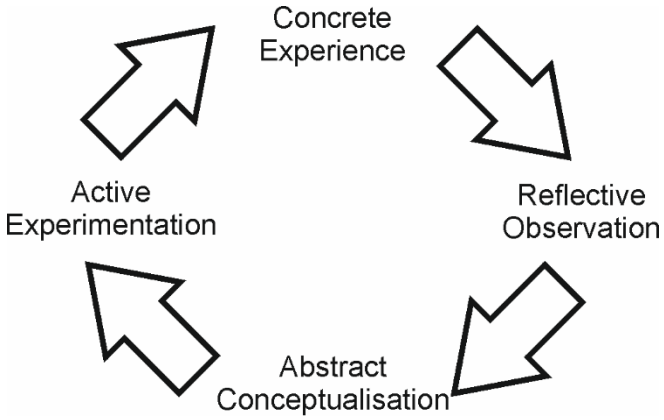
Underlying Motivation for Engagement

In all case games, gamification and game-based learning are strongly linked with motivating engagement. For games in their purest form, the primary goal of games is for the player to engage with the game. Even then though, as Crawford and Koster highlight (Crawford, 2011; Koster, 2010), games are about learning about the game itself. When there is no more to learn about the game motivation to engage in play is diminished. In a systematic meta-review of theoretical foundations of gamification, serious games, and game-based learning Krath et al identified 118 motivational theories (2021). Gamification is increasingly being used as one of the strategies and tools available in Higher Education (Aguiar-Castillo et al, 2020), however often gamification, game-based learning and other playful approaches to learning tend to focus on motivation through the provision of extrinsic measures of performance that mirror the increasingly metric driven systems found throughout institutions of higher education (Nørgård et al, 2016). This section considers three of the most popular theories in experiential learning theory, self-determination theory and the concept of flow, and their application to games, and to learning and teaching outside of games, both of which play significant roles in what makes games so compelling to players.

Experiential Learning Theory

Experiential learning embraces the idea that knowledge is learned through experience. It includes concepts of building, testing, and reflecting upon increasingly abstract mental models. Experiential learning uses experiences, reflection, reactions, feelings, and actions to consciously acquire knowledge (Valkanos and Fragoulis 2007).

Figure 1. Kolb's learning cycle (adapted from Kolb, 2014)



Perhaps the most prevalent theory of experiential learning is Kolb's learning cycle, shown in Figure 1. Kolb clarified that experiential learning requires a participant to immerse themselves fully and openly, without bias, in the experience (2014). The learners' observations must be reflected on from a variety of perspectives, to devise logically sound theories, which allow them to make decisions and solve problems. It is worth noting the importance of the role of feedback in experiential learning gained through testing and reflecting, to build better mental models of understanding.

Self-Determination Theory

Self Determination Theory is a theory of motivation in which participants of a task are motivated by the task itself. It includes the motivation to fulfil three needs; the need for competence in the task, the need for autonomy and the need for relatedness (Ryan 1982; Ryan and Deci 2000; Ryan, Rigby et al. 2006; Rigby and Ryan 2011). Competence (or mastery (Pink 2011)) refers to the feeling that participants are good (or at least improving their skills) for a particular task. Autonomy refers to the feeling that participants are in control of their actions, and that they are a result of meaningful choices that the participants themselves have made. Relatedness (or purpose (Pink 2011)) refers to the need for participants to be socially connected to others, and that individual participants are personally important to those people.

These three needs can be categorized as intrinsic motivators, which are inseparable from the task at hand, as opposed to extrinsic motivators, such as points, badges, money or marks. Facilitating intrinsic motivation is of particular importance in education. Ryan and Deci state that "intrinsic motivation results in high-quality learning and creativity" (Ryan and Deci 2000, p.55)

At this point, it is important to make a distinction between extrinsic and intrinsic motivators, as these are key to understanding Self-Determination theory. Extrinsic motivators are motivators that are separate to the desired behaviour being motivated, whereas intrinsic motivation comes from the behaviour itself. As such intrinsic motivators are typically highly dependent on the specific task involved but include feelings of satisfaction having achieved a challenging task, or progress towards mastery. Common extrinsic motivators are often less abstract because they are separated from the task. Common extrinsic motivation includes financial incentives or other rewards for work, such as marks. Motivators can also be negative sticks, as opposed to carrots, such as fines, or in academia penalties for failing to attend teaching activities.

Extrinsic motivators work well for mundane tasks; however, for cognitive tasks they can have a negative effect, particularly if the subject performing the task already holds some intrinsic motivation in that task.

Pink lists seven negative effects of adding extrinsic motivator to a task, claiming that extrinsic motivators can crowd out good behaviour, diminish performance, reduce creativity, encourage short-term thinking and cheating, become addictive, and possible worst of all, can suppress intrinsic motivation.

Pink (Pink 2011); Kohn (Kohn) and Werbach (Werbach and Hunter 2012) cite numerous studies in which the negative effects of extrinsic motivators have been recorded. Pink expands that for mundane tasks extrinsic motivators are a good technique, but for any cognitive task, extrinsic motivators can result in the detrimental effects described above.

Instead, it is better for cognitive tasks if there are intrinsic motivators. These motivators come from the task itself, and from the need fulfilment that the task itself can offer. The theory of intrinsic motivation is best embodied by Self Determination Theory, which will be explained in the following section.

In describing a "Motivational Continuum", Werbach and Hunter (2012, p.67) note that there is not a black and white divide between intrinsic and extrinsic motivators. Werbach gives the example of online role-playing games, which can be played alone or as part of a guild. He notes that certain mundane tasks such as collecting items will be performed as part of a group that would not be performed alone.
"The users need for relatedness dramatically changes the perceived nature of the motivation" (Werbach and Hunter, 2012, p.67)

Cognitive Evaluation Theory (CET) is also worthy of consideration and is considered a sub-theory for Self Determination Theory (Ryan and Deci 2000). CET places an emphasis on the need for autonomy alongside competence feedback, hypothesising that competence feedback will have no positive affect intrinsic motivation unless it is accompanied by a feeling of autonomy.

Malone et al identified that a focus in educational research on cognitive learning processes have left a comparative void in motivating learning and creating motivating learning environments (Malone 1981; Malone and Lepper 1987). To fill this perceived void, Malone et al attempted to create conditions for learning that rejected extrinsic motivators and embrace intrinsic motivators through engaging with fantasy, challenge and curiosity.

Flow

Another important motivational theory is that for Flow. Flow is the work of psychologist Mihaly Csikszentmihalyi who described his studies into the concept of happiness as the psychology of optimal experience (Csikszentmihalyi, 1990). The concept of flow describes a state of complete engagement, when a person faces a challenge is well matched to their skill that pushes them towards the limits of their ability. In the world of sports, this concept is often described as being "in the zone". That concept is illustrated in the figure below.

Figure 2 Visualisation of flow state with respect to challenge and skill

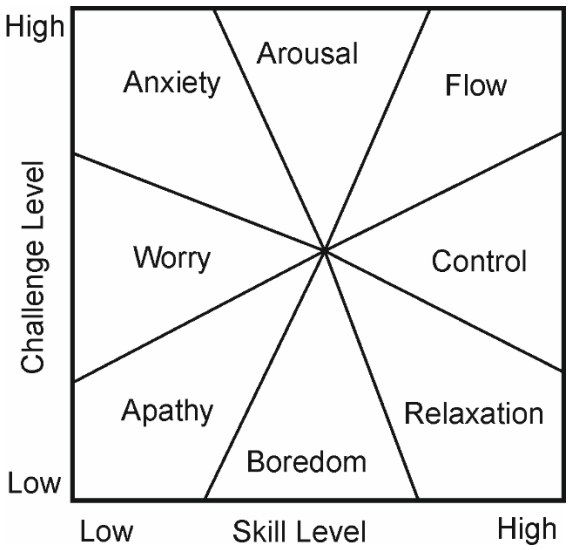


Figure 2 Visualisation of Flow with respect to challenge and skill charts relative challenge against skill level for a person carrying out some tasks, highlighting their emotions as their skill level changes with respect to the level of challenge they are facing. Consider the individual at the centre of the diagram, and the challenge level and skill level plotted relative to the individual. If the challenge of a task is less that the skill level, the individual is apathetic, bored, or relaxed. If the level of skill required by a challenge is greater than the individual's skill level then the individual becomes anxious, aroused, or in the flow state.

Flow is a valuable concept in games. Attempting to create better games, some game designers have latched on to this concept. Although it is unclear whether he was talking specifically about flow, it is claimed that Nintendo's legendary game designer Shigeru Miyamoto described directing players into a flow state in a rare interview (Desert Hat, 2009), describing how it is important to keep the player in a flow channel, enabling them to improve their skills, and to feel mastery. Games designer and founder of ThatGameCompany, Jenova Chen, based his doctoral thesis on the concept of flow in games, and since has made several successful games based around the concept of flow (2007). These examples of game designers in pursuit of the flow state are indicative of the importance of the concept. Miyamoto's description of the need to follow failure with the opportunity for the player to regain control and further improve their skills has parallels with both self-determination theory (through feelings of competence) (Ryan and Deci 2000; Ryan, Rigby et al. 2006; Rigby and Ryan 2011) and flexible personalized learning (Gordon 2013). Csikszentmihalyi states that to achieve flow "goals are usually clear and feedback immediate" (Csikszentmihalyi 1990, p.54). Feedback is a vital and recurring concept in both games as well as learning and teaching, which is reflected within Kolb's learning cycle (2014).

In summary, the role of good games is to engage players through designed experiences. Gamification is the use of game mechanics in non-game contexts to engage people towards a desired goal. People are motivated to engage through the provision of extrinsic and intrinsic motivators and require timely feedback to aid understanding and reflect upon their success moving towards a goal. This is achieved by adding a layer of extrinsic motivators; however, without care extrinsic motivators can have undesirable effects. In the next section, the authors attempt to raise awareness of these risks, by introducing the idea that any extrinsic motivation can be framed as gamification, either explicitly or implicitly. The authors also consider the potential relative alignment of extrinsic motivators with desired goals, theorizing that the negative effect of extrinsic motivation is diminished when the extrinsic motivators are well aligned with the desired goals.

SOLUTIONS AND RECOMMENDATIONS

In the previous sections, the authors have presented the case for increased engagement in higher education and highlighted the power of games to engage. Some prominent underlying motivational theories of engagement have been considered, and the risks involved in careless implementation of engagement techniques using extrinsic motivators have been highlighted. In this section, the authors will attempt to encourage consideration of this phenomenon when deploying techniques designed to promote engagement.

Taxonomy of Implicit and Explicit Gamification

As highlighted previously gamification manifests itself as a layer of extrinsic motivators to invoke a desired behaviour, and so any extrinsic motivation to engage can be considered gamification. It is important that extrinsic motivators are well aligned with desired behaviours, which in the case of learning and teaching typically refers to acquiring new knowledge or skills. In this section, the authors give examples to support the idea of implicit and explicit gamification. Any additional extrinsic motivators can be considered gamification. The institutional structures that are used to assess and monitor learning, providing feedback and marks, attaining credits and qualifications can be considered to be implicit gamification. Providing achievements, badges or points would be considered explicit gamification.

Figure 3. Game-likeness versus motivation. Examples of how some approaches fit into the space of motivation and gamification

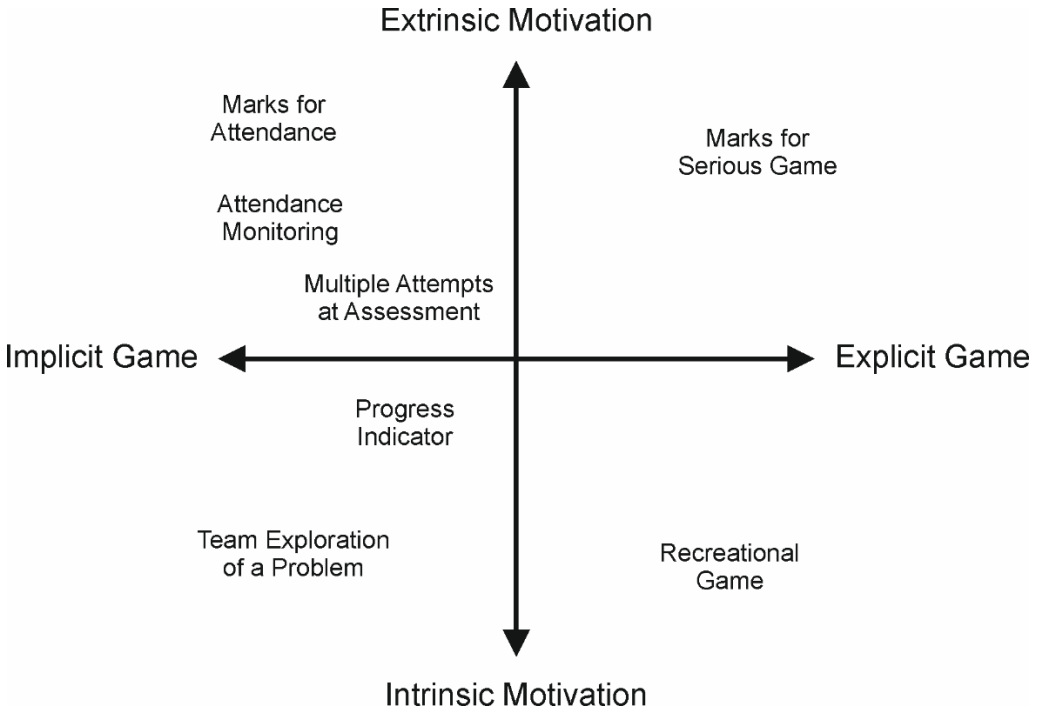


Figure 3 Game-likeness versus motivation shows how some common techniques used in higher education can be consider at implicitly or explicitly to be game-like. These techniques can also be analysed in terms of how far they provide varying levels of extrinsic or intrinsic motivation to engage with a specific task. In the case of higher education, the goal is that students learn about topics and acquire new skills. Awarding marks for work – indeed assessment in general - is considered an extrinsic motivator. Awarding marks for engaging with a serious game specifically designed to deliver the desired knowledge

and skills is explicitly a game. Awarding marks for attending a lecture is implicitly game-like because there are rules, a feedback system, and a goal. Playing a recreational game that immerses the player in a world is explicitly a game but is intrinsically motivated because the goal is to work through the game rather than to acquire skills and knowledge concerning the narrative of the game, for example.

List of Attributes Leading to Gamification

In this section the authors provide a list of game mechanics that can be applied in education, such as points, badges, leader boards, multiple attempts, fast feedback, teaching in narrative etc. (Gordon et al), particularly those that can be enabled through technology. These mechanics are presented in Table 2 and are structured as a taxonomy to show how motivation (intrinsic or extrinsic) and gamification (implicit or explicit) complement one another. Whilst these relate to the issue of engagement – the intention here being to engage students – we have not attempted here to assess how effectively they engage students.

Table 2. Taxonomy of gamification techniques

Technique/mechanic	**Description**	**Implicit or Explicit**	**Intrinsic or Extrinsic**
Attendance/access monitoring with rewards or penalties.	Checking presence at a session or accessing an online resource, with marks or other rewards for attendance and/or penalties for non-attendance.	Implicit: a reward mechanism for attempting	Extrinsic
Progress monitoring through learning resources or levels	Graphical or other indicator of progress through a session/module	Implicit	Intrinsic
Multiple attempts	Multiple attempts at an assessment activity	Implicit. Corresponds to multiple lives in a game.	
Low risk attempts/submission	Can have a go without fearing the consequence	Implicit	Extrinsic
Personalised experience	Randomisation or other approach to give a unique experience	Implicit	Intrinsic
Adaptive difficulty	Utilising knowledge or dependency structure to adapt activity to learner's performance	Implicit	Intrinsic
Immediate Feedback	To enable students to understand their current performance, and to try again	Implicit	Intrinsic
Serious Game	A game designed to teach some topic or awareness of issues	Explicit	Intrinsic
High scores and Leader boards	Enables students to understand their relative performance, and what is possible	Implicit	Intrinsic

Examples of Alignment of Extrinsic Motivation with Desired Goals

It is proposed that one method to avoid the negative effects of extrinsic motivation described by Pink (2011) is to ensure that extrinsic motivators are closely aligned with the desired goals. This is like the approach proposed by Grey et al when designing game-based learning by closely aligning game mechanics with desired behaviour (2017). In the diagram below, techniques used to prompt engagement are speculatively plotted against how well they could potentially be aligned with desired goals. This is speculative because in each case there are many factors involved. For example, awarded marks for the completion of assessment should assess that a student has achieved the learning outcomes and acquired the skills required to complete the assessment, but that is dependent on the quality of the assessment. Similarly, penalizing students or for failing to attend at a scheduled teaching activity may not be well

aligned with the goal of acquiring skills and knowledge because it is likely that some students would engage with the attendance monitoring system without engaging with the teaching activity itself.

Figure 4. Goal alignment versus motivation. Examples of how some approaches fit into the space of motivation and goal alignment

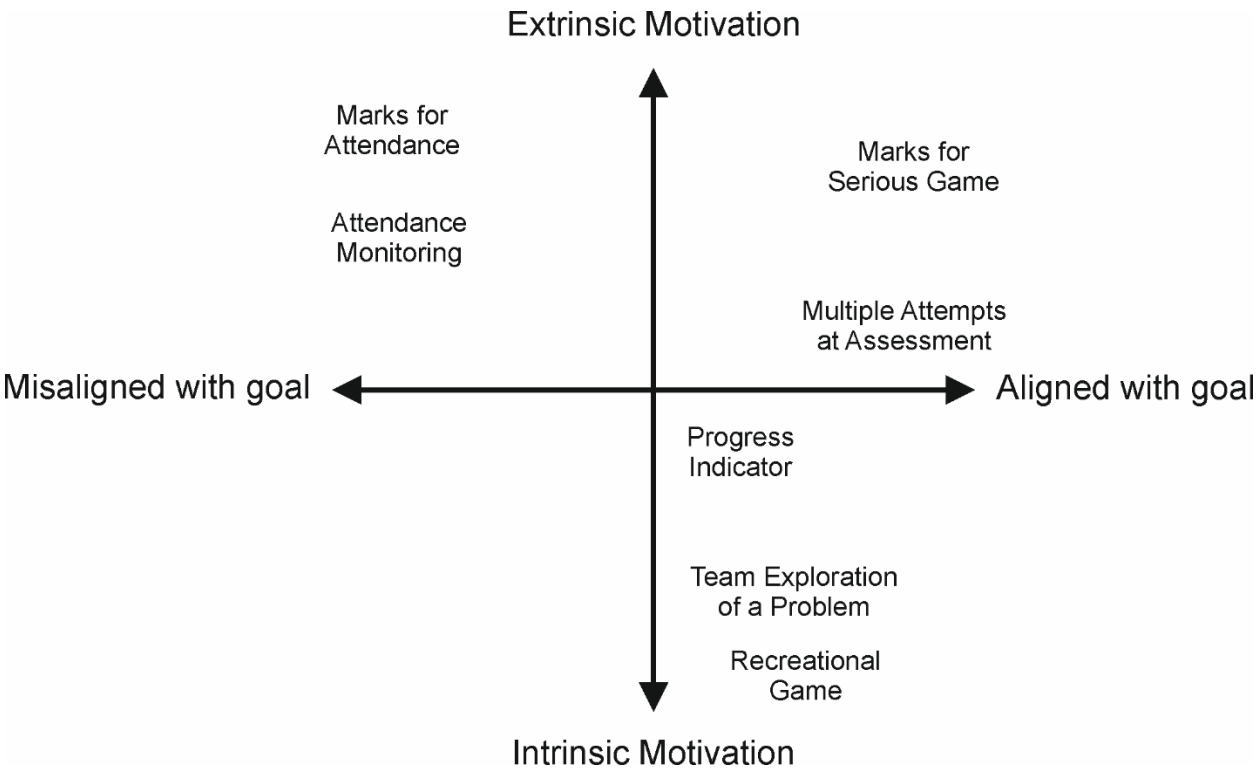


Figure 4 Goal alignment versus motivation speculatively shows how some motivation techniques fall along a spectrum of alignment with the intended goal. Features to note here are that marks awarded, and assessment of the acquisition of skills and knowledge are notionally separate from the goal of acquiring skills and knowledge. Thus, it seems that there will always be approaches in the top right quadrant. Anything concerning marks, an extrinsic motivator, would appear in the top half of the diagram.

Similarly, the bottom left quadrant is empty because it is hard to conceive of an approach that is intrinsically motivated by the desired goal but misaligned with that same goal. This quadrant will always remain empty.

Extrinsic motivators such as monitoring and awarding penalties or benefits for attendance alone are not well aligned with the desired goal, because it is very easy for students to attend and activity without actively engaging in the learning and teaching. This top left quadrant should be avoided.

The ideal space to occupy is the bottom right quadrant. In the example of learning and acquiring skills this can be regarded as learning for the love of learning. It should be noted that in this case the recreational game would be one that is accurate and immerses the player in the desired learning material, otherwise it is not well aligned with the goal – or rather is well-aligned with a different goal. This could then be considered procrastination.

Pragmatically in higher education, it is likely that most initiatives to promote engagement will occupy the top half of the diagram. It is hoped that by presenting techniques designed to promote engagement in this way can raise awareness of the risks of extrinsic motivators and encourage the use of techniques that move towards the right side of the diagram, and away from the top left quadrant.

FUTURE RESEARCH DIRECTIONS

Three are two things that digital games do particularly well that could be used in higher education. Both are related to flow. The first is the provision of challenges that are closely matched to the current skill of the students. The second is providing immediate feedback on performance. With increasing class sizes, this is becoming more and more challenging, and the two factors together present a particularly difficult problem. Providing a challenge closely matched to skill is synonymous with personalized learning. Providing fast feedback is feasible with very small student numbers, but rapidly becomes a question of automation. Automation makes personalized learning more difficult. Whilst both are theoretically achievable with appropriate resources, it is becoming increasingly challenging to achieve this whilst also avoiding slipping to the top-left quadrant of the diagram in Figure 4.

CONCLUSION

In conclusion, the authors have discussed the distinction between games, game-based learning and gamification, and have examined the underlying theories of motivation that drive engagement both in games and in learning. It has been demonstrated that extrinsic motivators for engagement are not without their risks, and these should be carefully considered. Care should be taken when implementing any initiative to promote engagement, to ensure that the necessary extrinsic motivators are well aligned with the desired goals and intended behaviour.

To demonstrate this the authors have identified some frequently used techniques to promote engagement in learning and plotted the degree that they motivate using intrinsic or extrinsic motivation against the degree that such initiatives are likely to be aligned with the intended learning goals.

The authors have identified some of the approaches to learning that gamification can enable and have shown how gamification can be applied implicitly or explicitly. How far these approaches can provide intrinsic or extrinsic motivation to engage learners has also been explored. The question of how far these are successful in engaging students, and how far they are successful in enabling actual learning, is something for further investigation. However, empirical evidence and experience of the authors has shown that these approaches do work well for some students and have value as part of the portfolio of teaching methods. The need for appropriate challenges and fast feedback has also been touched upon, and again, experience has shown that challenges can enable students to engage with their studies and can encourage students to push themselves further and thus improve their attainment. Improved engagement has the potential to improve student attainment, thereby improving their grades and potential career destinations. These measures are typically used in university rankings, and thus this can improve institutional esteem too, though that is very much a by-product and not an aim of the approach.

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KEY TERMS AND DEFINITIONS

Game-based learning: Learning through playing a game

Gamification: Promotion of engagement through the application of game mechanics to non-game contexts

Serious games: Games created for a specific purpose of learning and teaching, often in the form or training simulators

Playful learning: An inclusive term for taking a lusory approach to learning and teaching

Intrinsic motivation: Motivation to complete a task that originates from the task itself

Extrinsic motivation: Motivation to complete a task that is external to the task

Explicit gamification: Extrinsic motivation created in an explicit attempt to gamify a task

Implicit gamification: Extrinsic motivation created without an explicit attempt to gamify a task

Aligned extrinsic motivation: Extrinsic motivation that is well aligned with the desired goal

Misaligned extrinsic motivation: Extrinsic motivation that is not well aligned with the desired goal

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