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Gamification in Education: Play to learn?

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Introduction - Gamification today

Thousands of years ago the ancient Greek philosopher Plato had said "Do not keep children to their studies by compulsion, but by play"[1] (Plato, Republic 536e -537a) but then most of the world adopted a traditional teacher-centered learning approach that is considered by many students ineffective and boring. Despite the fact that teachers are always looking for more innovative teaching approaches, it is widely known that schools faced in the past and still face significant motivation and engagement issues (Lee & Hammer, 2011). Using educational games as learning tools can be a promising strategy, since they may improve not just knowledge but also fundamental skills, like problem solving, communication and collaboration. Games have a remarkable driving force. They employ a variety of mechanisms to encourage interaction, frequently without any reward, simply for the joy of the game and the possibility to win. However, it is difficult to create visually appealing and meaningful educational games and it is quite time consuming and costly (Kapp, 2012), while they usually target only a small portion of the learning objectives chosen by the educational game designer. Furthermore, the successful implementation of a game in the classroom necessitates specific infrastructure as well as training for the teachers and the students. So, the gamification method, which involves using game thinking and game design features to

[1] «Μὴ τοίνυν βίᾳ, εἶπον, ὦ ἄριστε, τοὺς παῖδας ἐν τοῖς μαθήμασιν, ἀλλὰ παίζοντας τρέφε ...», Πλάτων, Πολιτεία, 536e -537a. Retrieved October 20, 2021 from https://www.greek-language.gr/digitalResources/ancient_greek/library/browse.html?text_id=111&page=101

boost students' engagement and motivation, appears to be a more appealing method than using complex games, which need a lot of planning and development effort.

According to Deterding et al. (2011) gamification is the use of game design elements in non-game contexts and is a term originated by the digital media industry. Its first documented use was in 2008, but there was no widespread adoption before the second half of 2010 (Deterding et al, 2011). So, gamification is still a relatively new and fast evolving field. It differs from educational or serious games in that it utilizes game aspects rather than designing entire games for non-entertainment purposes. The notion behind it is that, because video games are designed primarily for entertainment, and because they can unarguably motivate users to engage with them with unprecedented intensity and duration, game elements should be able to enhance the enjoyment and engagement of other, non-game products and services as well. Gamification uses game elements like leaderboards, points, badges, rewards, etc. to attract learners' natural desire for competitiveness and accomplishment. The game-like mechanics encourage learners to participate, which consequently increases their engagement.

In recent years gamification has witnessed a huge surge in popularity with applications in many sectors, such as commerce, employment, health, even environmental initiatives. This is probably due to its extraordinary potential to guide users' behavior towards a desired direction. Ebay, Mcdonalds, Nike, Starbucks, Target, Underarmour and many other companies are using gamification to encourage loyalty, increase participation or improve their business' results. Game aspects are also used by many online educational platforms, such as Codecademy, Khan academy and IXL to further engage learners by awarding them with badges and points based on how many courses they finish. It looks like the popularity of gamification continues to rise. The

global gamification market size is projected to grow from $9.1 billion in 2020 to $30.7 billion USD by 2025 at a CAGR of 25.10% (Mordor Intelligence, 2021).

Gamification in Education - Game elements & impact

Gamification is also frequently employed in educational and learning environments. It utilizes eight game design elements: points, levels/stages, badges, leaderboards, prizes and rewards, progress bars, storyline, and feedback (Nah et al, 2014).

Points measure success or achievement. They can be used as a type of reward or asset in advancing one's goals, or as means of showing one's status. There are many different types of points, such as eXperience Points (XP) that are earned when completing a task and Steam Points that correspond to in-game currency (O'Donovan et al, 2013).

The levels/stages allow players to see how far they have advanced in the game. Initial levels are easier to achieve and require less effort, while higher levels necessitate more effort and expertise.

Badges are symbols of achievement or recognition for completing a task and can encourage students to strive toward long-term objectives (O'Donovan et al, 2013).

Leaderboards show high-scorers and total scores. They are used to build a sense of competition among learners, as they encourage them to advance their names higher on the board. According to O'Donovan et al (2013) leaderboards are the most effective in motivating the students.

Prizes and Rewards, according to Chou (2018), can take six forms. There are fixed action rewards (after a specific action), random rewards (e.g. mystery boxes), sudden rewards (not advertised or expected), lottery rewards (given to a select amount of winners by chance after a specific action), social gifting (given to one by one's friends), or collection set rewards (participants have to collect all the pieces to earn the reward). Rewards can be very effective in motivating learners (Brewer et al, 2013).

Progress bars are graphical elements that visualize learners' current position as they progress through the gamified module. They have the potential to motivate the learners who are close to completing their goals or encourage those who fall behind (O'Donovan et al, 2013).

The Storyline refers to the narrative or plot of the game. It can be fairly simple or complex. A good storyline, according to Kapp (2012), may assist learners stay engaged throughout the learning process and achieve a perfect engagement curve, with interest peaking at the beginning and the end of the story.

Finally, Feedback improves learners' engagement and performance. Frequent and immediate feedback leads to greater learning effectiveness and learners' engagement (Kapp, 2012).

Implementing the above mentioned gamification aspects in education has had mixed results in terms of students' learning outcomes, with research indicating both positive and negative consequences. Some research studies reveal that gamification in education can increase engagement, enjoyment, participation, motivation, performance, sense of achievement and accomplishment (Barata et al, 2013; Brewer et al, 2013; Gibson et al, 2013; Kapp, 2012; O'Donovan et al, 2013). While other studies reveal that some game design elements and settings may lead to negative results, like indifference,

loss of performance, undesired behavior and declining effects, such as gradual loss of motivation and engagement (Toda et al, 2018). Bogost et al (2014) point out that Points, Badges and Leaderboards (PBL Approach), without appropriate design, will not produce positive desired outcomes. Andrade et al (2016) discuss negative effects of gamification, such as lack of attention. While Markopoulos et al (2015) emphasize that extrinsic rewards, when badly designed in gamified applications, can even decrease learners' intrinsic motivation. Furthermore, some studies suggest that gamification design needs to address learners' genres and players profiles in order to be effective (Berkling & Thomas, 2013).

Effectively applying gamification in the classroom

In order to figure out why we have so different results we might need to have a look at the motivation aspect of gamification. The main objective/goal of integrating gamification in the classroom is to increase extrinsic and intrinsic motivation so that the learners will get more actively involved in the learning process. Extrinsic motivation is defined as "doing something because it leads to a separable outcome" while Intrinsic motivation as "doing something because it is inherently interesting or enjoyable" (Ryan & Deci, 2000, p.55). Gamification combines both extrinsic and intrinsic motivation. Through extrinsic motivation (points, levels, rewards) achieves learners' temporary engagement, while through intrinsic motivation helps the learners develop a sense of autonomy, mastery and a sense of belonging (Richter et al, 2015). Intrinsic motivation, which is directly connected to the Self-Determination Theory (SDT; Ryan & Deci, 2000), satisfies the learners' psychological needs: autonomy (one's ability to feel independent

and able to act in the world in a way that suits one's desires), competence (one's ability to feel effective in what one is doing; competence increases when the individual is given the opportunity to practice skills in challenges that best match one's abilities), and relatedness (one's ability to feel connected to others and have a sense of belonging).

Thus, when designing gamification strategies for education, it is important to focus on incorporating intrinsic motivation elements that will keep students engaged for a longer period of time. Learners might initially be attracted to learning due to external factors like badges, leaderboards etc. but the use of extrinsic motivational factors is not suitable for long-term engagement, so gamification designers need to consciously incorporate intrinsic motivational factors to empower students by giving them autonomy, competence and a sense of belonging.

Chou's (2018) Octalysis framework can help gamification designers identify the core drives that motivate students toward certain activities and decisions. Everything people/students do according to Chou (2018) is based on one or more of these drives that are charted on an octagon. The left side of the Octagon is associated with logic, analytical thinking, and ownership. This side is connected to the extrinsic elements we were discussing before, such as rewards, points, badges, etc. However, once these are obtained or get used to, the desired behavior is diminished. The right side of the Octagon relies on intrinsic motivation elements, such as creativity, self-expression and social dynamics. The knowledge of these 8 core drives can help educators or gamification designers understand students' motivation and develop gamification activities that increase motivation and engagement.

When developing classroom gamification activities, besides motivation, it is also important to consider Bartle's Player Types: killers, achievers, explorers, and socializers

as well as students' personality traits. According to Kocadere & Caglar (2018), the mechanics that attract learners in a gamified learning environment differ with regard to player types and this is the reason learning environments should be designed to incorporate a variety of elements so that each player type is able to encounter those that attract them. Also, as Smiderle et al. (2020) observed, gamification affected students in distinct ways based on their personality traits, for example introverted students are more engaged in gamified activities than extroverted ones.

Finally, in addition to the factors mentioned above, a successful gamification design should also consider not only the learning objectives and assessment of each module, but also the social interactions in the classroom (Simoes et al, 2013). Students need to know where they stand in the class and to feel connected and welcomed in order to learn. The gamification design in the classroom must encourage teamwork and collaboration. If it promotes division and rivalry, then it is likely that some students may feel isolated.

Conclusion

More than a century ago, John Dewey in 1917 had said "If we teach today, as we taught yesterday, we rob students of tomorrow". Gamification is here to stay but it's not a panacea for all our educational problems. In fact it is crucial that it transcends beyond "pontification" (points, badges, and leaderboards) to include features like collaboration and quests/missions/modules that can help students learn more effectively. Gamification needs to change, it needs to focus on intrinsic motivation, grow within a structured framework, meet specific learning objectives, and take into consideration

player types, character traits and social interactions. Gamification in education must be properly designed and implemented in order to promote high-quality learning and creativity.

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